The Lab

Global Innovation Lab for Climate Finance

Cloud Forest Blue Energy Mechanism

Instrument Analysis

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The Global Innovation Lab for Climate Finance is a global initiative that supports the identification and piloting of cutting edge climate finance instruments. It aims to drive billions of dollars of private investment into climate change mitigation and adaptation in developing countries.

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Cloud Forest Blue Energy Mechanism

DESCRIPTION —
An innovative “pay-for-success” financing Mechanism in which hydropower operators pay for measurable ecosystem services including reduced sedimentation, increased water flow and water regularity provided by cloud forests.

GOAL —
Commercial replication of the “pay-for-success” financing Mechanism to finance natural infrastructure restoration and conservation in multiple countries.

SECTOR —
Electricity; Land use; Biodiversity Conservation

PRIVATE FINANCE TARGET —
Commercial debt and equity investors

GEOGRAPHY —
Initial target countries: Brazil, Colombia, Costa Rica, Peru
Scale up: Latin America, Africa and Asia

1. CONTEXT

Deforestation and forest degradation[1] threaten food security, clean water and livelihoods of local communities.[2] Deforestation also increases the probability and severity of extreme events such as flooding and landslides (World Bank, 2016). In addition, it is a key driver of climate change: of the 4.7 GT CO_2 emitted by Latin American and Caribbean countries in 2010, about 67% were from land use and loss of forests (WRI, 2017). Maintaining and restoring cloud forests[3] provides socioeconomic benefits to local communities and industries. Despite their importance, 1.1% of cloud forests are lost every year (FAO, 1990): to date about 50% of these forests have been lost in Latin America (Saenz, 2014).

Forests deliver a multitude of clear benefits, but finance for conserving and restoring forests has fallen short of the need. One model with potential to increase investment in forest conservation is “payment for ecosystem services”. In this context, beneficiaries pay for the benefits delivered to them by restoration and conservation actions.

Two key beneficiaries of forests are hydropower plants and those dependent on hydropower for energy. In Latin America, cloud forests generate 50% of the available surface water flowing into reservoirs (Saenz, 2013). Cloud forests increase water inflow and flow regularity to hydropower plants, strengthening the energy security of countries dependent on hydropower energy generation. Cloud forests also help to reduce soil erosion and subsequent sediment inflows into hydropower plant reservoirs. This both helps reduce maintenance costs and contributes to plant sustainability: hydropower is not a renewable resource unless sedimentation is controlled (World Bank, 2016).

CONCEPT

2. INSTRUMENT MECHANICS

The Cloud Forest Blue Energy Mechanism is a new pay-for-success model to restore and conserve degraded cloud forests whilst increasing hydropower profitability

2.1 OVERVIEW AND OBJECTIVES

The Cloud Forest Blue Energy Mechanism (the Mechanism) aims to mobilize domestic commercial finance into cloud forest “natural infrastructure”[4] investments, initially in Latin America.[5] Proposed to the Lab by Conservation International and The Nature Conservancy, the Mechanism targets a reversal in the trend of deforestation and a significant contribution to both climate adaptation and mitigation efforts.

[1] For simplicity, we shall refer to deforestation and forest degradation as ‘deforestation’ throughout

[2] For example, many cities rely on cloud forests for drinking water, such as Tegucigalpa in Honduras and Quito in Ecuador (FAO, 2008)

[3] Cloud forests are defined as forests affected by frequent and/or persistent ground level cloud. They are among the wettest environments on earth and provide watershed services, such as the supply of water in quantity, quality and timing (Saenz, 2012).

