

Co-investment paradigms as alternatives to payments for tree-based ecosystem services in Africa

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Multiple paradigms have emerged within the broad payments for ecosystem services (ES) domain for internalizing externalities of local land-use change decisions. These range from reward of ready-made ES delivery (commoditised) to reward of processes of ES generation (co-investment). Evidence from tree-based projects in Africa suggests that currently, only carbon sequestration and emission reduction are 'commoditised', however in an artificial way where payments are not matched to ES delivery, but adjusted or supplemented with co-benefits. Co-investment in stewardship alongside rights is more widespread and versatile for a variety of ES. Efficiency concerns of co-investment schemes can be addressed when commoditised ES or profitable enterprises with positive ES externalities evolve from these.

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Introduction

Payment for Environmental Services (PES) is a conditional instrument where environmental stewards are given incentives to maintain or improve the flow of environmental services (ES) by those that benefit from these flows. For tree-based systems, various PES approaches with different levels of conditionality [1*,2**] are used. A synthesis of PES lessons in Asia categorised PES into three paradigms: 'Commoditisation' of Environmental Services, 'Compensation' for Opportunities Skipped and 'Co-investment' in

Stewardship' [3]. 'Commoditisation' entails recurrent payments for actual delivery of a specified ES conforming to market-based mechanisms. A subcategory establishes a direct link between environmental service performance and existing commodity markets, generally through a process of eco-certification [2**]. 'Compensation' entails payment for acceptance of restrictions or achievement of a condition or proxy to specified environmental outcomes. 'Co-investment' entails conditional rewards that are not market-driven, involving flexible contracts entrusting resource management and monitoring with local communities, with broad performance sanctions. Co-investment rewards are based on either proxies trusted to deliver a specific ES, a set of best-bet practices trusted to deliver an unspecified set of ES, or permits for actions trusted to generate positive ES externalities. In these projects, mostly financed from public or donor sources [4–6] due to lack of ES demand, emphasis is not placed on measuring outcomes, but rather, on motivating actions or 'good land use practices' for ecosystem health as a public good (Table 1).

In Africa, many tree-based PES projects fall within the 'softer' PES paradigm with characteristics of 'co-investment' and without explicit frameworks for monitoring and evaluating environmental service outcomes. It has been argued that this tends to be less efficient and not much different from past Integrated Conservation and Development Projects (ICDP) [7]. This desk review examined the 'state-of-the-art' in fifty tree-based PES projects in Africa from inventories and other publications (comprising 27 carbon sequestration and emission reduction, 17 biodiversity conservation, 2 watershed function and 4 bundled ES) to recommend design of efficient and fair PES in the African context (summarised in Figure 1 and Annex 1). We examine how variations in conditionality with land owners affect fairness and efficiency in delivering ES outcomes. Levels of conditionality with land owners were not always clear-cut, but guided by criteria presented in Table 1, projects could be generalized into the following categories: 30% 'commoditisation', 12% 'compensation' and 58% 'co-investment' (Table 2).

How realistic is commoditisation in tree-based projects?

