Principles for Conservation Agreements in Terrestrial and Marine Settings in Fiji




WCS

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Cover photos: Lill Haugen (top left), Stacy Jupiter (top right) Ruci Lumelume (bottom)

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1. Introduction to Conservation Agreements

Ecosystem services are the diverse benefits people around the world derive from processes and functions of different ecosystems. Ecosystem Services are formally defined as provisioning (e.g., food, drinking water), regulating (e.g., carbon sequestration, oxygen production, coastal protection), supporting (e.g., water filtration, food webs, nutrient cycling), and cultural (e.g., recreational, spiritual) (Table 1) (*Millennium Ecosystem Assessment 2005*).

Theoretically, maintaining ecosystem services, i.e., benefit flows to people coming from healthy ecosystem processes and functions, has positive outcomes for both biodiversity conservation as well as human well-being goals. One way to maintain ecosystem services is through various types of conservation agreements. Conservation agreements are not necessarily built on a payment scheme and may include:

- Concessions
- Easements
- Contracts
- Leases
- Licenses
- Purchase and sale
- Informal (verbal)

However, direct or indirect payments between interested parties, in the way of Payments for Ecosystem Services (PES) are one of many conservation agreement types employed to some success globally in terrestrial and marine settings. The term payments may include none-monetary payments or arrangements between parties. PES schemes are typically defined with the following components (*Wunder 2005*):

- Voluntary transaction;
- Well-defined ecosystem service, form of land use or marine area use likely to secure that service;
- Bought by at least one buyer;
- Sold by at a minimum of one provider; and
- Maintained only if provider continues to supply service (conditionality).

Table 1. Types of coastal ecosystem services (*Millennium Ecosystem Assessment 2005*).

Provisioning Service	• Fisheries • Aquaculture • Fuel wood (mangroves) • Transportation/ports areas
Regulating Services	• Weather regulation • Carbon sequestration • Coastal protection from storm surge • Nutrient regulation • Waste remediation
Supporting Service	• Photosynthesis • Nutrient cycling
Cultural Services	• Tourism • Recreation • Spiritual value • Aesthetic value • Education

1.1 Key Principles and Concepts Underpinning PES

The key premise in the concept of PES is that beneficiaries from ecosystem services benefits would make payments (either voluntary or compulsory) in order to contribute to the sustainable flow of those ecosystem services benefits, by either maintaining or restoring ecosystem functions. The positive impact of this approach is in its potential to change resource user behavior and incentivize attention to restoration and sustainable use, while also offering an alternative, market-based, revenue source in service to conservation, land and marine management, as well as a supplement for community livelihoods. In practice, the focus of PES schemes is on maintaining the flow of a specific benefit: clean water, coastal protection, wildlife habitat, biodiversity, carbon sequestration capacity, etc. (*Forest Trends and The Katoomba Group, 2010).* Critically, a PES scheme would not be viable if the payment was not designed to guarantee the ecosystem benefit would occur.

1.2 Payment Forms

Payment for PES can take a number of different forms, including:

- Direct financial payments, typically compensation for opportunity cost of otherwise developing or using the resource (e.g., profits from fish catch, profits from logging, etc.);
- Financial support for community development and infrastructure, including but not limited to schools, hospitals, roads, equipment that allows more sustainable harvesting practices;

- In-kind payments, including goods, knowledge transfer, capacity-building in exchange for conservation; or
- Rights recognition, including land rights, fishing access rights, and quota allocation.

1.3 PES Scheme Design Process

Experience from many NGOs, private sector entities, government entities, and individuals, converges on several typical steps for the design of a PES scheme (Fig. 1). It is crucial to **match management activities and desired ecosystem services outcomes**.

Step 1: Assessing the prospects

Step 2: Assessing local capacity

Step 3: Agreement Structure

Step 4: PES Agreement Implementation

In coastal and marine settings, there are various ecosystem services with potential to have PES around them. They include: shoreline stabilization, coastal protection, fish nursery habitat protection, coastal carbon storage (mangroves), marine habitat protection, marine species bioprospecting, coastal water quality, etc. (*Forest Trends and The Katoomba Group, 2010*). A PES deal can be done around multiple ecosystem services, thus maximizing income and diffusing risk. Before a deal is reached, buyers will need to know from providers:

i. the quality, current status, and future expectations of the ecosystem service which is the PES focus;
ii. how can knowledge of the state of the ecosystem services be verified;
iii. what practices will enhance and/or maintain the ecosystem service; and
iv. over what time span, and with what supporting information?

1.4 Motivations for PES Buyers

In summary, the buyers can generally fall in six categories, each with distinct sets of motivations as shown in Table 2.

Table 2. Payment for ecosystem services buyers and their motivations.