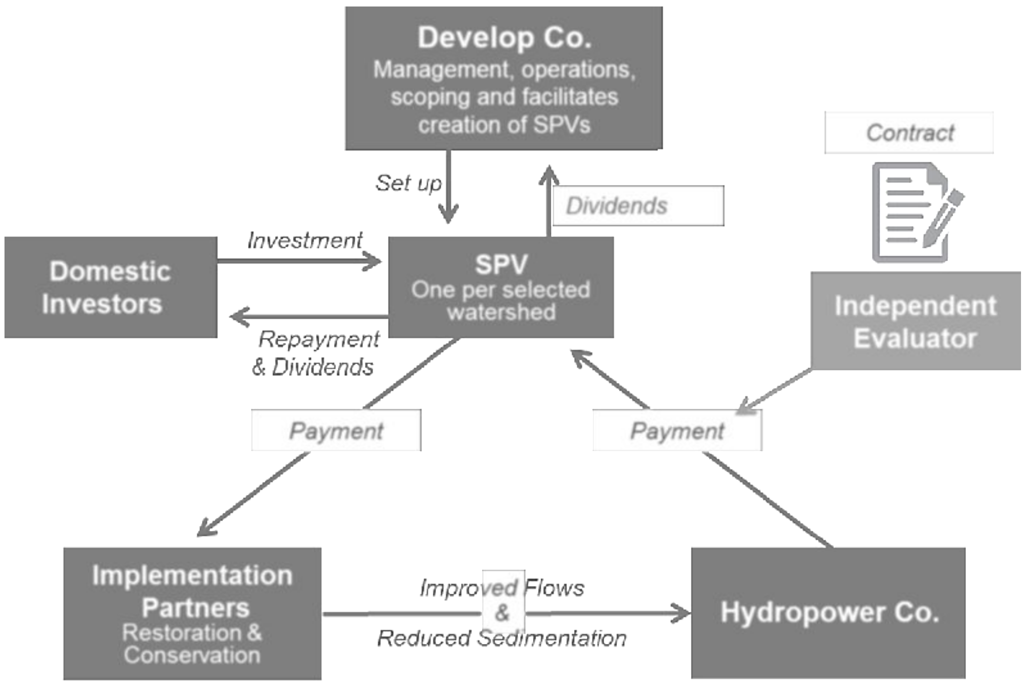
[4] Natural infrastructure refers to the “strategic use of networks of natural lands, working landscapes and other open spaces to conserve ecosystem values and functions and provide associated benefits to human populations” (WRI, 2013)

[5] The CFBEM model could also potentially apply to restoration of other types of forest or agricultural landscapes

The Mechanism is at late conceptual phase. It uses an innovative “pay-for-success” financing technique in which a hydropower plant pays for measurable ecosystem benefits of reduced sedimentation, increased water flow and improved water regulation provided by cloud forests within the plant’s catchment area. The Mechanism monetizes the essential benefits provided by cloud forests – this ensures they are valued and subsequently conserved.

This pay-for-success technique is embedded in a contract that serves the same function as an “offtake contract” in an energy or infrastructure project. This enables each restoration and conservation project to be funded through equity partners using project finance. Figure 1 illustrates the key actors and financial flows at the project level.

Figure 1: Key actors and relationships between them in Cloud Forest Blue Energy Mechanism



An overarching organization (**Develop Co.**) is established to act as a global project development company that scopes potential watersheds, undertakes feasibility studies and serves as a strategic manager for project operations globally. The Develop Co. provides seed funding (sunk costs) for a **Special Purpose Vehicle (SPV).** In addition to feasibility studies and setup, these costs include closing the restoration, conservation and operations, and maintenance contracts with the implementation partners and the “offtake contract” with the hydropower company.

The Special Purpose Vehicle is created for each project and manages operations in the project location[6] (where a cloud forest watershed overlaps with a hydropower catchment area). The Special Purpose Vehicle enables much needed flexibility in organizational structure and delivers transactional benefits expected to outweigh associated transactional costs. It also enables credit analysis to be limited to the project itself, not the parent Develop Co.

Debt and/or equity financing is raised from **Domestic Investors**. The Special Purpose Vehicle in turn organizes stakeholders within the watershed and uses the raised capital to pay the **Implementation Partners** for the initial restoration and ongoing conservation of cloud forests in areas that deliver highest value ecosystem benefits (‘hotspots’) within a plant’s catchment area.

[6] Multiple SPVs could potentially be established within a single country.

Restoration and protection of cloud forest hot spots provide ecosystem services of reduced sedimentation, increased water flow and improved water regulation. These measurable benefits, assessed by an **Independent Evaluator,** trigger payments from the **Hydropower Co** to the Special Purpose Vehicle through performance metrics established in the pay-for-success contract.[7]

Finally, the Special Purpose Vehicle uses revenues to pay back investors and carries residuals to the Develop Co. These funds would then support pipeline development on further watersheds[8].

While the Cloud Forest Blue Energy Mechanism could be applied wherever a cloud forest overlaps with a hydropower plant catchment area, research efforts to date have focused on Latin America, given the region's high dependence on hydropower and old growth forest area. Once proven, both Asia and Africa may also have high potential for Mechanism implementation[9].

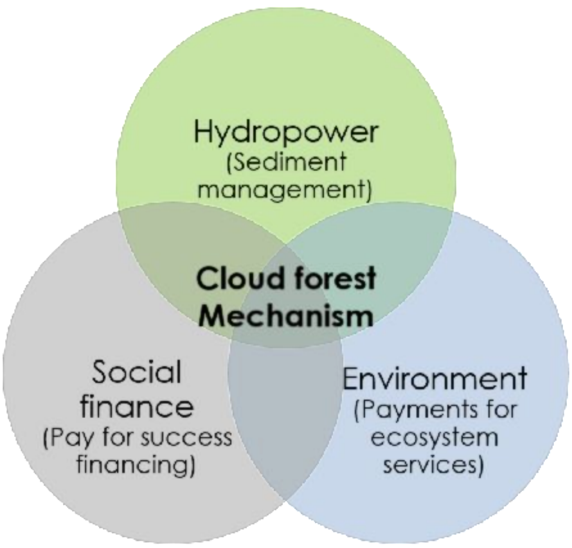
3. INNOVATION

The Cloud Forest Blue Energy Mechanism brings together payment for environmental services with a pay-for-success model to create a cutting-edge impact investment product – the first such Mechanism to target developing countries

3.1 INOVATION AND BARRIERS ADDRESSED

The Cloud Forest Blue Energy Mechanism applies models and practices from three different sectors to deliver multiple benefits.

