Independent Evaluation Office
GLOBAL ENVIRONMENT FACILITY

Evaluation of the Multiple Benefits of GEF Support through Its Multifocal Area Portfolio

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TECHNICAL DOCUMENT 1: PORTFOLIO ANALYSIS

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1.1 Scope

As of September 30, 2016, 532 projects labeled as Multi-focal area (MFA) in GEF's Project Management Information System (PMIS) have been CEO-endorsed or- approved, totaling USD 2.4 billion in GEF grants and USD 9.7 billion in co-financing (Table 1). Of these, 174 are Enabling Activities, accounting for 33% of projects and 2% of GEF funding of the MFA portfolio; 48 are Small Grant Programmes (SGPs), equivalent to 9% of MFA projects and 34% of the GEF funding. Cross-cutting capacity development projects comprise 11% of projects and 4% of GEF MFA funding. These capacity development projects support interventions that primarily aim to enhance country capacities for meeting their MEA obligations, such as through mainstreaming Convention guidance into national policy and financial frameworks.

The remaining 250 MFA projects, equating to USD 1.4 billion (60%) of GEF MFA funding, were identified as those primarily intended to achieve multiple environmental benefits. This set of MFA projects comprises the evaluation portfolio. It includes projects funded prior to GEF-4 that were retroactively labeled as MFA by the GEFSEC.

Table 1: MFA projects in GEF

Type	# of projects	% of total project number	GEF grant ($M)	% of total GEF grant
MFA projects	250	47%	1,432.6	60%
Enabling Activities	174	33%	36.3	2%
SGP	48	9%	816.5	34%
Cross-cutting capacity development projects	60	11%	90.2	4%
Total	**532**	**100%**	**2,375.6**	**100%**

Source of data: GEF PMIS.

Comparable single focal area (SFA) projects were also analyzed to identify characteristics that may be distinct to the MFA portfolio. The analysis covered 2,267 SFA projects that have been CEO-endorsed or-approved as of September 30, 2016, excluding enabling activities, capacity development projects and SGPs.

1.2 Methods

In order to get the MFA portfolio that primarily intended to achieve multiple environmental benefits, a set of criteria were identified to filter the PMIS data:

- Focal area: including multi-focal area;
- Project type: including full-sized project, medium-sized project;
- Project status (as of September 30, 2016): including CEO endorse, CEO approved, Implementing Agency (IA) approved, project closure, project completion, under implementation;
- Focal area priorities: **excluding** "Enabling activities (EA)" and " Short-term response measure (STRM)" in the GEF-3 Operational Program (OP) list, "Capacity Building (CB)" in GEF-4 Strategic Priority (SP) list, and "Cross-cutting capacity development (CD)" in GEF-5 FA objective list;

- Programmatic approach: **excluding** LDC/SIDS capacity building parent and child projects; six parents were excluded to avoid double counting;
- SGP: **excluding** projects with "SGP"/ "small grant" in project title.

The same filters were applied to get comparable SFA projects, except for the focal area filter. SFA portfolio covered projects in five focal areas: Biodiversity, Climate Change, Chemicals and Waste (including Ozone Depleting Substances and Persistent Organic Pollutants), International Waters, and Land Degradation.

Reporting on MFA portfolio distribution, financing, focal area allocation and project efficiency is based on the data collected by this evaluation to identify spatial, temporal and institutional trends. Any quantitative differences between the MFA portfolio and comparison groups, as well as between subsets of the MFA portfolio, were tested for statistical significance. The Box below summarizes the statistical tests used in the portfolio analysis.

Box 1: Summary of statistical methods in portfolio analysis

Topic analyzed	Statistical methods	Projects covered
Project size comparison	Two-sample t-Test	SFA projects vs. MFA projects with focal area component in GEF-4 and -5
Project cofinancing ratio comparison within countries	Paired two-sample t-Test	SFA projects vs. MFA projects with focal area component in GEF-4 and -5 SFA and MFA Projects were matched by country for comparison, and only the countries with both SFA and MFA projects were kept.
Focal area allocation comparison within countries	Paired two-sample t-Test	SFA projects vs. MFA projects with focal area component in GEF-4 and -5 SFA and MFA Projects were matched by country for comparison, and only the countries with both SFA and MFA projects were kept.
Average proportion of focal area funding in MFA projects	Mann-Whitney test	MFA projects in GEF-4 and -5
Correlation of focal area funding proportion in MFA projects	Spearman's rank correlation analysis	MFA projects in GEF-4 and -5
Factors affecting outcomes	– Fisher's exact test – Qualitative Comparative Analysis (QCA)	Completed MFA projects and comparable SFA projects

	– Logistic regression	
Country STAR allocation to MFA projects	– Two-sample t-Test – Linear regression	MFA projects in GEF-5
Project efficiency comparison	– Two-sample t-Test – Median test	MFA projects, and comparable SFA projects

An in-depth review of project documents was also undertaken using a standardized protocol. From this in-depth review, a dataset on the portfolio's design characteristics and outcomes was constructed and analyzed.

2. MFA portfolio

2.1 Distribution

The portfolio of 250 MFA projects accounts for 10% of the GEF portfolio, equivalent to 13% of total GEF grants. Since GEF-3, when the integration of the objectives of multiple focal areas in single projects was formalized, the MFA portfolio has grown by about 50% in each succeeding GEF phase in terms of both number of projects and total GEF grants. GEF-5 has the largest share of the MFA projects (44%) and GEF grant (50%), followed by GEF 4 with 25% of total MFA projects and 24 % of total GEF grants.

Of the four regions, Africa has the highest number of MFA projects (70) and share of GEF grant (27%), while the Europe and Central Asia (ECA) has the lowest. MFA projects comprise about the same proportion of each region's GEF portfolio in terms of number of projects and total grant amount, with the exception of Latin America and the Caribbean (LAC) region, which has slightly more MFA projects and higher total MFA grant relative to its entire portfolio. Noticeably, the increasing trend of MFA projects in the GEF portfolio is mainly due to a higher number of countries implementing MFA projects (table 2). In GEF-4, only 27 countries had at least one national MFA project; this increased to 80 countries in GEF-5.

Table 2: Number of countries with MFA projects

GEF phase	Africa	Asia	ECA	LAC	Total
GEF - 2	6	1	0	2	**9**
GEF - 3	7	3	7	5	**22**
GEF - 4	7	9	2	9	**27**
GEF - 5	27	23	11	19	**80**
GEF - 6	6	2	5	0	**13**

Source of data: GEF PMIS.

The bulk of the MFA portfolio (73%, equivalent to 69% of total MFA grants) was implemented by the three original GEF Agencies--the World Bank, UNDP and UNEP--with the World Bank having the largest share of projects and grant amount. From GEF-4 onwards, the majority of Agencies had MFA projects comprising more than 15% of their respective GEF portfolios, and at least 25% of total GEF funding. Exceptions to this are UNIDO, which generally implements chemicals-related projects, UNDP, and UNEP.

The African Development Bank (AfDB) and European Bank for Reconstruction and Development (EBRD) did not have any MFA projects in their portfolio when this evaluation was carried out. Among the new Project Agencies, the Development Bank of Latin America (CAF) and International Union for Conservation of Nature (IUCN) each have one MFA project to date, comprising half or all of their respective GEF portfolios and funding; none of the other Project Agencies had any approved.

Regarding project cofinancing, the total promised cofinancing for MFA projects is 6 dollars for every GEF dollar. The ratio of cofinancing to GEF grant for MFA projects has risen from 3.7 in GEF-3 to 5.8 in GEF-4, reaching 7.0 in GEF-5. The cofinancing ratio for the Asia region was highest at 8.7, followed by Africa (6.8), LAC (4.4), and ECA (4.2). Development banks showed higher cofinancing ratios for MFA projects, led by ADB with a ratio of 9.5 and the World Bank with a ratio of 7.7.

Table 3 presents the distribution of MFA projects and grants across GEF phases, regions, and GEF Agencies.

Table 3: Composition of MFA portfolio

Criteria		MFA portfolio						MFA in GEF portfolio			
		Projects #	GEF grant ($M)	Promised co-financing	Projects (%)	GEF grant (%)	Co-financing ratio	Total GEF projects #	Total GEF grant ($M)	MFA as % of total projects	MFA as % of total GEF grant
GEF phase	Pilot phase	0	0	0	0	0	0	82	453.2	0%	0%
	GEF - 1	2	3.7	4.0	1%	0.3%	1.1	111	856.1	2%	0.4%
	GEF - 2	16	53.4	207.4	6%	4%	3.9	308	1,436.4	5%	4%
	GEF - 3	44	202.8	741.0	18%	14%	3.7	477	2,221.0	9%	9%
	GEF - 4	62	348.1	2,027.2	25%	24%	5.8	701	2,432.6	9%	14%
	GEF - 5	109	722	5,067.7	44%	50%	7.0	761	3,531.7	14%	20%
	GEF - 6	17	102.7	564.7	7%	7%	5.5	77	383.5	22%	27%
	Total	250	1,432.6	8,612.1	100%	100%	6.0	2,517	11,314.5	10%	13%
Region	Africa	70	405.7	2,764.0	28%	28%	6.8	721	3,154.0	10%	13%
	Asia	61	335.3	2,921.3	24%	23%	8.7	662	3,277.8	9%	10%
	ECA	31	150.5	631.8	12%	11%	4.2	371	1,422.6	8%	11%
	LAC	59	377.4	1,654.5	24%	26%	4.4	485	2,326.0	12%	16%
	Global	29	163.8	640.4	12%	11%	3.9	278	1,134.1	10%	14%
	Total	250	1,432.6	8,612.1	100%	100%	6.0	2,517	11,314.5	10%	13%
GEF Agency	ADB	11	53.0	504.3	4%	4%	9.5	36	141.2	22%	31%
	CAF	1	9.7	58.2	0.4%	0.7%	6.0	1	9.7	100%	100%
	FAO	17	97.3	478.3	7%	7%	4.9	94	366.7	18%	27%
	IADB	7	57.4	298.1	3%	4%	5.2	37	184.5	16%	29%
	IFAD	14	67.6	351.5	6%	5%	3.8	43	186.1	28%	30%
	IUCN	1	2.0	2.3	0.4%	0.1%	1.2	2	3.4	50%	59%
	UNDP	66	307.2	1,463.8	26%	21%	4.8	615	2,208.1	9%	12%
	UNEP	29	103.3	435.4	12%	7%	4.2	248	684.9	8%	12%
	UNIDO	4	24.4	94.2	2%	2%	3.9	133	420.9	3%	6%

	World Bank	87	585.7	4,509.1	35%	41%	7.7	230	1,448.9	26%	31%
	Joint Agency	13	125.0	416.8	5%	9%	3.3	27	226.1	30%	41%
	Total	250	1,432.6	8,612.1	100%	100%	6.0	1,466*	5,880.4	13%	20%

Source of data: GEF PMIS.

Note: Numbers for GEF-6 as of September 30, 2016. Agency fees and project preparation grants excluded.

*GEF portfolio data for GEF Agencies only included GEF-4 to GEF-6 in order to compare the MFA projects and grant amount among different agencies.