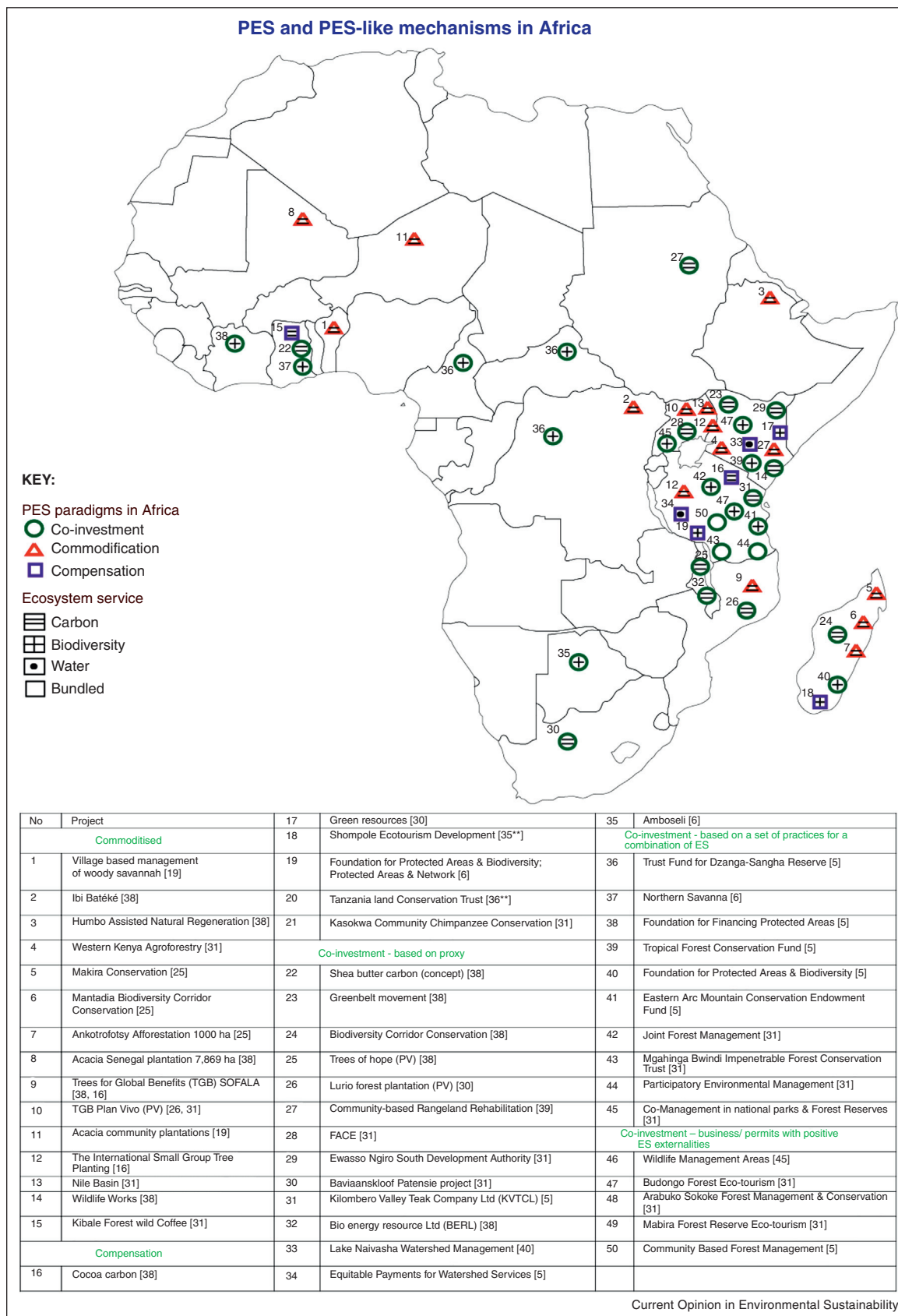
Tree-based projects generate multiple ES values [8] but so far demand that fits the commoditisation model exists for only carbon sequestration or emission reduction services, where projects are assessed per unit carbon, proven through third-party verification and certification.