Figure 2: The Mechanism melds models and practices from the Enviromental, Hydropower and Social Services sectors



The cutting-edge Mechanism brings together payment for ecosystem services models (used in the environmental sector) and pay-for-success financing techniques (used to finance infrastructure and social services provision) to finance and deliver sustainable sediment management – a field of growing importance in the hydropower industry. Figure 2 illustrates how the Mechanism melds these practices.[10]

The Cloud Forest Blue Energy Mechanism would be the first pay-for-success natural infrastructure instrument to be deployed in developing countries.

Pay-for-success structures have demonstrated their potential across a broad range of projects to date, such as in social impact bonds (Social Finance, 2016). The potential of pay-for-success structures is untapped for natural infrastructure and payments for

[7] There will be opportunities to modify instrument design for risk sharing amongst participants, depending on the context (e.g. involving local development banks or large energy companies to offer guarantees).

[8] Further details in Annex H

[9] Africa and Asia are estimated to hold 75% of global cloud forests (UNEP, 2004)

[10] For further detail, see Annex F

ecosystem services. To date, only $25 million of investment has been channeled into pay-for-success finance for natural infrastructure[11] – and all of this in the United States (Goldman Sachs, 2017).

There are only two comparable financial products to the Cloud Forest Blue Energy Mechanism: the (issued) DC Water Environmental Impact Bond and the (proposed) Forest Resilience Bond (Hall et al., 2017)[12]. However, neither of these products target developing countries.

Innovative performance metrics are used to put a value on environmental benefits

The performance metrics used to settle the Mechanism's pay-for-success contract (such as sediment load, suspended solids concentration and water discharge) have not previously been used as the basis for a contractual agreement. Results from the Mechanism will provide much-needed data and drive greater understanding of this field, which can catalyze other innovations and ventures (WRI, 2015)[13].

3.2 BARRIERS AND RISKS ADDRESSED

The Cloud Forest Blue Energy Mechanism provides hydropower plants with the benefits of upstream reforestation activities, at lower risk

The Cloud Forest Blue Energy Mechanism addresses several specific barriers that prevent hydropower plants from engaging in increased forest restoration/conservation.

1. Despite significant evidence of the economic benefits of upstream reforestation, hydropower plants remain skeptical. There is a body of scientific literature to support the benefits of cloud forest reforestation to hydropower plants (Saenz, 2013; Saenz, 2014; WAVES, 2015). In the absence of hard data showing the economic benefits of upstream reforestation, hydropower operators are reluctant to go beyond regulatory compliance[14]. Further, reforestation measures currently implemented by some hydropower plants do not target economic benefits.

- The pay-for-success model transfers 'technology' risk from the hydropower plant to the investor. The hydropower plant is shielded from downside risks and shares upside risk.
- The Mechanism creates data and evidence that can demonstrate the economic benefits of cloud forest reforestation and conservation for hydropower plants.

2. Hydropower plants are not well placed to measure the economic value of ecosystem benefits. Translating ecosystem benefits into a monetary value is complex and requires expertise. Cost-benefit analyses are needed to justify upstream investment in reforestation and conservation.

- Cloud Forest Blue Energy Mechanism uses its expertise in establishing and monitoring required metrics, in collaboration with the hydropower plant, to assess the value of upstream reforestation and conservation. An expert third party subsequently evaluates the ecosystem benefits delivered by reforestation and conservation.

[11] Reforestation for ecosystem services is considered a subset of natural infrastructure

[12] For DC Water's EIB, see US EPA 2017, *DC Water's environmental impact bond: a first of its kind* and Goldman Sachs 2017, *Fact sheet: DC Water environmental impact bond*. Further detail and the implications for the Mechanism are given in Annex B

[13] Please see Annex G for more information on proposed metrics.

[14] This challenge is considerable and widely acknowledged. For example, the World Bank's programme to drive sustainable sediment management practices includes RESCON 2, an educational tool that demonstrates the economic benefit of upstream reforestation (as well as other activities).