Buyer	Motivation
Private Company	Regulatory market: • Regulatory compliance (e.g., fisheries quota, water quality, etc.) Voluntary market: • Reduction of operating costs by investing in ES (e.g., beach maintenance, clean water in watershed, etc.) • Risk hedging related to anticipated regulations or ensuring supply of key natural resources • Increasing investor confidence by proactively addressing environmental issues • Enhancing brand (e.g., eco-labeling)
Private intermediary	• Shortening supply chains • Realizing profit • Adding value through service or certification
Government	• Implementing international policy • Adhering to national regulations for environmental protection • Investing in long-term natural capital • Responding to public demand • Recovery after natural disasters • Reducing costs (e.g., green infrastructure vs. grey infrastructure)
Donor Agency	• Meet their environmental and/or development mission • Increase sources of revenue for conservation
NGO	• Meet their environmental and/or development missions • Reducing NGO's environmental footprint
Private Individuals	• Act on their environmental and social concerns • Invest in new business ventures

Just as in any other market setting, the interaction of supply and demand will determine the price, e.g., the balance between what the buyer is willing to pay and what the seller/provider is ready to deliver. To identify buyers, it may be useful to start with recognizing who the largest employers are in a province, country, or region and who relies, and in what ways, from the benefit flows from ecosystem services based on healthy ecosystems.

Providers/sellers need to remember that payments will be contingent on delivery of ecosystem services. The delivery is contingent on a realistic deal, wherein the market price covers the cost of resource management, which will ensure the deal, provides the promised ecosystem services. Clear and measurable indicators of compliance are necessary, as well as an agreement about what happens where there is involuntary non-compliance related to climate change impacts or natural hazards (*Forest Trends and The Katoomba Group, 2010*).

While ecosystem services valuation studies, which focus on the market value of the ecosystem service, are an important and informative tool, these valuations should **not** be interpreted as the actual price for an ecosystem services. Prices on PES may need to also change over time if the opportunity costs vary as well, so that the PES remains greater than the opportunity cost and is thus still a viable deal. Consequently, the contract must include clauses that enable the sellers/providers to re-negotiate terms in case implementation costs rise at a rate that is unexpected.

Sellers/providers must have clarity on who will enforce and implement the PES agreement on the ground; how will monitoring, verification, and evaluation be done and by whom; who will receive and manage the PES revenue. If multiple sellers/providers join forces, these issues need to be clarified before the buyer is approached for negotiations.

1.5 Decision-making Factors

For community-based PES, it will be important to consider the following aspects related to decision-making:

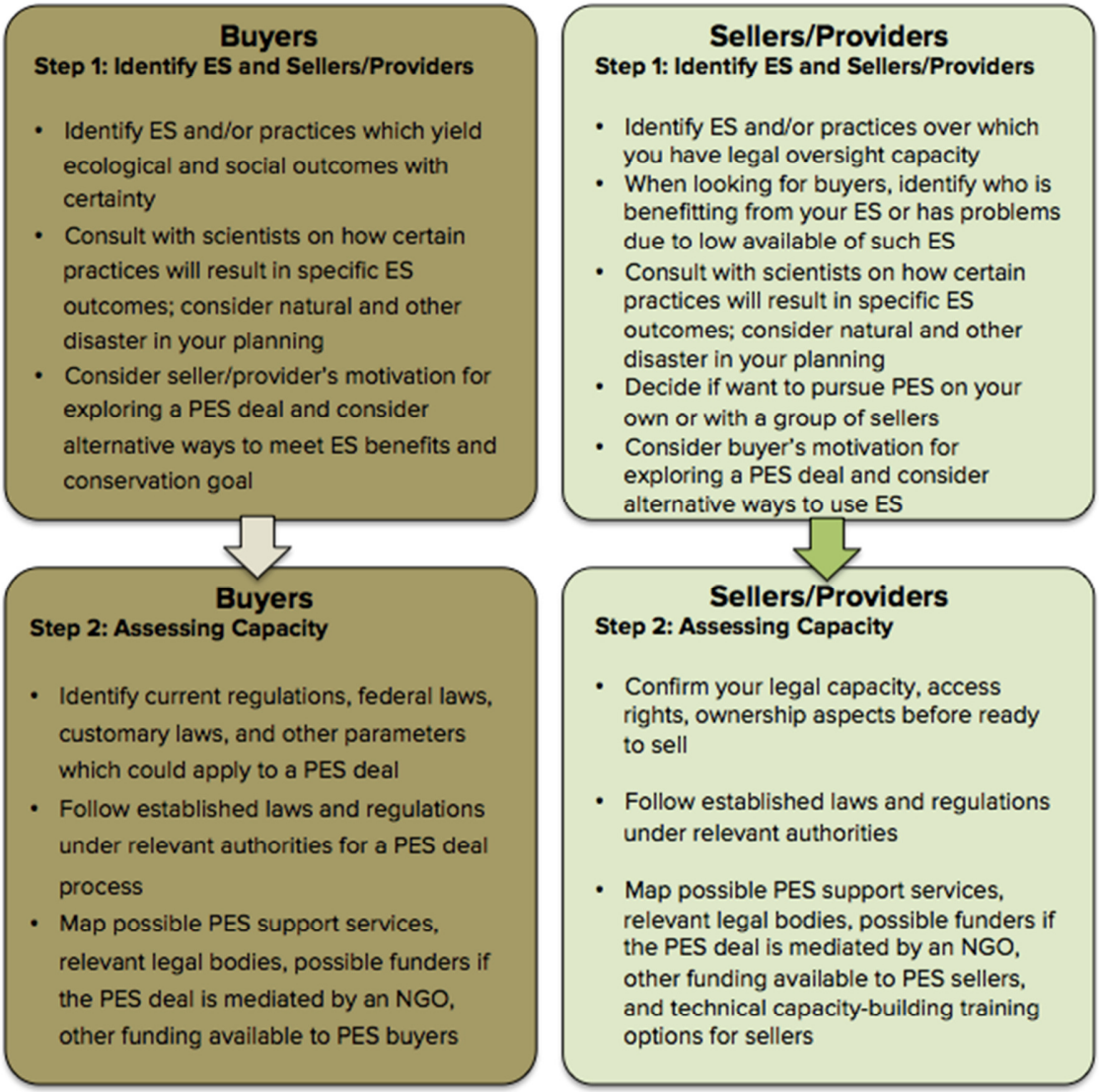
(i) How experienced are local organizations with project management and finance management, and how much technical support to they need to manage the PES system?
(ii) Are there community leaders who have been chosen to represent the community in negotiations with outsiders?