Table 1

Categorisation [2^{**},3] of tree-based PES projects in Africa





Reward mechanism	Sub-category	Performance indicator	Preconditions	Type of reward	Principle for establishing reward	Examples of source of reward	Strictness of conditionality
Commoditisation	Commoditisation of environmental services (ES) as such	Delivery of specified ES above agreed baseline level	Clarity of property rights on land, trees and ES; compliance with legal requirements for ES generation	Cash or in-kind rewards to individuals or groups. Sometimes with co-benefits	Willingness of buyers to pay for ES additional to a baseline status	Global regulated or voluntary carbon markets	Payment proportional to quantity of specified, verified and certified ES additional to a baseline.
	Environmental service branding of established commodities	Audited compliance with certification standards, with clarified force major clauses	Existing commodity markets with interest in ES enhancement	Maintenance of market share (traded volumes) and/or price	Willingness of consumers to pay premium price for quality of production process rather than the product as such	Eco-certified coffee, cacao or tea; Forest Stewardship Council certification of timber	Certification standards and auditing practice are under public scrutiny
Compensation		Adherence to restrictions or proxies for generation of specified ES beyond legal requirements	Legality of ES reducing practices that are foregone and now compensated	Cash or in-kind rewards to individuals or groups. Sometimes with revenue or benefit sharing	Willingness of sellers to accept compensation for opportunity costs for maintaining or enhancing existing baseline ES status	International conservation organisations, wildlife tourism or niche market commodity consumers	Payment proportional to opportunity cost of land and/or of adherence to specified restrictions or conservation actions.
Co-investment	Payment for effort proven or trusted to generate specified ES	Proof of actions known for generation of specified ES	Mechanisms can include creation of preconditions for other reward mechanisms	In-kind to groups. Inputs, for example, seedlings, labour. Sometimes with capacity building and advisory support	Mutual sharing of roles to achieve livelihood and ES outcomes. Ownership of ES sometimes distinct from ownership of livelihoods.	Conservation organisations, conservation funds, carbon brokers	Payment proportional to effort (e.g. number of trees planted) for achieving ES outcome
	Incentive for a set of efforts for ecosystem management without specifying ES	Achievement of mutually negotiated actions for maintaining or enhancing existing/ base line condition of an ecosystem		In-kind: access to or (co-) ownership of resources or support of conservation friendly enterprise, for example, bee keeping. Benefit sharing	Precautionary investment in management plans for meaningful participation of local stakeholders as insurance banking for ES without market demand.	International conservation organisations; Conservation funds; national governments	Negotiated rewards provided fully and good relations maintained, with continuous negotiation and encouragement of good performance. Rewards can be completely withdrawn but this is rare.
	Incentives for private businesses that generate positive ES externalities	Maintaining or enhancing baseline condition of ecosystem		License permits, rights or (co) ownership of resource to businesses or community organisations.	Willingness of buyers to pay for high value commodities or services that may maintain or enhance unspecified ES(s).	National governments	Permits upheld provided there are no negative environmental impacts

Figure 1



Commodification, compensation and co-investment rewards for tree-based ecosystem services for selected projects in Africa.

Table 2**Reward mechanisms for tree-based PES projects in Africa**

Reward mechanism	Number of projects	Ecosystem services
Commoditised	15	
Compensation	6	
Co-investment	29	
Total	50	

■ Carbon, ■ Biodiversity, ■ Water, ■ General.

Commoditisation is not applied in any of the current payments for watershed services [9] or biodiversity schemes in Africa. Of the 14 commoditised projects, 11 involved transactions between small-scale farmers or national governments mostly financed by the World Bank Bio-carbon fund and multi-national entities. In general, ES sellers had limited expertise and capacity to cover upfront costs of such projects, and therefore received just a fraction of the carbon proceeds. For example, the portion of carbon proceeds land owners received was 10% under Green Resources in Tanzania [10] and \$4/t for carbon prices ranging between US\$6 and US\$20/t under Ecotrust in Uganda [11]. They sometimes regarded such projects with suspicion [12]. Nonetheless, it was carbon payments that made projects viable in the first place, providing non-carbon payments that motivated farmers to participate. Regular guaranteed payments enabled farmers to access health, school and financial services for example, in Ecotrust [13].

Projects were established on large government (or aggregated smallholder) properties resulting in large volumes of credits and low per ton costs of transaction and implementation. This tended to exclude the poor or those without land titles [13,14,15^{••}], except for some pro-poor projects such as TGB and TIST [16]. Aggregated smallholdings were less competitive [17], and the preference for large government land areas resulted in projects with multiple (e.g. [18–20]) or communal land tenure (e.g. Nile Basin and Humbo Projects [21[•]]), where establishment of ownership of carbon rights became problematic.