3. Hydropower plants' core competences and interests do not include delivery of complex conservation activities. Reforestation and avoided deforestation is more complex than just planting trees: the drivers for deforestation must be addressed, e.g. through introducing sustainable land management practices. A host of different stakeholders, such as smallholders, largeholders, local community groups and business interests, must be coordinated. These activities are outside of most hydropower plants' core business.

- Complex conservation activities are managed by the Cloud Forest Blue Energy Mechanism's conservation experts to ensure effective and efficient implementation.

4. Upstream forest conservation activities require substantial up-front investment. Large-scale reforestation and conservation is needed to deliver benefits. This requires significant up-front capital investment. This is beyond the budget that hydropower plants typically allocate for sedimentation management and activities including reforestation and conservation.

- Upfront costs are covered by third party investors and paid back over time. The Mechanism's structure enables restoration of a greater area of deforested land.

3.3 CHALLENGES TO INSTRUMENT SUCCESS

The key challenges to instrument success are highlighted below:[15]

- **Hydropower operator skepticism may be hard to overcome.** The Mechanism drives behavioral change in hydropower operators – achieving this can be difficult. Some operators do not apply sediment management practices and treat projects as having limited economic lifespans. Those that do may be reluctant to participate in activities where they see limited historical data. Further, participation in the Mechanism will require operators to dedicate some human resources to non-business as usual activities. More conservative operators may be put off by this cost.

- **Robust methodologies must be developed to enable a pay-for-success model.** Techniques for benefit measurement and contractual structures required for the Mechanism's performance-based payments are unproven in this context. Hydropower plants and investors must agree upon contractually enforceable metrics and measurement techniques for performance.

- **Attribution uncertainty impacts on pay-for-success contract negotiation.** Pay-for-success contracts measure benefits relative to a predetermined baseline. Attributing changes in benefits relative to this baseline is challenging and introduces uncertainty ("attribution uncertainty") for operators: there will be some uncertainty regarding how much of the benefits can be attributed to restoration and conservation versus other factors. Aspects such as extraordinary external events, potential changes in operating behavior, lack of data and measurement error create attribution uncertainty.

- **Potential benefits vary greatly from location to location.** Hydropower and forest restoration are incredibly site-specific. The costs and applicability of sedimentation management options vary both from one site to another and as a function of sediment accumulation: in some instances, the value of ecosystem benefits delivered will not outweigh implementation costs (World Bank, 2016). In particular, forest restoration is likely to be most beneficial in smaller catchments (<150km^2) (Annandale, 2011). Mechanism success requires a careful and robust location scoping process.

[15] For a full list of risks to success, see Annex E

PILOT AND BEYOND

4. IMPLEMENTATION PATHWAY

Initial projects will demonstrate commercial viability, incentivizing hydropower operators to implement the instrument

Currently the Cloud Forest Blue Energy Mechanism is in its conceptual pre-development stage. Lab Secretariat analysis shows that research and development, in close collaboration with hydropower plants, is needed to:

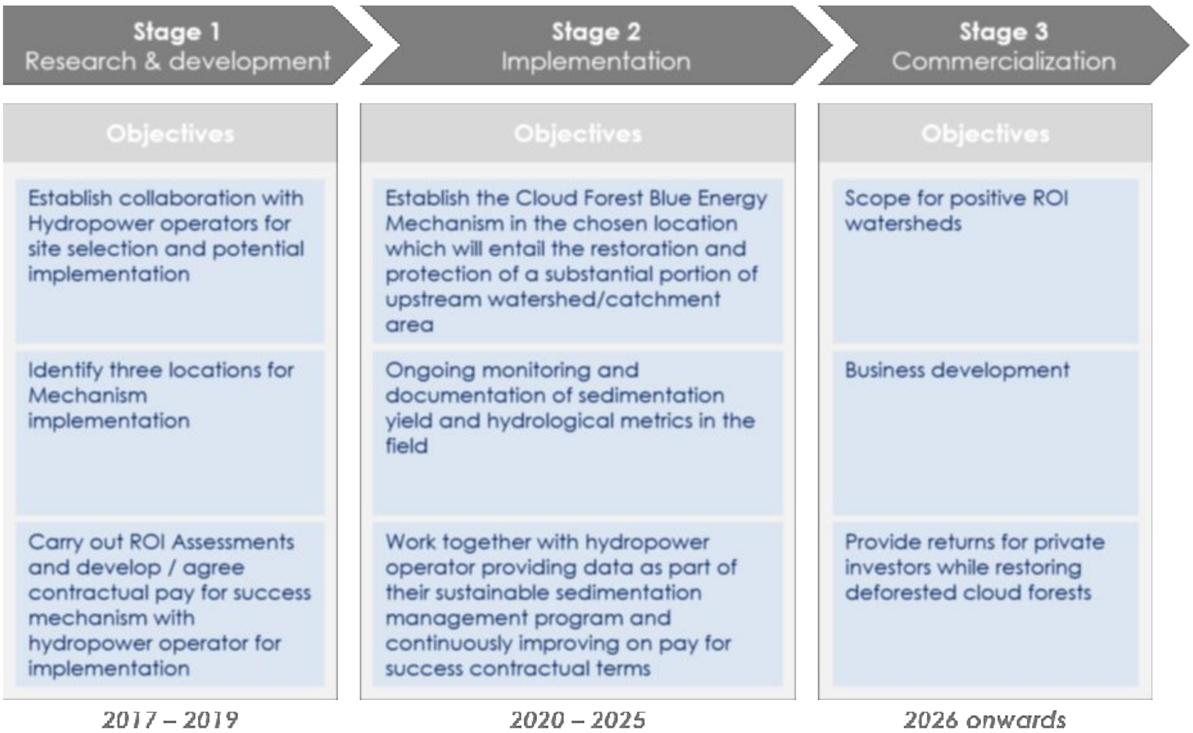
- Gather all relevant catchment area and operational data that enables development of feasibility studies for specific locations
- Develop and refine a pay-for-success contract that benefits all parties involved.