(iii) Is the PES scheme meeting community development and other goals, determined by a diverse representation of the community (including different genders, different income levels, etc.)?

(iv) Are decisions in the community made through a participatory process? Is there adequate community buy-in?

(v) Do local people, and particularly women, consider their voices have been heard and they have participated at different levels of project implementation or decision-making?

(vi) Do the beneficiaries from the payments consider the payments are equitably (fairly) distributed?



The agreement needs to include a business plan and needs to also allow for adaptive management of the agreement terms since the PES will be based on a living ecosystem and on a dynamic society. Risks must be discussed *a priori*, and contingency plans must be developed for cases when providers/sellers cannot meet the agreement terms (*Forest Trends and The Katoomba Group, 2010*). In addition to flexibility and risk being taken into account during the negotiation process, fairness and equity need to be ensured, so that neither sellers/providers, nor buyers, feel exploited.

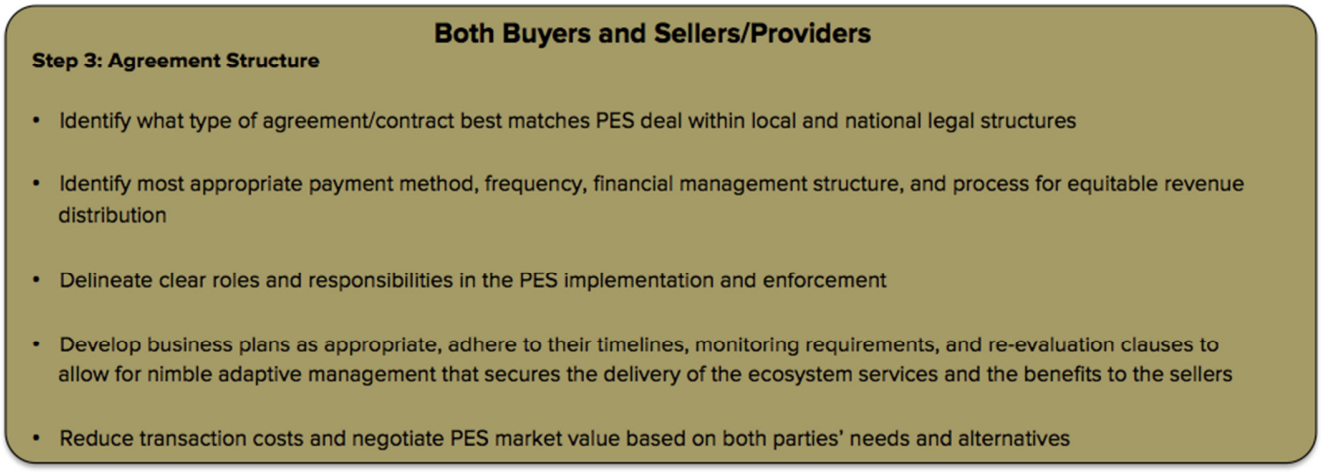
There are several types of agreements, which hold legitimacy for PES and formalize the deal:

- Memoranda of Understanding (MoU), Memoranda of Agreement (MoA);
- Formal written contracts, with legal council; or
- Customary law agreements (written or verbal).