This review could not establish the opportunity costs resulting from restriction in flexibility ES providers could exercise in alternating landuses under these projects, which were designed to span 20 years to 100 years. In theory payments should be elastic based on global carbon prices, but they were mostly fixed (e.g. [19]), based on

opportunity cost estimations or the price of carbon at the time of agreement [11]. Fixed carbon prices are easier to manage [22] and may buffer farmers against extreme price reductions, but may also unfairly cap their potential profits in case of price surges. There was also likelihood that recurrent project costs would increase over time [23,24]. Payment was often low, thus project proponents packaged it in various ways to create incentive. For example, it was aggregated over a shortened period (e.g. ECOTRUST made 30 year payments within the first 10 years [13]), made as a lump sum for a development program (e.g. Ankotrofotsy [25]), purposely coincided with times of need such as beginning of school [11], offered as credit guarantee for loans [13], or supplemented with co-benefits [11]. This artificial commoditisation has long-term implications on compliance [26[•]], as was observed in a carbon-contract project in Malawi [27[•]].

The potential for commodity-based compensation through price premiums could not be established in this review, but the single example of Kibale coffee showed that branding for such niche markets could be challenging [28].

Is compensation of proxies more appropriate for tree-based systems?

Most ‘compensation’ schemes involved governments or community groups with formal land tenure [29[•]], setting aside land for biodiversity services for long periods, with restrictions on grazing, agriculture and use of fire. The ‘buyers’ then translated the restrictions into ES outcomes that they sold. Green Resources [30] for example paid a 99 year land lease to the Tanzania government for tree plantations, then developed and sold carbon credits [31]. Similarly, in the Tanzania Land Conservation Trust (TLCT) project, land was leased for 99 years and communities were compensated for restrictions in favour of wildlife conservation as tourism business was developed.

Opportunity-cost based ‘compensation’ schemes aiming to avoid worsening the prevailing status of landowners, have gained from research on reverse auction [27[•],29[•]] and conjoint analysis for designing contracts and estimating opportunity cost. In many on-going schemes though, ‘compensation’ was often low, based on the minimum level from sellers’ willingness to accept (WTA) payments [32]. It was even lower for poorer land owners in remote locations with low market exposure [33,34]. Where institutions restricted resource ownership and rendered many actions ‘illegal’ and ineligible for compensation (e.g. Shompole project [35^{••}] and TLCT project [36^{••}]), the WTA was artificial and costs from landuse restrictions, displacement of livelihoods [34], increased wildlife numbers and tourist traffic [35^{••},36^{••}] were not really ‘compensated’. In some instances (e.g. Shompole and TLCT), commitments of compensation were not fully honoured by the companies that had the concessions. Therefore, compensation was rarely achieved and with the tendency to capture rent by

proponents or buyers, it is debatable whether this model is fairer than the 'commoditisation' model.

Is co-investment better than payment?

Co-investment projects were the most widespread, often having evolved from government supported participatory forest management. Land ownership was not always a pre-requisite for participation in co-investment projects. Most projects provided an easement in community access to forest resources on public or government controlled land (e.g. Joint forest management and eco-tourism projects in Uganda and Tanzania). Many of the project designs provided for inclusion of smallholder farmers and women, for example, Greenbelt [37], Trees of Hope [38], community based rangeland management in Bara [39] and use of payment vouchers by EPWS [40]. However, some co-investment projects working directly with government tended to exclude local people (e.g. FACE Foundation [31]) or made no provisions for their involvement (e.g. Kilombero [41]). The buyer-seller subdivision was sometimes indistinct as agreements were based on co-valuation of agreed interventions and sharing of roles [42,20]. Nevertheless, power dichotomies existed as in other PES paradigms [43,44].