2.2 Financing

This section includes 171 MFA projects from GEF-4 and -5, which have funding components that are explicitly linked to multiple focal areas through the RAF / STAR allocation. Comparable SFA projects from BD, CC, LD focal areas are also from GEF-4 and -5, totaling 1,291.

Project size comparison

GEF grant amounts for MFA projects and SFA projects were analyzed and compared by focal area. In GEF-4, the average grant amount for an MFA project with a BD or CC component was at least 60% more than for an SFA project in either of these focal areas (Table 4). Similarly, in the LD focal area, the grant amount for an MFA project was on average 41% larger than for an LD SFA project. An MFA project with BD or LD components in GEF-5 was on average more than double the size of an SFA project.

Overall, the average grant amount for an MFA project with the focal area component is larger than for an SFA project in GEF-4 and -5, the difference is statistically significant at 95% confidence level.

Table 4: Descriptive statistics of SFA and MFA project grants by focal area ($ M)

	BD				CC				LD			
	GEF 4		GEF 5		GEF 4		GEF 5		GEF 4		GEF 5	
	SFA	MFA	SFA	MFA	SFA	MFA	SFA	MFA	SFA	MFA	SFA	MFA
Mean	**2.7**	**4.6**	**3.5**	**7.1**	**3.6**	**5.9**	**4.8**	**6.8**	**3.4**	**4.8**	**2.4**	**6.1**
Median	1.8	4.3	2.7	6.1	2.6	4.7	4.2	5.6	2.9	4.5	1.9	5.3
Minimum	0.3	0.7	0.8	0.8	0.3	1.0	0.2	0.9	0.3	0.7	0.7	0.8
Maximum	15.9	13.1	18.2	39.5	25.0	18.0	27.3	39.5	9.0	13.0	6.1	39.5
Sum	648.0	191.1	556.6	618.2	872.3	187.4	1,558.5	478.2	135.5	190.7	110.7	483.0
Count (# of projects)	238	42	159	87	242	32	326	70	40	40	46	79

Source of Data: GEF PMIS.

Sustainable Forest Management (SFM) funding envelope

When the SFM/REDD+ funding envelope became available in GEF-5, 63% percent of MFA projects (n=109) received SFM funding (table 5). This matched STAR resources allocated to MFA projects by 28% on average. As of September 30, 2016, 77% of the GEF-6 MFA portfolio (n=17) has received SFM funding, which matched STAR resources for an MFA grant by 50% on average.

Table 5: SFM funding in GEF-5 and GEF-6

GEF phase	# of MFA projects with SFM funding	Total MFA projects	% of MFA projects with SFM funding	Total SFM funding in MFA projects (M $)
GEF-5	69	109	63%	105.8
GEF-6	13	17	77%	33.6

Source of Data: GEF PMIS.

Co-financing ratio comparison

In this section, analyses have been carried out to test whether MFA projects can generate more cofinancing than SFA projects by comparing project co-financing ratio at country level. Co-financing ratio was calculated as the ratio of co-financing amount to GEF grant at CEO endorsement/approval stage. The results showed that MFA projects with a BD component on average have a significantly higher cofinancing ratio than SFA projects in the BD focal area.

BD focal area

In GEF-4 and-5, 66 countries had both BD SFA projects and MFA projects with BD component (Table 6). MFA projects with BD component have a higher cofinancing ratio on average compared to SFA projects in the BD focal area (6.5 vs. 3.8). The paired t-Test suggests the difference within each country is statistically significant at 95% confidence interval.

Table 6: Descriptive statistics of project cofinancing ratio in BD focal area

BD SFA cofinancing ratio		**MFA with BD component cofinancing ratio**	
Mean	**3.8**	**Mean**	**6.5**
Median	3.1	Median	4.5
Minimum (Tajikistan)	0.6	Minimum (Tajikistan)	1.1
Maximum (Senegal)	20.8	Maximum (Nigeria)	58.2
Count (# of countries)	66	Count (# of countries)	66

Source of Data: GEF PMIS.

CC focal area

In GEF-4 and-5, there were 56 countries with financial data for both CC SFA projects and MFA projects with CC component (Table 7). On average, CC SFA projects have a higher cofinancing ratio compared to MFA projects with CC component (8.8 vs. 7.7), but the difference is not statistically significant.

Table 7: Descriptive statistics of project cofinancing ratio in CC focal area

CC SFA cofinancing ratio		**MFA with CC component cofinancing ratio**	
Mean	**8.8**	**Mean**	**7.7**
Median	6.3	Median	4.8
Minimum (Belize)	0.5	Minimum (Tajikistan)	1.1
Maximum (Nigeria)	34.0	Maximum (Philippines)	60.7

Count (# of countries)	56	Count (# of countries)	56

Source of Data: GEF PMIS.

LD focal area

Twenty countries had both LD SFA projects and MFA projects with LD component in GEF-4 and -5 (Table 8). Similar to the BD focal area, MFA projects with LD component have a higher cofinancing ratio on average compared to SFA projects in the LD focal area (9.7 vs. 8.7), but the difference is not statistically significant.

Table 8: Descriptive statistics of project cofinancing ratio in LD focal area

LD SFA cofinancing ratio		**MFA with LD component cofinancing ratio**	
Mean	**8.7**	**Mean**	**9.7**
Median	6.8	Median	5.7
Minimum (Uzbekistan)	3.6	Minimum (Mali)	1.5
Maximum (Armenia)	40.7	Maximum (Nigeria)	58.2
Count (# of countries)	20	Count (# of countries)	20

Source of Data: GEF PMIS.

2.3 Focal area allocation

Share of MFA projects and grants by focal area

Focal area funding allocation was compared between SFA projects and MFA projects with the focal area component at country level. The average amount allocated from the BD focal area to an MFA project was USD 3 million in GEF-4 and USD 4 million in GEF-5 (Table 9), equivalent to less than half (29% and 45%, respectively) of the average allocation to a BD SFA project. The paired t-Test suggests that the funding difference between SFA and MFA projects in BD focal area is statistically significant in GEF-4 and -5.

For the CC focal area, the average amount allocated to an MFA project was USD 1.6 million, equivalent to only 7% of that for a CC SFA project in GEF-4. While the actual amount doubled in GEF-5, this was equivalent to only 23% of the average grant amount for a CC SFA project. The paired t-Test suggests that the funding difference between SFA and MFA projects in CC focal area is statistically significant in GEF-5.

The average amount allocated from the LD focal area to an MFA project was USD 2.6 million during the GEF-4 and -5 period, equivalent to 47% of the average allocation to a LD SFA project. The paired t-Test was not conducted, due to the small sample size.

Table 9: Descriptive statistics of country level focal area allocation ($ M)

	BD				**CC**				**LD**	
	GEF 4		GEF 5		GEF 4		GEF 5		GEF 4 & 5*	GEF 4 & 5
	SFA	MFA	SFA	MFA	SFA	MFA	SFA	MFA	SFA	MFA

Mean	**10.2**	**3.0**	**8.9**	**4.0**	**22**	**1.6**	**14.2**	**3.3**	**5.5**	**2.6**
Median	5.5	2.0	3.4	2.8	8	1.0	9.0	2.0	4.8	1.9
Minimum	0.7	0.5	0.8	0.4	2	0.4	1.0	0.2	0.9	0.5
Maximum	46.4	9.0	43.2	16.4	125	4.4	129.3	21.7	13.4	11.9
Sum	183.8	53.2	265.5	120.2	286	20.2	609.3	142.1	110.4	52.4
Count (# of countries)	18	18	30	30	13	13	43	43	20	20

Source of data: GEF PMIS.

Note: *After matching two samples by GEF phase, the sample sizes are too small to conduct paired t-Test (2 countries in GEF-4 have LD SFA projects and MFA projects, 7 countries in GEF-5).

2.4 Design

This section includes 171 MFA projects from GEF-4 and -5, which have funding components that are explicitly linked to multiple focal areas through the RAF / STAR allocation.

Average proportion of focal area funding in MFA project

Table 10 and 11 present all focal area combinations of MFA projects in GEF-4 and -5. For each unique combination, the average focal area allocation within an MFA project was calculated. For example, an MFA project in GEF-4 that covered BD and CC focal areas, the BD allocation on average accounted for 59% of the total project grant amount, which was higher than the proportion of CC allocation (41%).

Table 10: List of focal area combinations and average proportion of focal area funding in GEF-4

FA Combinations	Average of % BD funding	Average of % CC funding	Average of % LD funding	Average of % IW funding	Average of % Chemicals funding	# of FA included	# of MFA projects
M	0	0	0	0	0	1	3
M;B;C;	59%	41%	0	0	0	2	9
M;B;C;I;	65%	15%	0	20%	0	3	2
M;B;C;L;	33%	24%	42%	0	0	3	11
M;B;C;L;I;	17%	31%	39%	13%	0	4	2
M;B;I;	44%	0	0	56%	0	2	2
M;B;L;	53%	0	47%	0	0	2	16
M;C;I;	0	19%	0	81%	0	2	2
M;C;L;	0	57%	43%	0	0	2	4
M;C;L;I;	0	7%	47%	47%	0	3	1
M;C;O;	0	50%	0	0	50%	2	1
M;I;P;	0	0	0	78%	22%	2	1
M;L;I;	0	0	58%	42%	0	2	6

Source: GEF PMIS

Note: B=Biodiversity, C=Climate Change, I=International Waters, L=Land Degradation, O=ODS, P=POPs, M=Multifocal

Table 11: List of focal area combinations and average proportion of focal area funding in GEF-5

FA Combinations	Average of % BD funding	Average of % CC funding	Average of % LD funding	Average of % IW funding	Average of % Chemicals funding	Average of % of SFM	# of FA included	# of MFA
M;B;C;	27%	73%	0%	0%	0%	0%	2	2
M;B;C;L;	41%	30%	29%	0%	0%	0%	3	4
M;B;C;L;I;	47%	32%	16%	5%	0%	0%	4	5
M;B;C;L;I;M;	48%	24%	7%	2%	0%	19%	5	1
M;B;C;L;M;	26%	32%	22%	0%	0%	20%	4	23
M;B;C;M;	37%	37%	0%	0%	0%	22%	3	15
M;B;I;	59%	0%	0%	41%	0%	0%	2	7
M;B;L;	57%	0%	43%	0%	0%	0%	2	10
M;B;L;I;M;	27%	0%	13%	46%	0%	14%	4	1
M;B;L;M;	47%	0%	29%	0%	0%	24%	3	19
M;C;I;	0%	64%	0%	36%	0%	0%	2	2
M;C;I;P;	0%	28%	0%	22%	50%	0%	3	1
M;C;L;	0%	59%	41%	0%	0%	0%	2	7
M;C;L;M;	0%	36%	42%	0%	0%	21%	3	8
M;C;M;	0%	50%	0%	0%	0%	50%	2	1
M;C;P;	0%	98%	0%	0%	2%	0%	2	1
M;I;P;	0%	0%	0%	28%	72%	0%	2	1
M;L;M;	0%	0%	50%	0%	0%	50%	2	1

Source of data: GEF PMIS

Note: B=Biodiversity, C=Climate Change, I=International Waters, L=Land Degradation, O=ODS, P=POPs, the first M=Multifocal, the last M=SFM.