PES agreements need to specify:

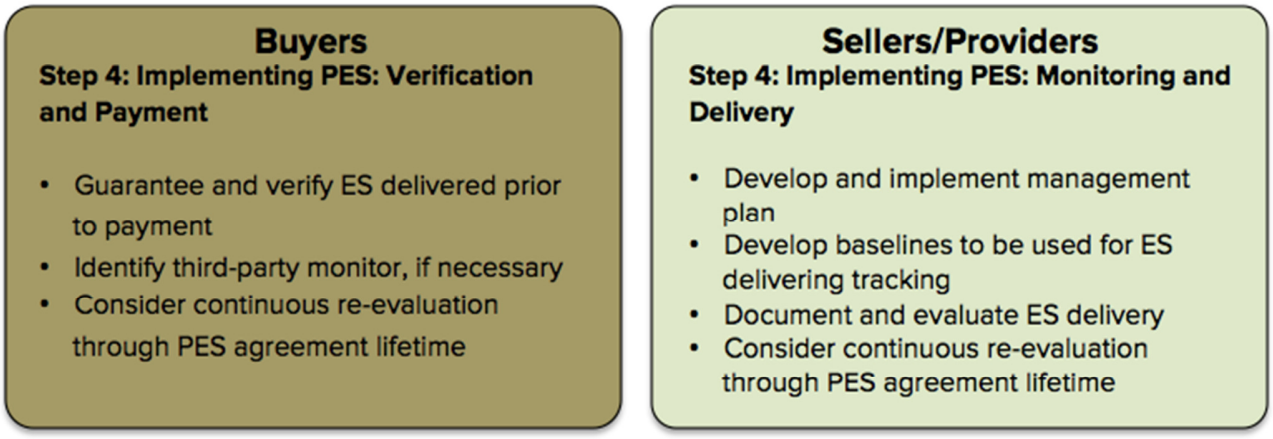
- Roles and responsibilities of sellers/providers, buyers, payment fund managers, etc.;
- Performance indicators upon which payment amounts can fluctuate;
- Fairness and equity indicators;
- Frequency and duration of payments under the PES deal; and
- Contingency scenarios and risk management.

In summary, both buyers and sellers/providers need to consider the following factors when structuring PES agreements (insert below).



Transparency and legitimacy must be ensured at all stages of PES implementation. A monitoring and evaluation (M&E) framework and plan become a critical aspect of PES implementation. Constant re-evaluation and verification is necessary to account for presence/absence of enabling factors for PES deal success.

The responsibilities of buyers and sellers/providers of PES during PES implementation can be summarized as follows (after *Forest Trends and The Katoomba Group, 2010*):



2. Enabling conditions for PES

Many factors for success, or enabling conditions, particularly those involving trust and technical capacity, will be shared between buyers and sellers in a PES. Some of the main factors are summarized here:

(i) Perceived benefit from PES deal

Minimal cost to get involved and/or adequate compensation.

(ii) Functional financial management infrastructure

An entity/committee trained in financial management must have the responsibility to handle the PES fund and disburse funds as per the conservation agreement.

(iii) Effective governance

There must be no doubt who is responsible for which resources or who has which access rights to which areas or land ownership to which areas and which authorities have jurisdiction in different locations. The governance structure must ensure transparency and inclusivity in decision-making; the governance structure must also work with the financial management entity responsible for the fund in

order to coordinate fairness and effectiveness in decision-making and fund disbursement.

(iv) Compliance with resource rules set forth in the PES agreement

The providers must respect the agreement and if they have given up fishing access or land use types in certain areas in order to secure the fund that comes with the PES conservation agreement. The providers must be compliant with the agreement and not be in breach of the agreement accessing certain fishing grounds or practicing land use banned by the agreement. If non-compliance is observed in the area under the PES conservation agreement, that would be a signal to monitor and evaluate the governance structure, who participates in the decision-making, and if the multiple providers/beneficiaries have all agreed how to manage their end of the PES deal, or if cohesion within the providers/beneficiaries group has broken down and the governance has become opaque, wherein some communities feel the need to not comply and in this way, show their disappointment with the authority system in place and the lack of voice they have experienced in decision-making

(v) Clear legal structure

There needs to be a legally legitimate enforceable structure to the PES agreements.

(vi) Performance-based payments

Buyers (or ecosystem services beneficiaries), which can be a complex group of NGOs, land trust boards, private companies benefitting from clear watersheds, and the tourism sector, may require adaptive re-negotiation of the PES agreement based on continuous monitoring of the ecological conditions of the area. In the case of a marine reserve, the reserve should maintain a healthy resilient ecological state, and then payments would continue, but if the ecological state deteriorates, payments will also decline or cease altogether until the sellers/providers can improve ecological condition as best as possible through measures that are in their control ('no-take' compliance). In the case of a PES conservation agreement on land involving the ban of certain land use (e.g., logging or farming) in exchange for payments, if logging is observed on the land, the payments could stop until the local group of PES sellers/providers can eliminate the illegal land use.

(vii) Monitoring and evaluation

Both buyers and sellers/providers are likely to have an intermediary group, which can be a third party that helps both negotiate the PES and to also undertake the M&E of the PES throughout the PES deal lifetime.

3. Monitoring and Evaluation Frameworks for Terrestrial and Marine PES in Fiji

3.1 Terrestrial PES

Terrestrial PES schemes have largely focused around of the promotion of particular land uses: (i) conservation and protection of existing ecosystems; (ii) agriculture providing specific environmental services (e.g., preserving biodiversity or water) and economic returns to farmers; (iii) reforestation for commercial purposes (i.e., timber goal), which is usually linked to carbon sequestration ecosystem services; or rehabilitation of degraded ecosystems for protection (e.g., both for biodiversity and clean water) (*Porras et al. 2011; TEEB 2011*).