4.1 INITIAL PROJECTS PAVE THE WAY FOR COMMERCIAL ROLLOUT

In the research and development stage (Stage 1), detailed studies (including fieldwork) on the costs and benefits of Mechanism implementation are conducted in collaboration with hydropower plants. A business case for Mechanism implementation in a specific catchment is developed[16]. Data from this exercise form the basis for the development of a win-win pay-for-success contract.

If the business case is positive, the Mechanism is implemented at specific hydropower watersheds in Stage 2. Demonstration of Mechanism viability at Stage 2 delivers proof of concept to enable commercialisation. Successes will encourage other private project developers to replicate the Mechanism as a standalone commercial vehicle. Figure 3 outlines the implementation pathway.

Figure 3: CFBEM implementation pathway



[16] See Annex I for details

4.2 BUDGET FOR IMPLEMENTATION

Stage 1 is financed with grant funding. The outcome of Stage 1 determines the blended market rate and concessional finance that is pursued in Stage 2. If successful, at Stage 3, a given SPV would be able to reach financial close with private domestic finance. Table 1 provides a detailed overview of the required budget for implementation.

Table 1: Budget for implementation & commercialization. See Annex C for assumptions and sources.

Stage	Phase	Timeframe	Budget Estimate $	Comments
STAGE 1				
Research & Development (Three Watersheds)	Phase 1 -Location Selection	Q2 2017-Q4 2017	150,000	Assessment methodology, application of criteria, information sharing agreements with hydropower plants
	Phase 2-Watershed research and metric development for initial site	Q3 2017–Q4 2018	550,000	Activities include: (1) Empirical observation, land cover change analysis and modelling; (2) Hydrological analysis; (3) Empirical analysis of sediment removal costs; (4) Economic valuation; (5) Business case; and (6) Pay-for-success contract development
	Phase 3-Mechanism setup	Q1-Q3 2019	300,000	Agreements, legal, transaction structure
	Stage 1- Subtotal		**1,000,000**	
STAGE 2		from 2020		
Mechanism Implementation (per watershed)	Setup (Site Selection and ROI Scoping)		-	Covered in Stage 1
	Initial revegetation planting costs (Capex)		6,750,000	9,000 ha at $750/ha
	Equipment costs		20,000	Including monitoring equipment
	Upfront forest maintenance cost		270,000	5 years of forest maintenance
	Upfront admin cost		372,000	5 years of admin costs
	Stage 2 - Subtotal		**7,412,000**	
STAGE 3		from 2026		
Commercial deployment (per watershed)	Setup (Site selection and ROI scoping)		50-100K	Range
	Initial revegetation planting costs (Capex)		5-18M	Range (depending upon costs and hectarage)
	Equipment costs		20K-1M	Range
	Upfront forest maintenance cost		0-500K	Range
	Upfront admin cost		0-500K	Range
	Subtotal		**5-20M**	**Estimated ticket size per commercial project**

5. IMPACT

In addition to sequestering 11.4 million tons of CO_2, restoring 27,000 ha of cloud forest and conserving 81,000 ha[17], the instrument aims to reduce communities' exposure to extreme climate events, increase water and energy security, and support local economic activity. While the environmental and social impacts are strong, private returns may be more modest: the Mechanism may require public equity or impact investors at commercialization

5.1 QUANTITATIVE MODELLING

The Lab Secretariat has undertaken illustrative modelling of the Calima Dam in Valle del Cauca, Colombia, which has provided initial data to the proponents[18]. Fundamental assumptions taken for the modelling are:

- Reforestation of 9,000 ha and maintenance of 27,000 ha
- The Special Purpose Vehicle receives two revenue streams from the hydropower plant:
  a) Variable performance based payments for avoided sedimentation costs ($ 382,000 per year, starting year five). Potential revenues from water quantity benefits are not included in this modelling.[19]
  b) Fixed payments for forest maintenance activities ($ 540,000 per year, starting year one). Many hydropower plants already conduct environmental activities. The Mechanism shifts operators' current spend on forest conservation activities towards conservation activities that target a measurable economic benefit to the plant.
- US$ 2.8M fixed amortization loan at 6% and 10-year tenor (secured against fixed payment)

Data constraints necessitated certain assumptions and estimates[20]. In particular, modelled pay-for-success payments consider sedimentation benefits only and do not incorporate water flow or regulation benefits. As such, modelled revenues can be considered conservative.

Table 2: Key financial metrics for Mechanism at Calima dam

Key metrics	Value
NPV[21] ($)	198,786
IRR (%)	6.36%
Payback (years)	12.66
Total project cost ($)	7,766,250
Leverage[22] (%)	36.0%
Cash to investors ($)[23]	5,598,142

A sensitivity analysis identified the impact of changes in the most influential variables. Figure 4 illustrates that project IRR is very sensitive to key variables[21]. **This shows that instrument success will depend on the specific conditions in a catchment: detailed feasibility studies must be conducted for each location to determine instrument viability.**

[17] Figures given are for impact at implementation stage. Assumes sites have similar characteristics to that of the Calima site

[18] In an ideal scenario, a detailed, site-specific financial model would have been constructed. It was not possible to gather all data required for this activity: very few hydropower plants appear to collect data on the costs incurred from sedimentation.

[19] This is due to a lack of quantitative data on the economic value of water benefits.

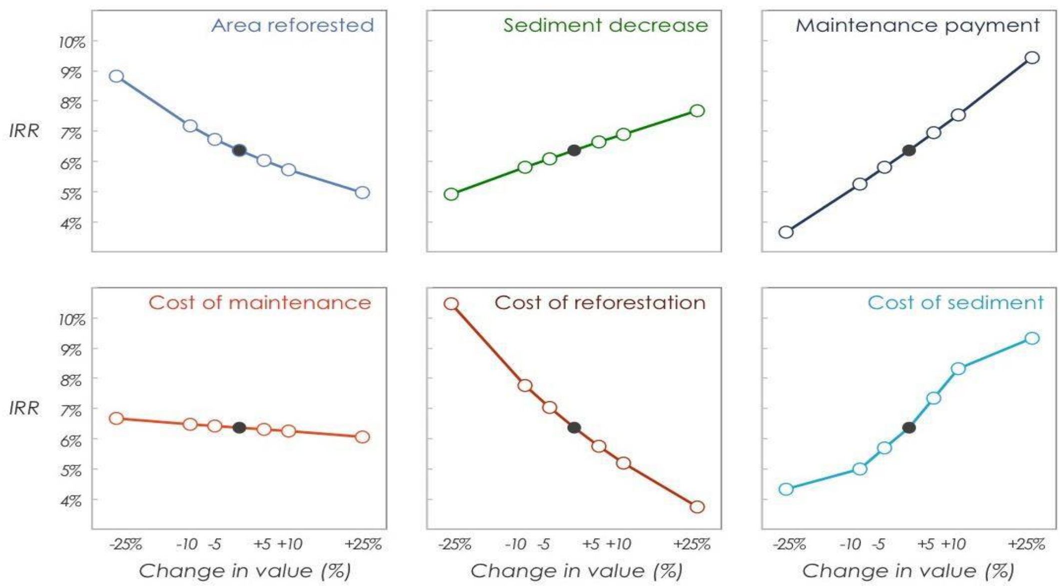
[20] Outlined in Annex C

[21] Annex D gives a more detailed sensitivity analysis

Preliminary insights from sensitivity analysis suggest that the Mechanism:

- **Is likely more viable in smaller catchments** (a view supported by expert opinion)[22];
- **Is economically viable based on the benefits of reduced sedimentation alone** (additional revenue benefits from improved water flows would improve the ROI);
- **Requires a fixed payment (for forest maintenance) in its revenue streams**. This payment can come from the hydropower plant's current environmental budgets and is feasible as the threat of further deforestation is a high risk to operations; and
- **Is unlikely to be feasible where restoration costs are high** and/or where sedimentation costs to the hydropower operations are low.