Correlation of focal area funding proportion

In GEF-4, when an MFA project received BD allocation, the BD funding on average took up 48% of total project grant amount, which is the highest proportion across focal areas (Table 12)[1]. The proportion dropped from 48% to 41% in GEF-5. Similar in LD focal area, the average proportion of LD funding decreased from 46% in GEF-4 to 30% in GEF-5. According to the Mann-Whitney test, there is a statistically significant difference between the underlying distributions (median) of LD funding proportion in an MFA project in GEF-4 and in GEF-5 ($z = 4.058$, $p = 0.0000$). The distributions are not statistically significant different in other focal areas between GEF-4 and GEF-5.

Table 12: Average proportion of focal area funding in MFA projects

	MFA projects with focal area component									
	BD		CC		LD		IW		Chemicals	
GEF Phase	# of projects	Ave. % of funding	# of projects	Ave. % of funding	# of projects	Ave. % of funding	# of projects	Ave. % of funding	# of projects	Ave. % of funding
GEF-4	42	48%	32	33%	40	**46%**	16	45%	2	36%

[1] Only the MFA projects received BD funding are included in the calculation.

GEF-5	87	41%	70	39%	79	**30%**	18	27%	3	41%

Note: Data for Chemicals focal area included Ozone Depleting Substances and POPs. Cross-cutting CB funding was not included in the calculation.

In order to further analyze the relationship between focal areas funding proportion in each combination, the Spearman's rank correlation analysis was conducted (see table 13 and 14). Portfolio level results only showed the averaged changing trend, it requires project level analysis to determine the actual relationship between focal area allocations in each MFA project.

In GEF-4, when there were BD and LD funding in an MFA project (regardless of the funding from other focal areas), there was a moderate negative correlation between the proportion of BD funding and proportion of LD funding. The negative correlation is statistically significant (r=-.5026, p=. 0055). Similarly, there was a moderate negative correlation between the proportion of CC funding and proportion of LD funding in an MFA, which is statistically significant (r=-.5378, p= .0213).

Table 13: Correlation of focal area funding proportion in MFA projects in GEF-4

GEF-4	BD	LD	CC
BD	1	-.5026*	-.1164
LD	-.5026*	1	-.5378*
CC	-.1164	-.5378*	1

Note: confidence interval 95%

For MFA projects in GEF-5, there was a weak negative correlation between the proportion of BD funding and proportion of LD funding, which is still statistically significant (r=-.3264, p=.009). On the other hand, there was a strong negative correlation between the proportion of BD funding and proportion of CC funding, which is statistically significant (r=-.6562, p= .0000).

The proportion of SFM funding was positively correlated with the proportion of BD funding and LD funding, but is negatively correlated with the proportion of CC funding. The correlations were very week and **not statistically significant**.

Table 14: Correlation of focal area funding proportion in MFA projects in GEF-5

GEF-5	BD	LD	CC
BD	1	-.3264*	-.6562*
LD	-.3264*	1	-.0951
CC	-.6562*	-.0951	1
SFM	.1911	.0577	-.1432

Note: confidence interval 95%

Number of focal areas and average funding proportion

The analyses in this section aimed to find out if the number of focal areas an MFA project covers would affect the focal area allocation proportion. One assumption is the funding allocation from different focal areas should take up the same proportion in an MFA project. For example, if an MFA covers BD and CC focal areas, we expect 50% of the project funding to come from the BD allocation and the other 50% to come from the CC allocation.

Seventy-six percent of MFA projects in GEF-4 and 5 had BD allocation, and the BD funding proportion on average has been higher than expected in both GEF-4 and 5, particularly in projects where two or more other focal areas are contributing funds. Seventy percent of MFA projects in GEF-4 and-5 had an LD-

funded component, yet in GEF-5 the proportion of LD funding allocation was lower on average than BD or CC. On average, the CC component funding in MFAs was lower than expected in GEF-4 and higher or equal to expected in GEF-5.

Table 15: Number of focal areas and average funding proportion in MFA projects in GEF-4

	2 Focal Areas		3 Focal Areas		4 Focal Areas	
Focal Area	**Average % of funding in MFA**	**No of MFAs**	**Average % of funding in MFA**	**No of MFAs**	**Average % of funding in MFA**	**No of MFAs**
BD	54%	27	38%	13	17%	2
LD	49%	26	43%	12	39%	2
CC	43%	16	22%	14	31%	2
IW	55%	11	29%	3	13%	2
Chemicals	36%	2				

Source of data: GEF PMIS

Table 16: Number of focal areas and average funding proportion in MFA projects in GEF-5 (excluding SFM)

	2 Focal Areas		3 Focal Areas		4 Focal Areas	
Focal Area	Average % of funding in MFA	No of MFAs	Average % of funding in MFA	No of MFAs	Average % of funding in MFA	No of MFAs
BD	47%	53	28%	28	47%	6
LD	36%	44	23%	28	15%	6
CC	47%	35	31%	28	30%	6
IW	39%	10	34%	2	5%	6
Chemical	73%	2	50%	1		

Source of data: GEF PMIS. Note: MFA projects with SFM funding are included, but SFM was not counted as a focal area in this table.

Focal area priorities

Table 17 shows the distribution of MFA projects and SFA projects under focal area priorities in GEF-4 and GEF-5 separately. Full names of GEF OP/SP/FA objectives are in listed in Annex A.

For the most commonly targeted focal area priority or focal area priority combinations, MFA projects in GEF-3 showed 22 unique combinations, with “OP 12-integrated ecosystem management” most commonly included (72%, n=44). SFA projects in GEF-3 had 58 unique combinations of operational programs, and the most commonly targeted ones are “OP 6-promoting the adoption of renewable energy” (12%, n=422), “OP 2-conservation and sustainable use of the biological resources in coastal, marine, and freshwater ecosystem” (10%) and “OP 15-Sustainable land management” (10%).

In GEF-4, MFA projects showed 38 unique combinations of strategic priorities. Most MFA projects (n=62) aimed to mainstream biodiversity through policy and regulatory frameworks (BD-4, 32%); address issues on land use, land use change and forestry, or LULUCF (CC-6, 29%); and support sustainable forest management in production landscapes (LD-2, 27%). SFA projects had 81 combinations of focal area priorities, more commonly targeted sustainable protected area system financing (BD-1, 10%, n=639);

energy efficiency in residential and commercial buildings (CC-1, 9%); and partnering for investments to implement national plans (POPS-2, 8%).

In GEF-5, MFA projects showed 95 unique combinations of focal area objectives, the majority of MFA projects (n=109) targeted LD and BD priorities in landscapes, including integrated landscapes (LD-3, 58%), protected area systems (BD-1, 56%), and production landscapes (BD-2, 53%). SFA projects showed 70 combinations of focal are objectives, most SFA projects (n=652) addressed climate change adaptation priorities (CCA-2, increasing adaptive capacity, 19%; and CCA-1, reducing vulnerability, 18%), and again sustainability of protected area systems (BD-1, 13%).

Table 17: Distribution of MFA projects and SFA projects under focal area priorities in GEF-4 and GEF-5

Focal area	# of projects under GEF-4 focal area strategic priorities																										
	BD-1	BD-2	BD-3	BD-4	BD-5	BD-6	BD-7	BD-8	CC-1	CC-2	CC-3	CC-4	CC-5	CC-6	CC-SPA	IW-1	IW-2	IW-3	IW-4	LD-1	LD-2	LD-3	ODS-1	POPS-1	POPS-2	POPS-3	SGP-1
MFA	5	11	7	20	7	1	1	2	2	2	1	2	0	18	2	2	6	1	7	9	17	7	0	0	0	0	0
BD	61	44	46	45	24	19	8	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
CC	0	0	0	0	0	0	0	0	58	37	49	31	23	5	17	0	0	0	0	1	0	0	0	0	0	0	0
LD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	8	24	15	0	0	0	0	0
IW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	19	16	5	0	0	0	0	0	0	0	0
Chemicals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ODS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
POPs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	49	24	0
MFA as % of MFA Projects (n=62)	8%	18%	11%	**32%**	11%	2%	2%	3%	3%	3%	2%	3%	0%	**29%**	3%	3%	10%	2%	11%	15%	**27%**	11%	0%	0%	0%	0%	0%
SFA as % of SFA projects (n=639)	**10%**	7%	7%	7%	4%	3%	1%	1%	**9%**	6%	8%	5%	4%	1%	3%	1%	3%	3%	1%	1%	4%	2%	0%	7%	**8%**	4%	0%

Focal Area	# of projects under GEF-5 focal area objectives																											
	BD-1	BD-2	BD-3	BD-4	BD-5	CCA-1	CCA-2	CCA-3	CCM-1	CCM-2	CCM-3	CCM-4	CCM-5	CCM-6	CHEM-1	CHEM-2	CHEM-3	CHEM-4	IW-1	IW-2	IW-3	IW-4	LD-1	LD-2	LD-3	LD-4	SFM/RE DD+-1	SFM/RE DD+-2
MFA	61	58	0	1	0	13	10	3	6	5	7	1	48	0	1	0	3	0	8	6	2	4	24	10	63	1	62	15
BD	87	75	4	26	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CC	0	0	0	0	0	117	127	86	38	63	85	33	7	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	6	31	12	0	0
IW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	20	23	1	0	0	0	0	0	0
Chemicals	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ODS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
POPs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59	0	29	6	0	0	0	0	0	0	0	0	0	0

MFA as % of MFA Projects (n=109)	**56 %**	**53 %**	0%	1%	0%	12 %	9%	3%	6%	5%	6%	1%	**44 %**	0%	1%	0%	3%	0%	7%	6%	2%	4%	22 %	9%	**58 %**	1%	**57 %**	14 %
SFA as % of SFA projects (n=652)	**13 %**	12 %	1%	4%	1%	**18 %**	**19 %**	13 %	6%	10 %	13 %	5%	1%	3%	9%	0%	4%	1%	2%	3%	4%	0%	3%	1%	5%	2%	0%	0%

Environmental issues and management approaches

Biodiversity loss was identified as the most frequently mentioned environmental problem targeted by MFA projects (78%, n=235)[2], followed by land degradation (72%).

Table 18: Frequency of environmental degradation symptoms being addressed by GEF in MFA projects

Symptoms of environmental degradation being addressed	Number of projects	Percentage (n=235)
Biodiversity Loss	183	78%
Land Degradation	169	72%
Deforestation or Forest Degradation	167	71%
Climate Change	109	46%
Degradation of Freshwater and Marine Resources	100	43%
None	26	11%

Source: Data is from project documents, reviewed and analyzed as part of this evaluation.

As to the combination of environmental degradation symptoms addressed by MFA projects, 47 projects intended to address all of the five symptoms. In addition, thirty-five MFA projects explicitly targeted the reduction of biodiversity loss, land degradation and deforestation/forest degradation together, while another 33 projects also sought to address climate change at the same time.