To test the effectiveness of the PES beyond the governance and management of the funds, with a stronger focus on the delivery of the ecosystem services, experts recommend that clear biophysical interconnections are identified between land use activities agreed upon within the PES and the resulting changes on watershed, water quality related ecosystem services, and biodiversity (*Landell-Mills and Porras, 2002; Kroeger and Casey 2007*). In M&E of terrestrial PES schemes, land uses and practices (e.g., logging, mining, farming, or lack thereof) often are used as proxies for watershed services with the assumption that banning certain land uses with result in improving watershed services downstream.

However, there are confounding factors, particularly in big watersheds where hydrological conditions may be influenced by processes not associated with land use, and there is typically a strong assumption that maintaining forest cover leads to improved water quality and hydrological function (*Asquith and Wunder 2008*). It is critical for both the ecological and the socioeconomic success of the PES, to gain an understanding of the ecological and physical interconnections in the geographical area of interest that serves as a baseline for M&E of the PES (*Asquith et al. 2008*).

When it comes to payments, in both terrestrial and marine PES examples, the payment level has to consider the opportunity cost for relinquishing the possibility for an alternative use of resources. The payments, if they are made to individuals, should equate to a value between the original resource use value to the provider/seller (e.g., farming, fishing, logging, etc.) and the cost of the land use or marine resource use expected to produce the ecosystem service desired (e.g., biodiversity protection, aesthetical recreational value, carbon sequestration, water availability and water quality); ideally, the payment should meet the opportunity cost of previously intended resource use outside of that specified in the PES agreement (*White and Minang, 2011*). Calculations

of the opportunity cost are often too simplistic, looking at basic cash flows, and thus not accounting for other motivations the providers/ sellers may have and can underestimate the incentives for land managers to participate in a PES and change their behaviour (*Porras et al. 2013*).

It is strongly advisable that the logistics of the M&E framework are discussed during the design of the terrestrial PES. In other words, during the design process, agreement is also reached on how frequently and what biophysical and socioeconomic data will be collected to measure the impact of the PES against its goals. Agreement will also need to be reached on who is doing the monitoring, who will write monitoring reports and who will review them, and who will take adaptive PES management action as a result of the monitoring.

Participatory monitoring, involving the providers as well as multi-stakeholder groups, possibly including the buyers or an intermediary can help keep the providers/sellers service delivery on track. While all monitoring efforts are challenged by attributing changes in water ES and biodiversity to the PES in light of lack of data which may mask local impacts, evidence from Australia, France, and other locations of watershed PES, has shown monitoring outputs with a reference to baseline can be successful (*Porras et al. 2013*).

Broadly speaking, the monitoring indicators have to be designed specifically with the following aspects in mind:

- What are the ecological goals of the PES? Water availability downstream? Water quality? Forest cover? Forest canopy biodiversity?
- What are the socioeconomic goals of the PES? Avert certain destructive land uses in exchange for payments which contribute to local livelihoods?
- What is the local scientific and technical capacity to undertake monitoring activities? More technical monitoring requirements in the M&E framework and plan will require more financial and more human resources which require adequate planning and likely also training.
- Who are the organisations who can commit to being involved in the monitoring?
- How frequently would monitoring be possible?

Below is a preliminary set of general indicators covering governance, financial management, community cohesion, trust, and ecological factors, which could be a starting point for designing a terrestrial PES M&E framework in Fiji. The ecological indicators linked to carbon stock and standing stock biomass are linked to REDD+

indicators and voluntary carbon markets which would be one mechanism for a PES system for forest conservation, in other words, one needs to know how much carbon is stored in a certain area of forest in order to determine if carbon offsets could be paid and to what amount to effectively safeguard the forest.

Indicators related to river water availability and water quality, and generally, hydrological services, stem from many studies focused on how a payment for ecosystem service scheme avoids a certain land use which disturbs the natural connectivity in the watershed or introduces pollutants and sediment. For example, if there has been logging in an area that now has been entered into a PES scheme with local communities, it is advisable to measure sediment loads and pollutants in the waterways downstream and how fast they decrease as a result of no more logging which typically introduces much sediment into watersheds.

Ecological indicators linked to biodiversity are there to track biodiversity protection goals set forth in the PES. The general longevity of the PES is contingent on monitoring trust, community cohesion, and effectively financial management of the PES system; specifically, equity in fund distribution and equity in involvement in decision-making are important factors to monitor. The PES needs to be adaptively managed over time as a result of the monitoring and evaluation results; sometimes, new indicators may become necessary, and the M&E framework is seen as a living document that responds to the PES situation as it evolves.