Figure 4: Sensitivity of IRR to key variables



5.2 IMPACT ON HYDROPOWER PROFITABILITY AND RESILIENCE

Based on this modeling and the literature, we see that, if successful, the Mechanism has the potential to provide the following operational benefits to the Calima hydropower plant:

- A reduction in absolute sediment inflows of 2/3 (Saenz, 2014)
- 9,000ha of cloud forest restored upfront, vs. a maximum business as usual value of 900ha[23]
- Decrease in sediment management costs of up to US$ 764,935/yr[24]
- Significant avoided production losses – initial analysis suggests up to 2 GWh/yr[25]
- Increased sustainability in operations

These results contribute to lower operating costs and more sustainability in hydropower operations. As an illustrative example,

Figure *5* compares the hypothetical behaviour change of hydropower plant operations to a business-as-usual scenario. The Mechanism shifts current spending on environmental activities

[22] A view expressed both in expert interviews and literature (Annandale, Going full circle, 2011)

[23] CPI analysis. Area reforested with CFBEM vs a business as usual area, as implied by HEP annual budgets

[24] CPI analysis. Considers the costs of (i) physical damage to plant; (ii) lost production from plant shutdown; and (iii) cost of sediment excavation. Based on Statkraft research and is not specific to the Calima dam. Annex C has sources & assumptions.

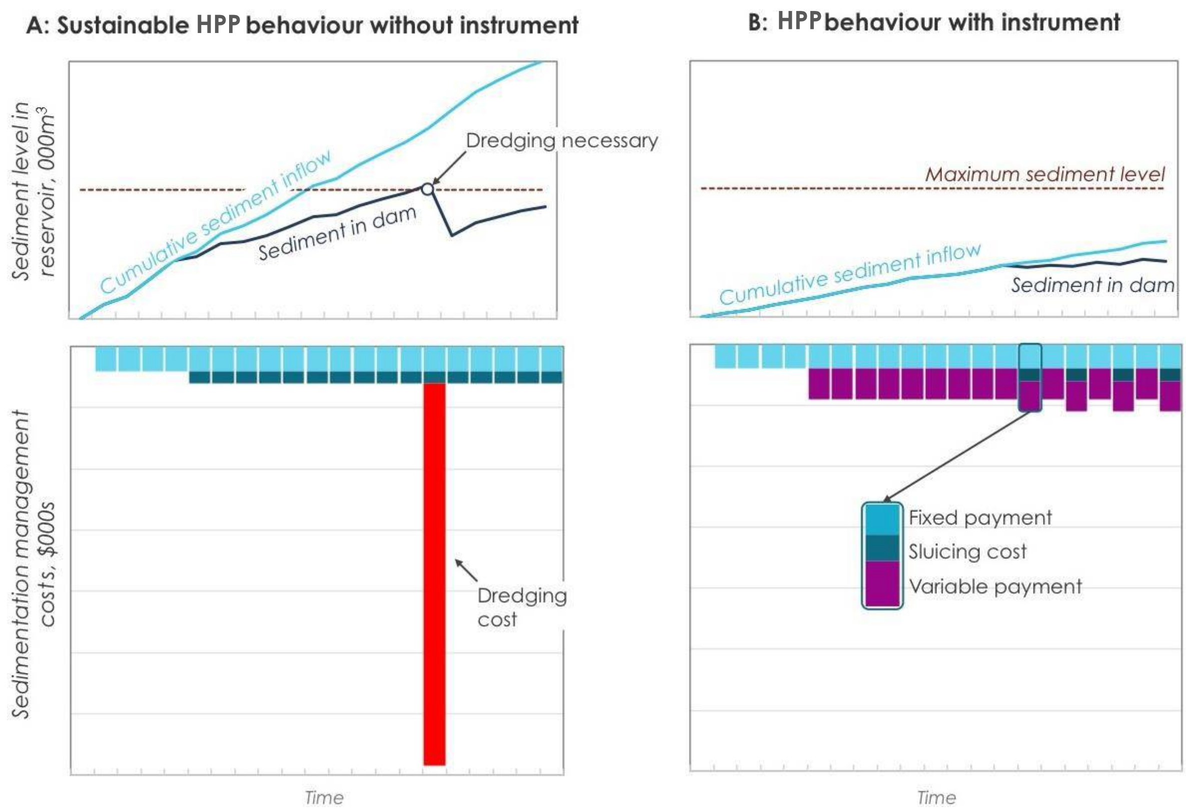
[25] CPI analysis. Based on Statkraft research at the La Confluencia dam in Chile, where we estimate that 1.8% of potential annual power generation is lost annually due to sediment management. Assuming that this is similar at Calima, we arrive at 1.97 GWh of lost annual production.

(Fixed payment) towards activities that target an economic benefit to the plant. The hydropower plant also makes a performance based payment (Variable payment) to the Special Purpose Vehicle for a portion of the measured and verified benefits that conservation and reforestation activities deliver. In particular, sedimentation management and operation costs are lower with the Mechanism than without it because of several specific factors:

- Lower costs from physical damage to turbines
- Avoided production losses during operational downtime for sediment management activities that reduce sediment deposition (e.g. sluicing)
- Reduced costs of removing sediment deposits (e.g. dredging)
- Avoided costs of lost storage capacity.