Table 19: Combinations of environmental degradation symptoms being addressed in MFA projects

Biodiversity loss	Land degradation	Deforestation or forest degradation	Degradation of freshwater and marine resources	Climate Change	None of the above	Number of Projects	Percentage (n=235)
X	X	X	X	X		47	20%
X	X	X				35	15%
X	X	X		X		33	14%
					X	26	11%
X	X	X	X			15	6%
X			X			13	6%
X		X				11	5%
X	X					8	3%
	X	X				6	3%
X	X		X			5	2%
	X	X		X		5	2%
X		X		X		4	2%
X	X		X	X		3	1%
X		X	X	X		3	1%
	X	X	X	X		3	1%
	X		X			3	1%
				X		3	1%
X	X			X		2	1%
X		X	X			2	1%

[2] Only 235 out of 250 MFA projects were included in the analysis due to lack of accessible documents for the other projects.

X			X	X		2	1%
	X	X	X			2	1%
	X		X	X		1	0.4%
	X			X		1	0.4%
		X		X		1	0.4%
			X	X		1	0.4%

Source: Data is from project documents reviewed and analyzed as part of this evaluation.
Note: This table presents all reported combinations.

The majority of MFA projects intended to address overexploitation or unsustainable use of natural resources as a driver of biodiversity loss (75%), and targeted unsustainable land use practices as a driver of land degradation (69%). Agricultural activities for food production were targeted by 59% of MFA projects as the main driver of deforestation or forest degradation (Table 20).

Table 20: Drivers addressed by MFA projects

Drivers addressed by MFA projects	Number of projects	Percentage (n=235)
Overexploitation	176	75%
Unsustainable land use practice	161	69%
Habitat Change	142	60%
Agriculture activities	139	59%
Over-harvest	92	39%
Unsustainable use of fossil fuel for energy production	74	31%
Expansion of infrastructure in forest land	68	29%
Illegal harvesting/logging	63	27%
Human-induced fire	61	26%
Inadequate or ineffective	60	26%
Unsustainable use of fossil fuel for building and infrastructure	49	21%
Pollution from pesticides/fertilizers/weed control chemicals	41	17%
Unsustainable fishing practices	40	17%
Invasive alien species	31	13%
Mining in forest land	26	11%

Source: Data is from project documents, reviewed and analyzed as part of this evaluation .
Note: Drivers of environmental degradation were identified in the GEF 2020 strategy.
http://www.thegef.org/sites/default/files/publications/GEF-2020Strategies-March2015_CRA_WEB_2.pdf
In this table, agriculture activities included agricultural production, overgrazing, and poor management of shifting cultivation. The expansion of infrastructure, mining, and illegal harvesting/logging drivers were further classified into three sectors: energy production, building and infrastructure, food production.

The majority of MFA projects (74%, n=235) were designed to implement integrated ecosystem management, landscape-based management or both. Other types of management approach funded by GEF are presented in table 21.

Almost half of the MFA projects (43%) addressed both agriculture and forestry sectors at the same time by combining approaches such as sustainable agriculture or sustainable land management with sustainable forest management and sustainable forest use/protection. Of these projects addressing

agriculture and forestry concerns together, 71% also addressed biodiversity concerns through ecosystem-based management.

Table 21: Types of management approaches funded by GEF in MFA projects

Type of management approaches	Number of projects	Percentage (n=235)
Integrated ecosystem or landscape-based management	173	74%
Biodiversity (ecosystem-based management)	148	63%
Agriculture (sustainable agriculture, Sustainable land management)	145	62%
Forest (sustainable forest use and/or protection, sustainable forest management)	128	54%
Ecosystem-based adaptation	26	11%
Market-based policy instruments	7	3%
Clean development mechanism (CDM)/Emission trading	4	2%

Source: Data is from project documents, reviewed and analyzed as part of this evaluation.

More than half of the MFA projects reported specific activities in ecosystem protection, mechanisms for stakeholder interaction, ecosystem restoration and alternative livelihood (table 22).

Table 22: Frequency of specific activities supported by GEF in MFA projects

Activities supported by GEF in MFA projects	Numberof projects	Percentage (n=235)
Ecosystem protection/ threat reduction	200	85%
Mechanisms for stakeholder interaction/ trust-building/ conflict resolution	166	71%
Ecosystem restoration/ rehabilitation	161	68%
Alternative/ improved sources of income or capital	137	58%
Sustainable financing	60	26%
Payment for ecosystem services (PES)	46	20%
Renewable energy technologies	26	11%
Unable to assess	8	3%

Source: Data is from project documents, reviewed and analyzed as part of this evaluation.

Synergies and trade-offs

Through a basic word search, the portfolio analysis showed that 74% of projects (n=206) mentioned the terms “synergy” or “mitigation” of trade-offs in project documents. Slightly more projects in GEF-3 (79%) mentioned the term “synergies” compared to GEF-4 (71%) and GEF-5 (75%). Only 8% explicitly mentioned the terms “trade-offs” in project documents, however, the reason for this would require further study. Identifying actual synergies and trade-offs at the portfolio level was not possible, as it required more detailed information on project activities and associated outcomes. The case studies provided this level of detail.

Focal area indicators

Based on a review of project documents, 95% of MFA projects with CC funding (n=95) specified CC-related environmental indicators in GEF-4 and -5. On the other hand, 75% of MFA projects with LD funding (n=115) and 88% of MFA projects with BD funding (n=123) specified indicators tracking environmental outcomes relevant to their corresponding focal areas (table 23) MFA projects that did not track environmental indicators despite receiving funding allocations from the relevant focal areas were found to track only process-related outputs and outcomes (e.g. development of natural resource management plans, awareness raised on new technologies).

The majority of MFA projects also tracked environmental indicators of focal areas that did not allocate any funding to them. Twenty-seven out of 31 (87%) MFA projects that did not receive funding allocation from the BD focal area tracked BD-related indicators. In the LD focal area, 78% (n=27) of MFA projects without LD funding tracked LD-related indicators. Of the 58 projects without CC funding, 88% tracked CCM or CCA indicators. More than half of the MFA portfolio (56%) tracked BD, LD and CC environmental indicators together in the same project, even though only 27% of projects were funded through all three focal areas.

In addition to environmental indicators, socioeconomic indicators were specified in the majority of MFA projects (85%, n=206)[3] to track socioeconomic outcomes as part of the multiple benefits. Fifty-three percent of MFA projects reported indicators tracking changes in income or access to capital, and 37% had indicators related to cooperation or reduction in conflict. Gender-related indicators were specified in 29% of the MFA projects.

Table 23: Frequency of identified environmental and socioeconomic indicators

	Indicators (focal area)	**Number of projects**	**Percent (n=206)**
Environmental Indicators	Reduction in environmental threats/ stresses	196	95%
	Ecosystem cover and/ or quality (Biodiversity)	160	78%
	Vulnerability/ resilience (Climate change)	118	57%
	Biodiversity and/ or species populations (flora or fauna) (Biodiversity)	95	46%
	Soil productivity/ vegetation cover (Land degradation)	95	46%
	Soil cover and/ or quality (Land degradation)	73	35%
	Carbon sequestered (Climate change)	64	31%
	Carbon mitigated (Climate change)	61	30%
	Water coverage and/ or quality (Land degradation)	48	23%
Socioeconomic Indicators	Income or access to capital	109	53%
	Cooperation/ reduction in conflict	77	37%
	Gender equality	60	29%
	Access to natural resources	25	12%
	Health/ safety (reduced exposure to risks)	13	6%
	Access to basic services (e.g. education, health)	10	5%
	Land use rights	7	3%
	None	2	1%

[3] Only 206 out of 250 MFA projects were included in the analysis due to lack of accessible documents in the other projects to identify indicators used.

Source: Data is from project documents, reviewed and analyzed as part of this evaluation.
N=206, due to lack of accessible documents in the other projects to identify indicators used.

3. Achievement of multiple benefits

In this section, only the 49 MFA projects with terminal evaluations are included in the analysis.

3.1 Performance ratings and reported outcomes of MFA projects

Of the completed projects that had outcome ratings (n=44), 77% were rated Moderately Satisfactory (MS) or higher. In GEF-3, 72% of MFA projects (n=29) were in the satisfactory range, which is lower than GEF-2 (86%, n=7) and GEF-4 (88%, n=8). Regarding the regions, 89% of MFA projects in Europe and Central Asia (n=9) had outcome rating of MS or higher, followed by 80% in Asia (n=10), 71% in Africa (n=14), 70% in Latin America and Caribbean (n=10).

Of the completed MFA projects that had sustainability ratings (n=44), 61% were rated Moderately Likely (ML) and above for sustainability. In GEF-2, 43% were rated ML or higher for sustainability, increased to 62% in GEF-3, 75% in GEF-4. In GEF-3 and GEF-4, the sustainability rating of MFA projects is higher than that of the overall GEF portfolio in the respective GEF phase. All MFA projects in Asia (n=10) have sustainability rating of ML or higher, followed by 70% in Latin America and Caribbean (n=10), 56% in Europe and Central Asia (n=9), and 29% in Africa (n=10).

Positive environmental outcomes were most commonly reported to be in the form of reduction in environmental stress or threats (90%), and improvements in ecosystem cover or quality (71%), both of which are typically associated with benefits to the BD focal area. A little over half of the projects (51%) reported improvements in soil productivity or vegetation cover. Among socioeconomic outcomes, increased income or access to capital was the most frequently reported (74%). Other commonly reported positive socioeconomic outcomes were related to cooperation or reduction in conflict among stakeholders (33%), increased access to natural resources (30%) and gender equality (28%). Three MFA projects reported “participation in environmental activities/pro-environmental behavioral change” as the socioeconomic outcome. Table 24 provides the full list of types of outcomes reported.

Table 24: Types of environmental and socioeconomic outcomes achieved by completed MFA projects

Positive Environmental Changes/Trends	**Number of projects**	**Percentage (n=49)**
Reduction in environmental threats/ stresses	44	90%
Ecosystem cover and/ or quality	35	71%
Soil productivity/ vegetation cover	25	51%
Biodiversity and/ or species populations (flora or fauna)	23	47%
Vulnerability/ resilience	20	41%
Soil cover and/ or quality	12	24%
Carbon sequestered	14	29%
Water coverage and/ or quality	11	22%
Carbon mitigated	9	18%
Positive Socioeconomic Changes/Trends	**Number of projects**	**Percentage (n=46)**
Income or access to capital	34	74%
Cooperation/ reduction in conflict	14	30%
Access to natural resources	13	28%
Gender equality	12	26%
Health/ safety (reduced exposure to risks)	6	13%

Land use rights	5	11%
Access to basic services (e.g. education, health)	5	11%

Source: Data is from project documents, reviewed and analyzed by GEF IEO.

Some degree of broader adoption of governance- , management- and institutional capacity-related outcomes was reported in 80% of projects. These projects had fully or partially started the broader adoption of these outcomes, indicating progress towards larger-scale impact (table 25).

Table 25: Extent of broader adoption in MFA projects

Extent of broader adoption	Number	Percentage (n=49)
Yes (implemented and/ or showing results)	28	57%
Some concrete action taken but not (yet) fully implemented	11	22%
Planned/ discussed in detail but not (yet) implemented	3	6%
Mentioned/ intended but no detailed plans or discussions (yet)	3	6%
No	2	4%
Unable to assess	2	4%

Source: Data is from project documents, reviewed and analyzed by GEF IEO.