Metrics	Indicators	Measures of success
COMMUNITY SOCIO-ECONOMIC ASPECTS: Process-oriented metrics		
1. Percent of households familiar with how the rules will change as a result of the establishment of the forest conservation area through a PES	Communication, transparency of process	High %
2. Percent of community supporting the rules changing for the establishment of a PES	Trust in leaders	High %
3. Percent of respondents who feel they can participate in decision-making	Knowledge of human agency	High %
4. Percent of households who were able to identify who initiated the changes and the creation of the forest conservation area or PES	Creators of rules about resource management	High %
5. Percent of households/respondents who get to participate in decision-making about the PES	Participation in decision-making	High %
6. Percent of households/respondents who believe the decisions about the conservation area PES are made fairly	Perceived fairness in decision-making	High %
7. Percent of households who are familiar with where the funds are coming from	Participation and transparency in decision-making	High %
8. Percent respondents who feel they receive fair benefits from the voluntary funds of the PES	Equity of resource management/Social performance	High %
9. Percent of households who feel their community receives fair benefits from the voluntary user fee-based funds of the PES	Equity of resource management/Social performance	High %
10. Percent of households who used the land in the area which is now a conservation area because of the PES	Perception of opportunity cost	Low %
11. Level of consensus among sellers/providers who will participate in the PES deal on the causes for land degradation	Cohesiveness on perceived threat to the environment	High
12. Level of consensus among sellers/providers who will participate in the PES deal on the need for change in land use	Cohesiveness on perceived need to act	High
13. Number of farmers and farmer households affected by the PES	Fisheries dependence	Low %
14. Percent of household income from farming livelihoods	Fisheries dependence	Low %
15. Percent of households perceiving an increase in ecosystem service as a result of the PES (e.g., forest in better condition, less sediment in the watershed)	Local observations of change	High %
16. Percent of households who believe the PES is delivering socioeconomic benefits to them as individual households as well as to the community	Economic benefit	High %
17. Percent of household who believe the PES, in addition to delivering socioeconomic value, is delivering environmental services to individuals and to the community	Environmental benefit	High %

COMMUNITY SOCIO-ECONOMIC ASPECTS: Outcome-oriented metrics		
18. Percent of households satisfied with the health and status of local land resources	Dependence on local seafood for subsistence	High %
19. Percent of farmers/farming households who lost farming income due to the PES	Equity of resource management	Low %
20. Percent estimated loss of income due to foregone farming or additional effort	Equity of resource management	Low %
21. Percent of households who feel it is fair to distribute funds according to those who have farmed (or logged) in closed areas the most (i.e., those who have the highest opportunity cost)	Equity of resource management	High %
22. Percent of households who feel it is fair to distribute funds according to the size of the land ownership parcels where the forest reserve is established	Equity of resource management	High %
23. Percent of households who feel it is fairest to distribute funds according to poverty level	Equity of resource management	Low %
24. Percent of respondents/households who know and respect the spatial boundaries of the forest reserve set up by an PES	Well-defined spatial boundaries	High %
25. Percent of respondents who observed illegal land use (i.e., logging) in the forest reserve established through a PES	Knowledge of rules about resource management	Low %
26. Percent of respondents who support the rules changing and the implementation of the PES	Knowledge of rules about resource management	
27. Percent of respondents who perceive significant positive benefits to themselves from the establishment of the forest reserve through a PES	Positive impact of PES	High %

ECOLOGICAL METRICS		
28. Standing forest stock biomass increasing (track through GIS, mapping growth of forest)	Productivity of the system	Increasing
29. Forest flora and fauna biodiversity surveys	Biodiversity, species richness	Maintained or increasing
30. Carbon stock above and below ground increasing	Carbon sequestration potential	Increasing
31. Sedimentation/erosion: total suspended solids (TSS) load in rivers	Water quality	Decreasing
32. Nutrients and pollutant concentrations in rivers	Water quality	Decreasing

3.2 Marine PES Monitoring and Evaluation Framework Indicators

As with the proposed terrestrial M&E framework indicators, the indicators for a successful marine conservation agreement listed below include both socio-economic aspects of PES impact on people, as well as ecological monitoring to track changes in the natural environment as a result of the PES. Because conservation agreements focus on providing incentives for changing human behavior around certain natural resource uses, it is advisable to monitor the level of trust between parties to the agreement, the level of involvement in decision-making, and the perceived fairness of the arrangement, and how people's perceptions change over time about the terms of the conservation agreement.

Therefore, in both the terrestrial and marine M&E framework indicators, questions on trust, decision-making, and equity are included based on the premise that if trust diminishes, and there is a perception of unfairness and lack of active role in decision-making for individuals among the parties to the agreement, then the sustainability of the conservation agreement is in jeopardy and issues would need to be addressed through consultation and adjustments to the agreement structure.