Incentives were conditional to satisfaction of performance indicators of effort, which were assessed over large time intervals (sometimes 5 years). Performance was judged subjectively using a binary scale as either 'good' or 'poor' (e.g. Equitable Payments for Watershed Services — EPWS — projects in Tanzania and Kenya). Sanctions to withdraw or sustain incentives were sometimes negotiable. Delivery of ES was not made explicit, which avoided overdue focus on a single ES, but also obscured project effectiveness. In EPWS projects, payment was made for proxies in trust, and whether desired ES outcomes were achieved was then verified through subsidiary measurements outside the agreement. Sometimes private-sector led commoditised sub-projects were nested within co-investment projects, for example, FACE Foundation [31], Lurio Forest Plantation [30], Ewaso Ngiro South project [31] and BERL project [38].

Incentives were mostly in-kind including granting of access or ownership rights, or support with start-up costs for community enterprises. Rewards were given collectively, encompassing free riders too. The incentive, often determined top-down was not valued against cost of effort. There is no evidence from experimental impact analysis to show effectiveness of projects. However, performance at project level was generally low, even though based on broad indicators. The risk of communities viewing incentives as entitlements [1^{*}] could not be overruled.

Incentives were supplemented with revenue or co-benefits from ecotourism (e.g. Mabira, Budongo [31] and Wami Mbiki [45] projects) and commoditised sub-projects (e.g.

in Kilombero Valley Teak Company). Commonly though, these are what motivated performance and potential for improving efficiency by making them conditional should be explored. In instances where the practices themselves were substantially beneficial (e.g. EPWS [46], Ecotrust [47], Arabuko Sokoke, Wami Mbiki and Mbomipa), performance increased and projects attracted more participants.

Conclusion

The strength of PES in improving natural resource management is in its emphasis on conditionality. However, in its strictest 'commoditised' form, it stagnated at only delivering tree-based carbon sequestration and emission reduction services, dependent on external global markets and likely to crowd out other conservation motivations [15^{**}]. Commoditisation could not fully mimic market principles as payments needed to be adjusted because of low carbon prices to ensure fairness. Its tendency to focus on piecemeal ES, made it difficult to fit into existing governance frameworks [48], knowledge demanding and expensive. Given what ES buyers are WTP, options for financing ES accounting costs from sources other than the ES providers (e.g. through partnership with national research institutions), should be explored.

'Co-investment' though more widespread in the African market-scarce context is criticised for its potential erratic compliance [49]. It can potentially deliver a range of ES to society through a systems focus [50], beyond what could be driven by ES buyers. However it must demonstrate the intended improvement in per hectare performance beyond ICDPs [51,52] by directly targeting and accounting for ES outcomes rather than targeting inputs, activities and incomplete proxies. Performance can be improved through strengthening conditionalities, translating proxies into ES outcomes, nesting commoditised ES subprojects into co-investment projects, and developing profitable enterprises with positive ES externalities within co-investment projects. None of the paradigms provided satisfactory incentives for landowners. However, co-investment incentives in certain instances created opportunities for development of commoditised ES.

Commoditisation enhances efficiency, but because it is applicable only where markets exist and these have not expanded widely for tree based projects, ES flows can only be ensured if compensation and co-investment alternatives demonstrate efficiency. Provisions for strengthening capacity to account for ES outcomes in co-investment projects (such as finding supplementary financing, training staff and partnering with research institutions) need to be developed as good practice to enhance efficiency in targeting investments. This might build the trust necessary for catalysing evolution of commoditised ES demand.

Appendix A

See Table A1.