3.2 Factors affecting achievement of multiple benefits

Contributing and hindering factors

44 out of 49 MFA projects have reported factors affecting outcomes in the terminal evaluations. Factors most frequently mentioned as contributing to positive outcomes in MFA projects (n=44) were good engagement of key stakeholders (77%), national government support (48%), highly relevant technology or approach (41%). The three factors mentioned in the most number of terminal evaluations for hindering achievement of outcomes in MFA projects were low institutional capacity (50%), poor project management (39%), and overly ambitious project objectives (32%).

Table 26: Factors most commonly cited in Terminal Evaluations as affecting environmental outcomes

Factor type	Contributing		Hindering	
	Factor	Number (%)	Factor	Number (%)
Project related	Good engagement of key stakeholders	34 (77)	Poor project management	17 (39)
	Highly relevant technology/approach	18 (41)	Overly ambitious project objectives	14 (32)
	Good coordination with/ continuity of previous or current initiatives	14 (32)	Inappropriate/insufficient technology/approach	10 (23)
	Good project design	14 (32)	Ineffective/ insufficient stakeholder engagement	9 (21)
Contextual	National government support	21 (48)	Low stakeholder/ institutional capacity to implement activities	22 (50)
	Other stakeholder support	14 (32)	Lack of other stakeholder support	11 (25)

	Previous/current related initiatives (by government, donors, global events, etc.)	6 (14)	Lack of national government support	8 (18)
	"Champions" (individuals who pushed strongly for outcomes to be achieved)	6 (14)	Other unfavorable political conditions/events (e.g. civil war, change in leadership)	8 (18)

Note: n=44

Factors significantly affecting MFA project outcome ratings

For the completed MFA projects, "low stakeholder/ institutional capacity to implement activities" was reported by 90% of projects (n=10) with outcome ratings in the unsatisfactory range and 38% of projects (n=34) with satisfactory outcome ratings, a difference that is statistically significant (p=0.009, Fisher's exact test). That is to say, low institutional capacity to implement activities was particularly linked to unsatisfactory outcome ratings.

Together with low stakeholder/institutional capacity, hindering factors that were more frequently reported by MFA projects with unsatisfactory outcome ratings also included inappropriate/insufficient technology/approach (44% vs. 8% in projects with satisfactory outcome ratings), lack of national government support (44% vs. 8%), over ambitious project objectives (44% vs. 31%) and no activities designed to sustain momentum beyond project (33% vs. 8%).

Of the 22 MFA projects reported low stakeholder/institutional capacity as a hindering factor, 59% still had outcome ratings in the satisfactory range. When looking deeper into contributing factors cited by these projects, the most common ones were: highly relevant technology/approach (31% vs 0% in projects with unsatisfactory outcome ratings), support from other stakeholders such as other donors, private sector, CSOs (31% vs. 11%), and good project design (31% vs. 21%).

In order to identify the necessary and/or sufficient conditions (combinations of contributing and hindering factors) for MFA projects to achieve satisfactory outcome ratings, Qualitative Comparative Analysis (QCA) was conducted on a sample of 22 MFA projects that reported "low stakeholder/ institutional capacity to implement activities" as hindering factor.

Based on previous analysis, only the most frequently mentioned factors were included in the QCA, these are:

- Contributing factors: highly relevant technology/approach, good engagement of key stakeholders, good coordination with/ continuity of previous or current related initiatives, good project design, national government support, other stakeholder support.
- Hindering factors: overly ambitious project objectives, poor project management, low stakeholder/ institutional capacity to implement activities.

Parsimonious solution

The truth table analysis yielded parsimonious solution (table 27) that included smallest number of conditions, it suggested that a satisfactory outcome rating is likely to be achieved in the given low institutional capacity situation, when:

- No other major hindering factors presents together with low institutional capacity factor;
- The project has good project design even without much national government support;

- The project has highly relevant approach.

Table 27: Output of truth table analysis (parsimonious solution)

Terms	Raw coverage	Unique coverage	consistency
NO national government support **AND NO overly ambitious objective** **AND NO poor project management**	**0.46**	**0.15**	**1**
Good project design **AND NO National government support**	**0.31**	**0.23**	**1**
Highly relevant approach	**0.31**	**0.08**	**1**
Good engagement of key stakeholder AND previous/current related initiatives AND NO overly ambitious objectives	0.15	0.08	1
NO previous/current related initiatives AND National government support AND poor project management	0.15	0.08	1

Intermediate solutions

The intermediate solutions based on selected simplifying assumptions provided the following possible solutions (table 28 and 29):

Assumption one:

- **Present conditions:** highly relevant approach, good engagement of key stakeholders, good project design.
- **Absent conditions:** national government support, other stakeholder support.
- **Present/absent conditions:** previous/current related initiatives, overly ambitious objectives, poor project management.

A satisfactory outcome rating is likely to be achieved in the given low institutional capacity situation, when:

- The project has national government support or previous/current related initiatives, but also has no other major hindering factors presents together with low institutional capacity factor;
- No other major hindering factors presents together with low institutional capacity factor in the project, and the project has good engagement of key stakeholders and previous or current related initiatives.

Table 28: Output of truth table analysis (intermediate solution assumption one)

Terms	Raw coverage	Unique coverage	consistency

NO poor project management AND NO overly ambitious objectives AND NO national government support AND NO previous/current related initiatives	0.38	0.38	1
NO poor project management AND NO overly ambitious objectives AND previous/current related initiatives AND good engagement of key stakeholder	0.15	0.15	1

Note: there are 6 other possible solutions with coverage of 0.08 that are not included in the table.

Assumption Two:

- **Present conditions:** highly relevant approach, good engagement of key stakeholders, good project design, national government support, other stakeholder support.
- **Absent conditions:** poor project management.
- **Present/absent conditions:** previous/current related initiatives, overly ambitious objectives.

A satisfactory outcome rating is likely to be achieved in the given low institutional capacity situation, when the projects has effectively engagement of key stakeholders and no other major hindering factors.

Table 29: Output of truth table analysis (intermediate solution assumption two)

Terms	Raw coverage	Unique coverage	consistency
NO poor project management AND NO overly ambitious objectives AND NO national government support AND engagement of key stakeholders	0.31	0.31	1
No previous/current initiatives AND overly ambitious objectives AND national government support	0.15	0.08	1
No previous/current initiatives AND overly ambitious objectives AND good project design	0.15	0.08	1
No previous/current initiatives AND No poor project management AND NO national government support	0.15	0.08	1

AND good project design			
No previous/current initiatives NO national government support AND good project design AND engagement of key stakeholders AND other stakeholder support	0.15	0.08	1

Note: there are 3 other possible solutions with coverage of 0.08 that are not included in the table.

Necessity (Superset)/ sufficiency (subset) analysis

When the contributing factor of "highly relevant approaches" was reported, the outcome rating was always in satisfactory range, and it was observed in 31% of the successful cases.

When the combination of "highly relevant approaches" and "engagement of key stakeholders" was reported, the outcome rating was always in satisfactory range, and it is observed in 23% of the successful cases.

When the contributing factor of "other stakeholder support" is reported, it led to satisfactory outcome rating in 80% of the cases. It is observed in 31% of the successful cases.

QCA's crosstabs procedure was used to assess necessary conditions. When the row percentage (the percentage of the cases with the outcome) is at least 90%, then it is a possible necessary condition. The results showed that no factor in this analysis had row percentage of at least 90%, in other words, no factor is a necessary condition.

Table 30: Output of superset/subset analysis

terms	consistency[4]	coverage	combined
Highly relevant approaches	1	0.31	0.55
Highly relevant approaches AND engagement of key stakeholders	1	0.23	0.48
Other stakeholder support	0.8	0.31	0.50

Note: Only the terms have consistency greater than 0.75 and coverage greater than 0.2 are kept.

In addition, binary and multinomial logistic regression models were developed to test whether being an MFA or SFA project would show difference in the outcome rating. 205 projects from GEF-4 and GEF-5 with available outcome ratings were included (13 MFA projects and 172 SFA projects).

In the binary logistic regression model, the binary outcome rating[5] was chosen as the dependent variable (Y), starting with 3 explanatory variables (MFA/SFA, GEF grant amounts, cofinancing ratio). The independent variables were chosen because these are the key indicators that may show differences between an MFA project and an SFA project. However, the model was not significant.

[4] Consistency refers to the proportion of cases with a given causal combination that also achieved satisfactory outcome rating, while coverage represents how many cases with the satisfactory outcome ratings are represented by a particular causal condition.

[5] Binary outcome rating: 1 = Moderately Satisfactory and above; 0 = Moderately Unsatisfactory and below

A forward selection approach was used by adding more explanatory variables into the binary logistic regression model, they were: project length, sustainability rating, implementation rating, execution rating, M&E design rating, and M&E implementation rating. With all 9 explanatory variables built in the model, the regression model had a likelihood ratio chi-square of 55.6 with a p-value of 0.0001, which showed that the model as a whole fit well. But none of the independent variables was significant.

The six-point outcome rating[6] was used in a multinomial logistic model as the dependent variable, with the same 9 independent variables tested in the binary model, but this model did not converge.

Hence, there is not enough evidence from the regression models to tell if being an MFA or SFA project would affect project outcome rating.

4. Institutional issues

4.1 STAR allocation in GEF-5

GEF-5 STAR allocation covered 144 countries, more than half (56%) of which have developed 94 country-level MFA projects, amounting to USD $606.4 million GEF grant. The rest (44%) did not have MFA projects, the majority of which are countries with flexibility in STAR allocation (table 31). Of the 63 countries with flexibility (STAR allocations ≤$ 7 million), 62% had no MFA projects, while 38 % had only one MFA project.

Table 31: Distribution of countries with MFA projects in GEF-5

Number of MFA projects	Number of Countries		Total
	Without Flexibility (STAR allocation > 7 million)	With Flexibility (STAR allocation ≤ 7 million)	
0	25	39	64
1	45	24	69
2	9	0	9
3	1	0	1
4	1	0	1
Total	**81**	**63**	**144**

Source of data: GEF PMIS

For the 80 countries that have developed at least one country-level MFA projects, 70% of the countries (56) have more SFA projects than MFA projects in GEF-5, including 11 countries with flexibility in STAR allocation and 45 countries without flexibility (Table 32). It suggests that most countries prefer to implement SFA rather than MFA projects, at least during this GEF phase.

Table 32: Countries' choices between MFA projects and SFA projects in GEF-5

MFA projects as % of total projects in GEF-5	Number of Countries		Total
	Without Flexibility (STAR allocation > 7 million)	With Flexibility (STAR allocation ≤ 7 million)	
Less than 50%	45	11	56
Equal to 50%	7	9	16

[6] six-point outcome rating scale: 1 = Highly Unsatisfactory; 2 = Unsatisfactory; 3 = Moderately Unsatisfactory; 4 = Moderately Satisfactory; 5 = Satisfactory; 6 = Highly Satisfactory.