Metrics	Indicators	Measures of success
COMMUNITY SOCIO-ECONOMIC ASPECTS: Process-oriented metrics		
1. Percent of households familiar with how the rules will change as a result of the establishment of the marine reserve through a MCA	Communication, transparency of process	High %
2. Percent of community supporting the rules being changed to establish the marine reserve	Trust in leaders	High %
3. Percent of respondents who feel they can participate in decision-making	Knowledge of human agency	High %
4. Percent of households who were able to identify who initiated the changes and the creation of the marine reserve or MCA	Creators of rules about resource management	High %
5. Percent of households/respondents who get to participate in decision-making about the MCA	Participation in decision-making	High %
6. Percent of households/respondents who believe the decisions about the MCA are made fairly	Perceived fairness in decision-making	High %
7. Percent of households who are familiar with where the funds are coming from	Participation and transparency in decision-making	High %
8. Percent respondents who feel they receive fair benefits from the voluntary user fee-based funds of the MCA	Equity of resource management/social performance	High %
9. Percent of households who feel their community receives fair benefits from the voluntary user fee-based funds of the MCA	Equity of resource management/social performance	High %
10. Percent of households who used to fish in the area which is now a marine reserve	Perception of opportunity cost	Low %
11. Number of fishers and fishing households affected by the MCA	Fisheries dependence	Low %
12. Percent of household income from fisheries livelihoods	Fisheries dependence	Low %
13. Percent of households who eat seafood frequently	Dependence on local fishing grounds for food security	Low %
14. Percent of households who perceive there is higher fish biomass as a result of the MCA	Local observation of benefit	High %

COMMUNITY SOCIO-ECONOMIC ASPECTS: Outcome-oriented metrics		
15. Percent of households satisfied with the health and status of local marine resources	Dependence on local seafood for subsistence	High %
16. Percent of fishers/fishing households who lost fisheries income due to the MCA	Equity of resource management	Low %
17. Percent estimated loss of income due to foregone catches or additional effort	Equity of resource management	Low %
18. Percent of households who feel it is fair to distribute funds according to those who used to fish in the area covered by the marine reserve the most	Equity of resource management	High %
19. Percent of households who feel it is fair to distribute funds according to level of customary rights in the place where the marine reserve is established	Equity of resource management	High %
20. Percent of households who feel it is fairest to distribute funds according to poverty level	Equity of resource management	Low %
21. % of respondents/households who know and respect the spatial boundaries of the marine reserve set up by the MCA	Well-defined spatial boundaries	High %
22. Percent of respondents who observed poaching/illegal fishing in the marine reserve (established through an MCA)	Knowledge of rules about resource management	Low %
23. Percent of respondents who support the rules changing as a result of the implementation of the MCA	Knowledge of rules about resource management	
24. Percent of respondents who perceive significant positive benefits to themselves from the MCA	Positive impact of MCA	High %

TOURISM OPERATOR PERCEPTIONS: Process-oriented metrics		
25. Percent dive operators who have >50% of their dive operations in the area of interest for a MCA reserve	Commitment and vested interest of stakeholder	High %
26. Percent of dive operators who trust and agree with the decisions made by the governing entities of the *qoliqoli* and *tabu* areas	Trust in leaders	High %
27. Percent of dive operators who believe a Resource Management Committee is adequately managing or would adequately manage a dive fund generated by voluntary contributions	Technical capacity in financial management	High %
28. Percent dive operators who support the changing of the fishing pressure rules with the establishment of the no-take reserve	Trust	High %
29. Percent of dive operators who participate in the decision-making of setting up the management rules for the MCA (including boundaries, voluntary contributions, etc.)	Equity in decision-making	High %
30. Percent of dive operators who believe decision-making on the marine reserve (even if they do not participate) is adequate	Trust	High %
31. Percent of dive operators who perceive they have a responsibility to play role in enforcing the rules of the marine reserve	Enforcement capacity	High %
32. Percent of dive operators who believe the local authorities have to use their authority to discourage poaching/illegal fishing	Non-compliance	High %
33. Percent of dive operators who believe the governance and management of the agreement with communities can be improved	Governance and collective decision-making	Low %
34. Percent of dive operators who see a risk to their operations because of the MCA	Business Risk	Low %
35. Percent of dive operators who see a risk to the ecosystems they access because of the MCA		

TOURISM OPERATOR PERCEPTIONS: Outcome-oriented metrics		
36. Percent of dive operators who have noticed improvements in the coral reef habitats and fish biomass in the marine reserve since its establishments	Perceived ecological benefit	High %
37. Percent of dive operators perceiving benefits to their operations from the MCA?	Perceived individual economic benefit	High %
38. Percent of dive operators who perceive all dive operators collectively have benefitted from the MCA	Equity	High %
39. Percent of dive operators who expect a positive impact of the MCA on the people of the district	Benefit sharing	High %
40. Percent of dive operators who have observed increased tourism visitation to the marine reserve after creation of the reserve	Perceived individual economic benefit	High %
41. Percent of dive operators who have observed poaching/illegal fishing in the no-take reserve	Non-compliance	Low %
42. Percent of respondents who do not believe the ecological and socioeconomic benefits could have been achieved without this MCA agreement	MCA additionality	High %