Table A1

Categorization of PES mechanisms in Africa

No.	Project	Buyer	Seller	Conditionality: Payment for...
Commoditised				
1	Village based management of woody savannah [19]	World Bank Biocarbon Fund (WBCF)	Villagers	CO ₂ at US\$3.50/t Co-benefit: capacity building
2	Ibi Batéké [38]	WBCF; Danone	NOVACEL	2.4 MtCO ₂ in 30 y — reforestation and reduced shifting cultivation; co-benefit: schools/health facilities; forest products
3	Humbo Assisted Natural Regeneration [38]	World Vision Ethiopia	7 community cooperatives	0.88 MtCO ₂ in 30 y — reforesting, foregoing grazing, fuelwood collection and charcoal in 2728 ha forest; co-benefit: access
4	Western Kenya Agroforestry [31]	WBCF	Community	Over 1.2 Mt soil carbon - agroforestry and other practices
5	Makira Conservation [25]	Mitsubishi Group rock group; Pearl Jam WB; USAID Japan; NAVTEQ	Ministry of Environment, Water, Forests, & Tourism (MEWFT)	9.5 MtCO ₂ in 30 y
6	Mantadia Biodiversity Corridor Conservation [25]	Foreign countries	Local government; MEWFT	1.2 MtCO ₂ in 30 y reforestation; 25 MtCO ₂ in 30 y from REDD; Co-benefit: agricultural productivity
7	Ankotrofotsy Afforestation 1000 ha [25]	3 C Factor was conducting negotiations in 2008; no updated information	Tany Meva Foundation with 3 local community groups	0.18 MtCO ₂ in 60 y; co-benefits: development, incomes and capacity building projects
8	Acacia Senegal plantation 7869 ha [38]	WBCF; Deguessi Groupe	Local communities	0.45 MtCO ₂ by 2017 Co-benefit: gum, land access for inter-cropping
9	Trees for Global Benefits (TGB) SOFALA [38,16]	Tetrapak; Future Forests U&W Humbleside	Nhambita Community Association	2.1 MtCO ₂ in 99 y Co-benefit: community development; livelihoods, credit
10	TGB Plan Vivo (PV) [26*,31]	Same as above	Farmers through Environment Conservation Trust (Ecotrust)	0.05 MtCO ₂ /y for 100 y
11	Acacia community plantations [19]	Achats Services International	15 000 farmers	1.8 MtCO ₂ by 2017 Co-benefit: Gum, firewood, timber, capacity building
12	The International Small Group Tree Planting [16]	CAAC	4309 farmer groups	0.5–3 MtCO ₂ CAAC owns carbon Co-benefit: tree ownership; welfare projects
13	Nile Basin [31]	WBCF	National Forestry Authority (NFA) & communities	0.28 MtCO ₂ e in 20 y
14	Wildlife Works [38]	NedBank Group Ltd	Community	49 MtCO ₂ e in 30 y — restricted grazing Co-benefits: youth employment
15	Kibale Forest wild Coffee [31]	Kibale Forest Foundation Uganda Coffee Trade Federation	Arabica farmers	Maintaining biologically diverse ecosystems for premium price for coffee
Compensation				
16	Cocoa carbon [38]	To be identified	Farmer groups	Halting expansion of farms into unprotected forest and forest reserves for REDD
17	Green resources [30]	Green Resources	Tanzania government	Land and taxes. Company owns carbon
18	Shompole Ecotourism Development [35**]	Shompole Community Trust Kenya Wildlife Service, African Conservation Center, Art of Ventures	Shompole Group Ranch	Exclusive conservation area — 10 000 ha
19	Foundation for Protected Areas & Biodiversity; Protected Areas Network [6]	GEF + GoM	Various	Reducing slash and burn — biodiversity
20	Tanzania Land Conservation Trust [36**]	Investors in wildlife via African Wildlife Foundation	Manyara Ranch	Setting aside or selling land' grazing restrictions — conservation. Co-benefit livestock improvement
21	Kasokwa Community Chimpanzee Conservation [31]	Tourists, researchers, schools	Communities	Restricted land use — conservation Co-benefit: tourism revenue

Table A1 (Continued)