Greater than 50%	1	0	1
100%	3	4	7
Total	56	24	80

Source of data: GEF PMIS

Flexibility of STAR allocation vs. proportion of STAR funding allocated to MFA

The proportion of STAR funding allocated to MFA is used to test its relationship with flexibility in STAR allocation. Countries with flexibility in STAR allocation tend to allocate on average 64% of the STAR resource to MFA projects, while countries without flexibility use 38% of the STAR funding in MFA projects. Both a t-test and linear regression analysis show that the difference is statistically different. That is to say, countries with less STAR funding tend to allocate a higher proportion of their STAR resources to MFA projects.

Country characteristics vs. number of MFA projects

Country characteristics in this analysis include 4 types: Small Island Developing States (SIDS), Land-locked developing countries, fragile countries, and Least Developing Countries (LDCs). Of the 64 countries without MFA projects in GEF-5, majority (73%) had special country characteristics, while a little over half (56%) of the 80 countries that developed MFA projects in GEF-5 had special characteristics. When controlling for country characteristics, the difference was not statistically significant at the 95 percent level.

4.2 Project efficiency

Figure 1 shows different stages in the GEF project cycle. There are time standards that have been approved by the GEF Council: Full-sized projects (FSPs) receive CEO endorsement no later than 18 months after the Council approves the relevant work program that included the Project Identification Form (PIF); Medium-sized projects (MSPs) receive CEO approval no later than 12 months after CEO approves the MSP PIF. Project cancellation can happen prior to or after CEO endorsement/approval.

The analyses in this section aimed to find out if MFA projects are different from SFA projects in terms of elapsed time between different stages in the project cycle.

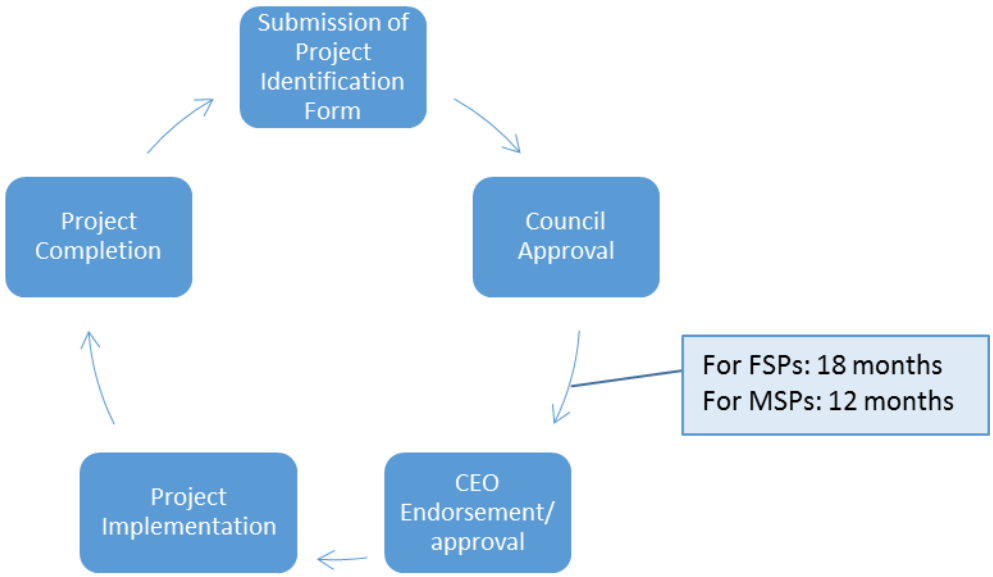


Figure 1: Generalized GEF project cycle

Elapsed time from project submission to endorsement (MFA vs. SFA)

This analysis was conducted to see if there is difference between MFA projects and SFA projects in terms of elapsed time from submission of Project Identification Form to CEO endorsement. Table 33 shows the sample size by focal area. On average, it took 24 months for an MFA project to get CEO endorsed/approved from first submission, which is the same as LD SFA project. BD SFA project on average took 26 months to get endorsed/approved, and CC SFA project needed 25 months. t-Test results show that there is no significant difference in elapsed time from entry to CEO endorsement between MFA projects and BD/LD/CC projects.

Table 33: Elapsed time from submission to CEO endorsement/approval (months)

Focal Area	**MFA**	**BD**	**CC**	**LD**
Sample size	246	375	541	84
Max	82	84	78	77
Min	0.1	0.1	0.1	0.1
Mean	**24**	**26**	**25**	**24**
Median	23	24	24	21

Source of data: GEF PMIS

Elapsed time from project approval to completion (MFA vs. SFA)

Total sample size is 205 projects from GEF-4 and-5 with available outcome rating, including 13 MFA projects and 192 SFA projects.

For this selected sample, t-Tests have been conducted for four efficiency indicators: project length, time from approval to start, time from approval to project completion, and project extension length. The Results showed no significant difference between selected MFA projects and SFA projects in project cycle efficiency.

Table 34: Project length comparison (months)

	MFA	**SFA**
Sample Size	13	192

Max	74	93
Min	0	0
Mean	46.5	34.9
Median	55.0	40.5

Source of data: GEF IEO APR dataset

Table 35: Elapsed time from project approval to implementation start (months)

	MFA	**SFA**
Sample Size	13	192
Max	17.0	32.0
Min	0	0
Mean	5.8	4.0
Median	4.0	2.0

Source of data: GEF IEO APR dataset

Table 36: Elapsed time from project approval to project completion (months)

	MFA	**SFA**
Sample Size	13	192
Max	80	95
Min	24	0
Mean	57.2	53.8
Median	60.0	56.0

Source of data: GEF IEO APR dataset

Table 37: Project extension length comparison (months)

	MFA	**SFA**
Sample Size	13	192
Max	24	62
Min	-5	-1
Mean	9.3	9.8
Median	9.0	6.5

Source of data: GEF IEO APR dataset

Elapsed time from project submission to cancellation (MFA vs. SFA)

Additional test was conducted to assess whether there is significant difference between MFA and SFA projects in terms of elapsed time from project submission to cancellation. Seven MFA projects and 67 SFA projects with available information were included.

On average, MFA projects took 48 months from first submission to cancellation, while SFA projects took 42 months. Given that the sample size is very small and not normally distributed, a Median test was carried out. Test result indicated that the difference is not statistically different.

Table 38: Elapsed time from project submission to cancellation (months)

	MFA	**SFA**
Sample size	7	67
Max	91	110
Min	19	2
Mean	48	42
Median	43	34

Source of data: GEF PMIS

Approval time of MFA projects

Majority of MFA projects were approved by GEF Council in the first 3 years in each GEF phase (68% in GEF-3, 90% in GEF-4, and 93% in GEF-5) (see table 39 to table 41). No MFA project was approved in the final year of GEF-3. In GEF-4 and GEF-5, MFA projects that got approved in the final year of each phase accounted for only 5% of all projects approved in that year (see table 42 to table 44). The analysis shows that countries typically submit proposals for MFA projects within the first half of each GEF phase.

Table 39: Percent of projects approved in each focal area every year during GEF-3 (2002-2007)

Focal Area	Before 2002	2002	2003	2004	2005	2006	2007	2008	2009
Biodiversity	0%	11%	24%	18%	28%	18%	0%	0%	0%
Climate Change	0%	9%	17%	17%	23%	33%	2%	0%	0%
International Waters	0%	8%	29%	20%	31%	6%	2%	4%	0%
Land Degradation	2%	0%	2%	19%	33%	29%	10%	4%	2%
Multi Focal Area	0%	18%	25%	25%	14%	18%	0%	0%	0%
POPs	0%	12%	12%	24%	24%	29%	0%	0%	0%
Total project approvals for GEF-3 by year	**0%**	**10%**	**20%**	**19%**	**26%**	**22%**	**2%**	**1%**	**0%**

Source of data: GEF PMIS.
Note: columns add up to 100%

Table 40: Percent of projects approved in each focal area every year during GEF-4 (2007-2010)

Focal Area	2007	2008	2009	2010
Biodiversity	18%	32%	36%	15%
Climate Change	12%	24%	36%	28%
International Waters	33%	46%	15%	6%
Land Degradation	70%	20%	10%	0%
Multi Focal Area	21%	50%	19%	10%
Ozone Depleting Substances	0%	50%	0%	50%
POPs	19%	44%	27%	10%
Total project approvals for GEF-4 by year	**20%**	**32%**	**30%**	**17%**

Source of data: GEF PMIS.
Note: columns add up to 100%

Table 41: Percent of projects approved in each focal area every year during GEF-5 (2010-2014)

Focal Area	2010	2011	2012	2013	2014	2015	2016
Biodiversity	1%	14%	31%	28%	27%	0%	0%
Climate Change	2%	12%	25%	35%	25%	1%	0.3%
International Waters	0%	14%	10%	48%	29%	0%	0%
Land Degradation	0%	7%	30%	20%	43%	0%	0%
Multi Focal Area	0%	34%	31%	28%	7%	0%	0%
Ozone Depleting Substances	50%	0%	50%	0%	0%	0%	0%

POPs	0%	9%	34%	44%	13%	0%	0%
Total project approvals for GEF-5 by year	**1%**	**15%**	**28%**	**33%**	**23%**	**0%**	**0%**

Source of data: GEF PMIS.
Note: columns add up to 100%

Table 42: Percent of projects approved each year during GEF-3 (2002-2007)

Year	Biodiversity	Climate Change	International Waters	Land Degradation	Multi Focal Area	POPs
Before 2002	0%	0%	0%	100%	0%	0%
2002	46%	24%	9%	0%	17%	4%
2003	47%	22%	16%	1%	12%	2%
2004	38%	23%	11%	11%	12%	4%
2005	42%	23%	13%	14%	5%	3%
2006	32%	39%	3%	14%	8%	5%
2007	0%	33%	11%	56%	0%	0%
2008	0%	0%	50%	50%	0%	0%
2009	0%	0%	0%	100%	0%	0%
Total project approvals for GEF-3 by focal area	**39%**	**26%**	**11%**	**11%**	**9%**	**4%**

Source of data: GEF PMIS.
Note: columns add up to 100%

Table 43: Percent of projects approved each year during GEF-4 (2007-2010)

Year	Biodiversity	Climate Change	International Waters	Land Degradation	Multi Focal Area	Ozone Depleting Substances	POPs
2007	30%	20%	13%	20%	9%	0%	8%
2008	33%	26%	11%	4%	14%	0%	12%
2009	40%	41%	4%	2%	6%	0%	8%
2010	30%	56%	3%	0%	5%	1%	5%
Total project approvals for GEF-4 by focal area	**34%**	**35%**	**8%**	**6%**	**9%**	**0%**	**9%**

Source of data: GEF PMIS.
Note: columns add up to 100%

Table 44: Percent of projects approved each year during GEF-5 (2010-2014)

Year	Biodiversity	Climate Change	International Waters	Land Degradation	Multi Focal Area	Ozone Depleting Substances	POPs
2010	13%	75%	0%	0%	0%	13%	0%
2011	19%	34%	5%	3%	32%	0%	6%
2012	23%	39%	2%	7%	16%	0%	12%
2013	17%	46%	8%	4%	12%	0%	13%
2014	25%	46%	7%	12%	5%	0%	6%

2015	0%	100%	0%	0%	0%	0%	0%
2016	0%	100%	0%	0%	0%	0%	0%
Total project approvals for GEF-5 by focal area	**21%**	**43%**	**6%**	**6%**	**14%**	**0%**	**10%**

Source of data: GEF PMIS.