ECOLOGICAL METRICS		
43. Reef Fish Biomass (kg/hectare) in the reserve	Productivity of the system	High kg/ha
44. Reef Fish Biomass (kg/hectare) outside of the reserve ('spillover')	Productivity of the system	High kg/ha
45. Percent hard coral cover in the marine reserve	Biodiversity protection and resilience	High %
46. Coral genera richness in the marine reserve	Essential Habitat	High
47. Reef fish species richness inside the marine reserve	Biodiversity protection and resilience	High levels of species richness
48. Reef fish species richness outside the marine reserve ('spillover')	Biodiversity protection and resilience	High levels of species richness
49. Structural complexity inside the marine reserve	Habitat complexity	Highly complex
50. Density of invertebrates (abundance/m^2) inside the marine reserve	Density of targeted invertebrates	High abundance/m^2

ECONOMIC METRICS (including MCA Transaction Costs)		
51. Money and time spent by MCA parties and other supporting stakeholders (e.g. supporting NGO, government) to **design** the MCA (e.g. meetings, feasibility study)?	Design costs	Cost-benefit ratio <=1
52. Money spent by MCA parties and other supporting stakeholders (e.g. supporting NGO, government) to **establish** the MCA (e.g. meetings, bank account & initial investment, official launching)?	Establishment costs + potential investment costs	
53. Money spent by MCA parties and other supporting stakeholders (e.g. supporting NGO, government to **operate** the MCA (e.g. time spent by the board, control & enforcement, M&E)?	Operating costs	
54. Money spent by all partners to make any change to the MCA (e.g. new feasibility, surveys, meetings)?	Adapting management costs	
55. Money from the voluntary payments, and the proportion of payments used to cover operating costs.	Benefits from the MCA	

4. Natural Disasters Risk

The devastation from Category 5 Tropical Cyclone Winston on 20 February, 2016 has caused unprecedented damage across Fiji, killing 44 people, destroying thousands of homes across the islands, and damaging much needed staple food crops (Government of Fiji 2016). The recovery effort will possibly take years. Social, economic, and financial resilience in in island nations is closely tied to resilience of ecosystems, as often people's livelihoods have been closely tied to natural resources.

The same ecosystem functions, in terrestrial, coastal and marine environments that produce ecosystem goods and services which form the basis of many island communities' sources of food and livelihoods, are the same ecosystem functions that need protection to help reduce social-ecological vulnerability to natural disasters and maximize potential for recovery after disturbance (i.e., resilience). While PES are not typically designed to reduce poverty or provide financing after a natural disaster, PES schemes can result in both financial and ecological stability, thus reducing disaster risk and reducing the magnitude of the disturbance from a natural disaster. In this way, payments can be structured, prior to natural disasters, to secure ecological infrastructure (also called natural capital) and provide ecosystem-based disaster risk reduction. During the process of negotiating a PES deal, natural disasters should be considered in two ways:

A. How could a natural disaster affect the effectiveness of the PES and detract from ecosystem services delivery?
B. How could an effective PES also deliver reduced natural disaster risk through securing certain ecosystem services?

With respect to climate change and rising sea levels, an obvious PES scheme in low-lying island areas, suitable for mangrove habitat, is to make payments, possibly through a carbon offset mechanism, for mangrove reforestation. Coastal protection ecosystem services from the mangroves represent valuable ecosystem services in this case.

In the case for supporting healthy ecosystems for their capacity to provide food and income in times of crisis after natural disasters strike, a PES deal involving local marine reserves sponsored through tourism revenue, such as the Namena Marine Reserve example, can result in both income and food security benefits to communities, if the natural disaster does not significantly affect the marine environment. If and when tourist visitations return to normal trends, in the months after Cyclone Winston, and if dive operators maintain their operations within marine reserve under specific PES

agreements, such as the one in Namena Marine Reserve, the communities which were the providers/sellers of the ecosystem services, in this case, would continue to receive much needed income at a time for disaster recovery.

Furthermore, if the Namena Marine Reserve has been continuously delivering ecosystem services in the form of healthy reefs, with presumably significant fish biomass and biodiversity, a 'spillover' effect is anticipated beyond the reserve. Similarly to dividends from a long-term significant investment, the 'spillover' fishing dividends for communities associated with the Namena Reserve may contribute to their local food security during recovery from Cyclone Winston.

5. Conclusion

The success of marine or terrestrial conservation agreements, whether they involve payments or not, depends on how carefully the agreement is crafted to take into account the ecological, socioeconomic, cultural, and political factors that may affect the outcomes. The thought and effort invested during the design stage of the conservation agreement, the involvement of all stakeholders, and pre-emptive listing and addressing as many foreseeable pitfalls, are all valuable efforts in the beginning that will secure a better, more stable and long-lasting agreement. The agreement then easily translates into a Monitoring and Evaluation Framework which will include the ways the parties to the agreement, or a third party, will track if the actions of the parties according to the agreement are resulting in the desired outcomes.

Monitoring will require financial and human resources once the agreement is established, but it is highly worthwhile, because monitoring and evaluation can hold the relevant parties accountable towards best outcomes. Monitoring and evaluation also provide a rigorous test for how well and efficient solutions are on the ground and leads to adaptive management. This is important for responding to unforeseen but needed course corrections to secure conservation and human well-being goals.

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