No.	Project	Buyer	Seller	Conditionality: Payment for...
Co-investment-based on proxy				
22	Shea butter carbon (concept) [38]	To be identified	Communities	Tree planting Co-benefits: portion of carbon revenue
23	Greenbelt movement [38]	WBCF	Community forest associations	Reforesting 1500 ha degraded land — carbon
24	Biodiversity Corridor Conservation [38]	WBCF	Mandtadia government and communities	Linking fragmented habitats for 14.6 MtCO ₂ e Co-benefit: fruit gardens
25	Trees of hope (PV) [38]	Clinton hunter Foundation	Farmers	Tree planting for livelihoods and carbon Co-benefit: pledged carbon cash
26	Lurio forest plantation (PV) [30]	Associação Envirotrade Carbon Livelihoods	Green Resources	Tree planting. Developers own carbon.
27	Community-based Rangeland Rehabilitation [39]	Environment Ministry	Local community, Bara Province	Forestry/rangelands rehabilitation for carbon. Co-benefits: community development
28	FACE [31]	FACE Foundation - Dutch Electricity Generating Board	Uganda Wildlife Authority (UWA)	Reforestation of degraded park FACE owns carbon
29	Ewaso Ngiro South Development Authority [31]	Spanish Government, GEF, Green Belt Movement	Communities	Reforestation, regeneration of Mau forest and adjacent land—carbon
30	Baviaanskloof Patensie project [31]	Not identified	Baviaanskloof Patensie Community	Labour for land rehabilitation
31	Kilombero Valley Teak Company Ltd (KVTCL) [5]	KVTCL	Village-groups	Establishment of timber plantations; co-benefit: 10% of carbon revenues
32	Bio energy resources Ltd (BERL) [38]	BERL	Farmers	Jatropha seeds — 15 000 trees
33	Lake Naivasha Watershed Management [40]	Flower farmers	Upstream WRUAs	Soil and water conservation practices (SWCP)
34	Equitable Payments for Watershed Services [5]	DAWASCO, Coca Cola	Villages	SWCP
35	Amboseli [6]	UNEP/UNDP, FAO	Amboseli Park, Group Ranches, Communities	Reforesting landscapes for biodiversity
Co-investment-based on a set of practices for a combination of ES				
36	Trust Fund for Dzanga-Sangha Reserve [6]	Donors	Landowners	Joint management plan to restore landscapes (JMPL) — biodiversity
37	Northern Savanna [6]		Community	Increasing landscape productivity to spare biological corridors
38	Foundation for Financing Protected Areas [5]	Donors	Landowners	JMPL
39	Tropical Forest Conservation Fund [5]	Donors	Landowners	Joint forest management — biodiversity
40	Foundation for Protected Areas and Biodiversity [5]	Various donors	Landowners	JMPL
41	Eastern Arc Mountain Conservation Endowment Fund [5]	Various donors	Landowners	JMPL
42	Joint Forest Management [31]	Forestry & Bee keeping Division, Ministry of Natural Resources & Tourism	Village governments	5–10 y management plan — biodiversity
43	Mgahinga Bwindi Impenetrable Forest Conservation Trust [31]	UWA	Communities	Participation in forest conservation — management plan
44	Participatory Environmental Management [31]	CARE, TFCG	Villages	Management plan. Community institutions strengthened — biodiversity
45	Co-Management in national parks and Forest Reserves [31]	Government (UWA/NFA)	Communities	Forest access rights in return for protecting resource use areas
Co-investment-business/permits with positive ES externalities				
46	Wildlife Management Areas [45]	Tourists	Wami Mbiki and Mbomipa Societies	Right to develop business that enhances forest status — management plan
47	Budongo Forest Eco-tourism [31]	Ecotourism business	Communities JGI	- same -

Table A1 (Continued)

No.	Project	Buyer	Seller	Conditionality: Payment for...
48	Arabuko Sokoke Forest Management and Conservation [31]	KNH-NABU, USAID Birdlife International, WWF	Community	- same -
49	Mabira Forest Reserve Eco-tourism [31]	NFA	Communities	- same -
50	Community Based Forest Management [5]	Local District Authorities	Village governments	Full forest ownership for conservation management plan

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