Note: columns add up to 100%

Annex A: GEF OP/SP/FA objectives

OP/SP/FA Objectives	Definitions
GEF 3 OP list	
1	[BD] The conservation and sustainable use of the biological resources in arid and semi-arid zone ecosystems.
2	[BD] The conservation and sustainable use of the biological resources in coastal, marine, and freshwater ecosystems generally (including lakes, rivers and wetlands, and island ecosystems).
3	[BD] The conservation and sustainable use of the biological resources in forest ecosystems.
4	[BD] The conservation and sustainable use of the biological resources in mountain ecosystems.
5	[CC] Removal of barriers to energy efficiency and energy conservation: to reduce the risk of climate change by reducing net greenhouse gas emissions from anthropogenic sources and by protecting and enhancing removal of such gases by sinks.
6	[CC] Promoting the adoption of renewable energy by removing barriers and reducing implementation costs: to remove the barriers to the use of commercial or near-commercial RETs; and to reduce any additional implementation costs for RETs that result from a lack of practical experience, initial low volume markets, or from the dispersed nature of applications, such that economically profitable “winwin” transactions and activities increase the deployment of RETs.
7	[CC] Reducing the long-term costs of low greenhouse gas-emitting energy technologies: to reduce greenhouse gas emissions from anthropogenic sources by increasing the market share of low greenhouse gas-emitting technologies that have not yet become widespread least-cost alternatives in recipient countries for specified applications.
8	[IW] Waterbody-based operational program: to undertake a series of projects that involve helping groups of countries to work collaboratively with the support of implementing agencies in achieving changes in sectoral policies and activities so that transboundary environmental concerns degrading specific waterbodies can be resolved.
9	[IW] Integrated land and water multiple focal area operational program: to achieve global environmental benefits through implementation of IW projects which integrate the use of sound land and water resource management strategies as a result of changes in sectoral policies and activities that promote sustainable development.

10	[IW] Contaminant-based operational program: to develop and implement International Waters projects that demonstrate ways of overcoming barriers to the use of best practices for limiting releases of contaminants causing priority concerns in the International Waters focal area, and to involve the private sector in utilizing technological advances for resolving these transboundary priority concerns.
11	[CC] Promoting environmentally sustainable transport
12	[LD/ (BD, CC, IW)] Integrated ecosystem management: to provide a comprehensive framework to manage natural systems across sectors, and political or administrative boundaries within the context of sustainable development.
13	[BD] Conservation and sustainable use of biological diversity important to agriculture: to promote the positive impacts and mitigate the negative impacts of agricultural systems and practices on biological diversity in agro ecosystems and their interface with other ecosystems; the conservation and sustainable use of genetic resources of actual and potential value for food and agriculture; and the fair and equitable sharing of benefits arising out of the use of genetic resources.
14	[POPS] Persistent organic pollutants: to provide assistance, on the basis of incremental costs, to developing countries and countries with economies in transition to reduce and eliminate releases of POPs into the environment.
15	[LD] Sustainable land management: to mitigate the causes and negative impacts of land degradation on the structure and functional integrity of ecosystems through sustainable land management practices as a contribution to improving people's livelihoods and economic well-being.
GEF 4 SP list	
BD-1	Sustainable financing of PA systems at the national level
BD-2	Increasing representation of effectively managed marine PA areas in PA systems
BD-3	Strengthening terrestrial PA networks
BD-4	Strengthening the policy and regulatory framework for mainstreaming biodiversity
BD-5	Fostering markets for biodiversity goods and services
BD-6	Building capacity for the implementation of the Cartagena Protocol on Biosafety
BD-7	Prevention, control and management of invasive alien species
BD-8	Building capacity on access and benefit sharing
CC-1	Promoting energy efficiency in residential and commercial buildings
CC-2	Promoting energy efficiency in the industrial sector
CC-3	Promoting market approaches for renewable energy

CC-4	Promoting sustainable energy production from biomass
CC-5	Promoting sustainable innovative systems for urban transport
CC-6	Management of land use, land-use change and forestry (LULUCF) as a means to protect carbon stocks and reduce GHG emissions
LD-1	Supporting sustainable agriculture and rangeland management
LD-2	Supporting sustainable forest management in production landscapes
LD-3	Investing in innovative approaches in SLM
IW-1	Restoring and sustaining coastal and marine fish stocks and associated biological diversity
IW-2	Reducing nutrient over-enrichment and oxygen depletion from land-based pollution of coastal waters in LMEs consistent with the GPA
IW-3	Balancing overuse and conflicting uses of water resources in surface and groundwater basins that are transboundary in nature
IW-4	Reducing persistent toxic substances and testing adaptive management of waters with melting ice
ODS-1	Phasing out HCFC and strengthening of capacities and institutions
POPS-1	Strengthening capacity for NIP (National Implementation Plan) development and implementation
POPS-2	Partnering in investments for NIP implementation
POPS-3	Partnering in the demonstration of feasible, innovative technologies and best practices for POPs reduction
CHEM-1	Integrating sound chemicals management in GEF projects
CHEM-2	Articulating the chemicals related interventions supported by the GEF within countries' frameworks for chemicals management
SFM-1	Sustainable financing of protected area systems at national level (same as BD#1)
SFM-2	Strengthening terrestrial protected area networks (same as BD#3)
SFM-3	Management of LULUCF as a means to protect carbon stocks and reduce GHG emissions (cross-cutting BD/LD)
SFM-4	Strengthening the policy and regulatory framework for mainstreaming biodiversity (same as BD#4)
SFM-5	Fostering markets for biodiversity goods and services (same as BD#5)
SFM-6	Promoting sustainable energy production from biomass (same as CC#4)

SFM-7	Supporting sustainable forest management in productive landscapes (same as LD#2)
GEF 5 FA Objectives list	
BD-1	Improve Sustainability of Protected Area Systems
BD-2	Mainstream Biodiversity Conservation and Sustainable Use into Production Landscapes, Seascapes and Sectors
BD-3	Build Capacity for the Implementation of the Cartagena Protocol on Biosafety (CPB)
BD-4	Build Capacity on Access to Genetic Resources and Benefit Sharing
BD-5	Integrate CBD Obligations into National Planning Processes through Enabling Activities
CCM-1	Technology Transfer: Promote the demonstration, deployment, and transfer of innovative low-carbon technologies
CCM-2	Energy Efficiency: Promote market transformation for energy efficiency in industry and the building sector
CCM-3	Renewable Energy: Promote investment in renewable energy technologies
CCM-4	Transport/ Urban: Promote energy efficient, low-carbon transport and urban systems
CCM-5	LULUCF: Promote conservation and enhancement of carbon stocks through sustainable management of land use, land-use change, and forestry
CCM-6	Enabling Activities: Support enabling activities and capacity building under the Convention
IW-1	Transboundary Basins/ Aquifers: Catalyze multi-state cooperation to balance conflicting water uses in trans-boundary surface and groundwater basins while considering climatic variability and change
IW-2	Large Marine Ecosystems/ Coasts: Catalyze multi-state cooperation to rebuild marine fisheries and reduce pollution of coasts and Large Marine Ecosystems (LMEs) while considering climatic variability and change
IW-3	IW Capacity Building: Support foundational capacity building, portfolio learning, and targeted research needs for joint, ecosystem-based management of trans-boundary water systems
IW-4	ABNJ Pilots: Promote effective management of Marine Areas Beyond National Jurisdiction (ABNJ)
LD-1	Agriculture and Rangeland Systems: Maintain or improve flow of agro-ecosystem services sustaining the livelihoods of local communities

LD-2	Forest Landscapes: Generate sustainable flows of forest ecosystem services in drylands, including sustaining livelihoods of forest dependent people
LD-3	Integrated Landscapes: Reduce pressures on natural resources from competing land uses in the wider landscape
LD-4	Adaptive Management and Learning: Increase capacity to apply adaptive management tools in SLM/SFM/INRM by GEF and UNCCD Parties
CHEM-1	Phase out POPs and reduce POPs releases
CHEM-2	Phase out ODS and reduce ODS releases
CHEM-3	Pilot sound chemicals management and mercury reduction
CHEM-4	POPs enabling activities
SFM/REDD+ - 1	Forest Ecosystem Services: Reduce pressures on forest resources and generate sustainable flows of forest ecosystem services
SFM/REDD+ - 2	Reducing Deforestation: Strengthen the enabling environment to reduce GHG emissions from deforestation and forest degradation and enhance carbon sinks from LULUCF activities.
CCA-1	Reducing Vulnerability: Reduce vulnerability to the adverse impacts of climate change, including variability, at local, national, regional and global level
CCA-2	Increasing Adaptive Capacity: Increase adaptive capacity to respond to the impacts of climate change, including variability, at local, national, regional and global level
CCA-3	Adaptation Technology Transfer: Promote transfer and adoption of adaptation technology
CD-1	Enhance capacities of stakeholders for engagement through consultative process
CD-2	Generate, access and use of information and knowledge
CD-3	Strengthened capacities for policy and legislation development for achieving global benefits
CD-4	Strengthened capacities for management and implementation on convention guidelines
CD-5	Capacities enhanced to monitor and evaluate environmental impacts and trends
CD-SGP	Global Environmental benefits secured through community-based initiatives and actions

TECHNICAL DOCUMENT 2: CASE STUDY ANALYSIS

TABLE OF CONTENTS

OVERVIEW OF CASE STUDY PROJECT CHARACTERISTICS

	MFA PROJECTS					SFA PROJECTS				
PROJECT CHARACTERISTICS	**933 & 2688 Senegal**	**1544 Brazil**	**2369 China**	**4080 Senegal**	**4625 Malawi**	**2788 Ningxia China**	**2934 Brazil**	**3302 Malawi**	**3864 Gansu China**	**4234 Senegal**
Focal Areas	OP12/ SFA LD	OP12	LD, BD	BD, CCM	BD, LD, CCA	BD	BD	CCA	BD	CCA
Type of ecosystem (F=forest; W=wetland; D=drylands; G=grasslands; M= Mangroves; L=Lowlands/inland valleys; V=various)	V	F	D	V	F, W	D, G, W	F	D	V	M, L, W
Implementation Dates	2004-11	2005-11	2011-16	2011-16	2012-ongoing	2009-16	2009-16	2012-16	2011-15	2012-16
Total Budget (US$ million)	14/11	15	29.5	16	73	215	37	9.3	9	15
GEF Funding (US $ million)	4/3.6	6.8	4.5	2.9	6.6	4.5	6	3	1.7	5
Project Management Budget (US$ million)	?/0.9	2.6	1.3	1.2	7.4	7.1	4.2	0.9	2	1.4
Participatory design process	✓	✓					✓			
Component of a larger project					✓	✓			✓	
Blended with another project			✓					✓		✓
% women engaged	54%	-	48%	73%	-	-	-	-	-	-
Total Weighted Benefit Score	6.25	7.33	8.58	7.33	3.58	3.58	3.58	2.25	1.92	2.58

METHODS

Case study analysis involved an in-depth review of project documents (including CEO Endorsement documents, PIR, TEs, other reports where available) and analysis of interviews carried out with project staff and beneficiaries. Literature was reviewed where necessary for additional details and context regarding country level policies or laws, specific interventions used, and species planted.