Critically, net operational costs in hydropower operations with the Mechanism are lower than net costs without the Mechanism – as Figure 5 illustrates.

Figure 5: Hydropower operator behavior without Mechanism (A) compared to behavior with Mechanism (B)



Note that the Mechanism will have a greater impact upon hydropower plant profitability and resilience through the additional ecosystem benefits of increased and more regular water inflows. However, a lack of data prevents a quantitative assessment of this impact at this point.

5.3 ENVIRONMENTAL IMPACT

The Cloud Forest Blue Energy Mechanism will drive substantial climate mitigation benefits through carbon savings from reforestation and avoided deforestation. Implementation at three sites would sequester an estimated 11.4 million tons of CO_2 over 20 years through reforestation of 27,000 hectares of cloud forest and avoided deforestation of a further 54,000 hectares.[26]

The Mechanism also delivers significant climate resilience benefits. The instrument may significantly contribute towards:

- **Reducing the risk of catastrophic landslides or sedimentation events that impact power production, industry, agriculture and/or residents downstream.** These risks are significant: there were 611 fatal landslides in Latin America and the Caribbean between 2004-2013, causing 11,631 fatalities (Sepulveda and Petley, 2015).
- **Improving water security** by providing a more reliable and increased water supply (World Bank, 2016). This combats a global trend of net decrease in water storage due to sedimentation, at further risk from climate change (Annandale, 2013).
- **Increasing energy security** through greater efficiency at up to 30GW of hydropower plants.
- **Reducing flood risk and creating greater ability to attenuate flooding** (World Bank, 2016). Seventy percent of Latin America is vulnerable to flood events (UNEP, Global environment outlook year book 2003, 2003). Recent trends of increased frequency and intensity of flooding are expected to continue with continued climate change (IPPC, 2007);
- **Creating employment and economic opportunity** as well as introducing more sustainable land management practices.
- **Preserving biodiversity and habitats** (CCB, 2011).

5.4 PRIVATE FINANCE MOBILIZATION AND REPLICATION POTENTIAL

The illustrative modeling exercise suggests that the Cloud Forest Blue Energy Mechanism can be viable for private debt investors as loan characteristics match what is available in the market. However, returns on the equity side are on the low side compared with traditional commercial equity investments, especially given perceived risks. It is therefore important to highlight that if results in other catchments are similar to the above model, impact-oriented equity investors would be the most suitable partners[27]. Note that the analysis considers only value from avoided sedimentation costs: there are potentially other revenue streams that the Mechanism can capture (e.g. water quantity benefits discussed above, carbon credit mechanisms, tourism from improved biodiversity, and more).

Assuming pre-development studies show the Mechanism to be successful and that projects have similar characteristics to the Calima catchment, the Mechanism has the potential to mobilize $20 million to $30 million at Implementation stage through investment in conservation at three watersheds up to 2030 – reforesting 27,000 ha and protecting a further 54,000 ha of cloud forest.[28]

By Stage 3 of implementation, the Mechanism could mobilize $12 billion of private capital to 2030 in Latin America, across 60 million ha of cloud forest[29].

[26] CPI calculations, using emissions data from (Song et al., 2015) and (Spracken, 2016)

[27] Figure 10 in Annex H shows the waterfall of payments based on the revenue.

[28] $20 million to $30 million is the range of NPV for future capex and opex spend, to 2030, discounted at 3%

[29] Again, $12 billion is the NPV of future capex and opex spend, to 2030, discounted at 3%

6. KEY TAKEAWAYS

The Mechanism has significant promise and meets the Lab criteria; most importantly, the instrument is innovative and has a high impact potential. Next steps include collaborating with hydropower plants to move towards implementation – steps that would benefit from an endorsement by the Lab.

- **Innovation:** The Cloud Forest Blue Energy Mechanism would be the first environmental pay-for-success instrument in developing countries.
- **Actionability:** Hydropower plant collaboration is key: plants looking to implement sustainable sedimentation management programs should be prioritized. Initial projects are essential to Mechanism rollout: philanthropic or public support is needed here. Data collected in site feasibility studies and limited cost/risk create a strong incentive for plants to collaborate in research and development.
- **Financial sustainability:** The Mechanism is likely to be most commercially viable in small catchments. Feasibility studies are required to evaluate returns at any specific location. Other revenue streams can be pursued to improve returns.
- **Catalytic impact:** Once proven through initial projects, the Mechanism can be replicated across the market, with high impact. While data are limited at present, it seems likely that the Mechanism will be most attractive for impact investors. Research & development and initial projects are needed to move from concept to commercial implementation.

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