For each MFA and SFA case study:

- All quantitative indicators available in project documents were collected in one file for the project and all project sites, where possible;
- Intended activities and anticipated outcomes as described in submitted project proposals and CEO Endorsement documents were mapped in a Theory of Change diagram. This allowed an assessment of intended results;
- Actual activities carried out and quantitative and qualitative outcomes were systematically collected in tabular format from self-reported outcomes in PIRs, TEs and interviews. The association between activities and outcomes, or outcomes and outcomes were documented in tabular format for easy reference. Inferred benefits were recorded where there was sufficient evidence to suggest that an activity actually occurred and likely produced benefits (e.g. carbon sequestration from stated hectares or kilometers of trees planted). The analysis included benefits achieved across a broad scale as well as those benefiting one or a few individuals/families.
- Completed activities and associated outcomes were mapped in diagrams to illustrate connections between activities and outcomes, and to identify where interactions among activities or benefits occurred.
- A table of activities and associated outcomes was produced, grouped into focal area and socioeconomic categories. This assisted in the identification of synergies – benefits to more than one focal area and socioeconomic outcomes – associated with one intervention.
- Trade-offs were assessed by using the categories identified in the literature as a guide (see Chapter 1), and analyzing available material and interviews.
- Factors contributing to achievement of outcomes and broader adoption were explored through an examination of relevant project characteristics, noted contributing and hindering factors identified in the portfolio analysis, and other factors identified during the document review and interviews. Factors were listed in tabular format and presence/absence of the factor noted across all ten projects.

Benefit Scoring Approach

For each case study, quantitative and qualitative benefits were systematically collected in tabular format from self-reported outcomes identified in project documents (PIRs, TEs, and other reports where available) and interviews with project staff and beneficiaries. Literature was reviewed where necessary for additional details and context regarding country level policies or laws, specific interventions used, and species planted. Inferred benefits were recorded where there was sufficient evidence in the form of reported outputs with likely benefits (e.g. carbon sequestration from stated hectares or kilometers of trees planted). The analysis included benefits achieved across a broad scale as well as those benefiting one or a few individuals/families.

Outcomes were categorized into 15 Categories, three for each of the following focal areas or sectors: biodiversity, land degradation, climate change, "other environmental", and socioeconomic. Under each category, a list of benefits was identified to standardize and capture the range of specific outcomes reported or inferred from all 10 case studies. The types of benefits identified in each category are listed in the table below.

Each type of benefit identified in a case study was given a score as follows:

Score	Description
1	Benefit quantitatively measured (M)
0.5	Benefit reported qualitatively (in TEs, PIRs, interviews) but not quantitatively measured (R)
0.25	Benefit inferred from reported outputs (I)
0	No benefits reported (N)

Scores assigned to each benefit were added within a category, and then an average of the three categories was taken for each focal area or sector. Below is an example using the BD focal area.

Category	Benefit	Score
Ecosystem cover	Forest cover increased by 25% over the project period	1
Biodiversity and/or species populations	Diversity studies show an increase in 10% of bird species	1
	Community members have observed an increase in populations of grazing animals	0.5
Reduced threats to biodiversity	Extraction of non-timber forest resources was reported to have decreased with project activities	0.5
	Forest fires have reduced by 90% due to project activities	1
	TOTAL SCORE FOR BD FOCAL AREA	4/3 = **1.33**

The average scores for each focal area, other environmental benefits, and socioeconomic benefits were added together into a total score for the diversity of types of benefits per case study project. This allowed a more standard method of assessing GEF contributions and understanding how these were achieved, rather than assessing GEF support primarily on the magnitude of the multiple benefits

produced, considering the range of differences in types of interventions and contexts that the case study projects supported, as well as in the quality of data available.

Category	List of Benefits
ENVIRONMENTAL BENEFITS	
(BD) Ecosystem cover and/ or quality increased and/or maintained	• Increased ecosystem cover (of relevant habitat) – e.g. habitat restored, habitat regenerated • Improved ecosystem quality (e.g. improved wetland habitat observed improvements) • Increased habitat connectivity (e.g. between PAs, inferred if corridors deliberately created)
(BD) Biodiversity and/ or species populations (flora or fauna)	• Increased or maintained flora/fauna population (observed or measured) • Increase species diversity (observed or measured)
(BD) Reduced threats to biodiversity (includes reduced extraction)	• Reduced burning/fires/charcoal • Reduced timber/firewood extraction • Reduced grassland, rangeland and forest clearing for other land use purposes • Reduced removal of non-timber resources (e.g. plants, mushrooms, other) • Reduced poaching of animals
(LD) Improved soil quality	• Increased organic material (measured, or inferred from activities) • Increased nutrients (measured) • Increased agricultural productivity due to soil improvement activities (as a proxy for improved soil but use R)
(LD) Soil structure improvements	• Reduced erosion • Water quality improvements due to reduced sedimentation in waterways • Improved water flow from groundwater restoration
(LD) Reduced threats to land	• Reduced use of chemical fertilizer, pesticide use • Reduced grassland and rangeland clearing • Reduced burning • Reduced deforestation
(CC) Carbon sequestered	• From active tree planting (calculated or inferred) • From allowed regeneration (calculated or inferred from land protected, taken out of use, etc.)
(CC) Maintenance of carbon sinks	*Due to project activities, carbon that is currently stored (in forests, soils etc.) is not released* • From protection activities – e.g. CNRs, improved PAs • From reduced burning of forests • From reduced deforestation
(CC) Reduced GHG emissions	• From reduced bush fires/burning • From replacement of fuel sources with cleaner burning fuels
Other environmental benefits/ reduced environmental threats:	• Air quality improvements

Air	
Other environmental benefits/ reduced environmental threats: Waste/Water	• Waste management/reduction
Other environmental benefits/ reduced environmental threats: Chemicals	• Reduced chemical pollution in general
SOCIOECONOMIC BENEFITS	
Income or access to capital	• Income gained – itemizing each income generation opportunity • Access to credit • Lower agricultural production costs/lower expenses
Food security	• Increased agricultural productivity (amount of food increased) • Inferred from food-related activities, each itemized (direct and indirect from income gained)
Context-specific SE benefits	*Dependent on social conditions/problems in the area. Could include….:* • Access to natural resources and land rights • Cooperation/ reduction in conflict • Benefits to women/access to income • Benefits to women/labour reduced • Education benefits/more children going to school • Education benefits/improved performance • Social integrity/reduced exodus of youth • Social integrity/ability to participate in religious events • Health benefits/better access to treatment • Health benefits/reduced exposure to chemicals • Health benefits/reduced exposure to disease or sanitation • Improved housing • Improved infrastructure • Reduced risk of safety hazard

SENEGAL PGIES: Integrated Ecosystem Management in Four Representative Landscapes of Senegal (PHASE 1: 2004-2007; PHASE 2: 2007-2011) (GEF ID 933/2268)

Country: Senegal
Focal Area: Phase 1 -**OP12**; Phase 2 **SFA –** Land Degradation (LD)
Geographic Scope: 57.7 million ha – focus on subset of 19 PAs and 10% of villages for project
Executing Agencies: Ministry of Environment; cooperation of DPN, DEFCCS, DCERP; and Ministry of Fisheries
Total Budget:
Phase 1 - $14.5 million ($4 million GEF; $2.4 million Senegal; $1.7 million UNDP; remainder from other country funders (EU, JICA, USAID, GTZ, Netherlands)
Phase 2 - $11.4 million ($3.6 million GEF; $2.4 million Senegal, $1.2 million UNDP, remainder from country funders)
GEF Contribution: Phase 1 - US$4 million; Phase 2 - $3.6 million
Project Management: Phase 1: ? ; Phase 2: US $914,822

PGIES was designed to address land degradation (forests, rangelands, mangroves), fragmentation and pressures on protected areas and biodiversity loss. Key threats identified included land conversion, deforestation, poaching, overgrazing, over-extraction of marine resources and non-timber products, and uncontrolled fires. Four representative ecosystems were selected, each with distinct contexts and threats to biodiversity and land degradation (see below). All sites were noted as having a high degree of conflict between local community members and protected area staff due to a lack of buffer zones.

FOUR REPESENTATIVE LANDSCAPES IN PGIES

	Dominant use	Identified pressures
Ferlo sylvo-pastoral ecosystem	Livestock and crop farming by four agro-pastoral ethnic groups, one of which is transhumant	Over-grazing, poaching of predatory animals to protect livestock, increased settlement and conversion of land to crops, droughts driving transhumant groups south (to Niokolo-Koba) in search of forage
Niokolo-Koba dry open forest	Subsistence agriculture	Expansion of agriculture, fuelwood harvesting, and poaching for food and protection of livestock
Niayes coastal ecosystem	Commercial fruit and vegetable production Fishing	Overexploitation of water table for irrigation, overgrazing on dunes, expansion of horticulture. Fisheries: traditional fishing gear, disturbance of turtle nests, and illegal fishing boats competing with local fishers
Delta du Saloum marine-coastal-inland wooded savannah	Fishing and trading of fish products (oysters, molluscs, etc.), salt extraction, crop cultivation, and livestock breeding	Overexploitation of fish, associated with declines in production, and commercial crop production on the continental side

The approach used in PGIES was that of three inter-linked spatial units consisting of existing Protected Areas (PA) at the core, newly created Community Nature Reserves (CNR) and Pastoral Units (PU) as a buffer around the core, and Village Territories around the outside of both units practicing sustainable natural resource management. The project also took into account regional inter-linkages between the four ecosystems through eco-regional planning. CNRs and PUs did not exist in Senegal before the project, however the country had been moving towards decentralization of environment and natural resource management to communities since 1972. A 1988 Forestry Code also recognized for the first time the existence of community forests and confirmed communal ownership of forest products.

PGIES had a participatory planning phase, involving local farmers, fishers, herders, NGOs, National Parks and other agencies (2000 participants). These actors endorsed the project at the planning stage, noting

especially the benefits of their active role in formulating the plan and model of co-management. Overall the project was integrated at design, to manage globally significant biodiversity, sequester carbon and avoid carbon emissions, and prevent land degradation. The integrated approach was purposefully chosen with the rationale that the lack of sectoral integration in the wide diversity of existing country and regional projects has resulted in non-replicable packages past the demo site and limited adoption by participants.

PGIES was originally designed as a 3-phase project. Phase 1 focused on removing barriers and creating an enabling environment for IEM, the CNRs, integrated conservation and development, and Eco-Regional Planning. Phase 2 focused on testing models in sample sites and sharing lessons learned. Phase 3 was intended to replicate and scale up efforts from Phase 2. GEF funding was not acquired for Phase 3.

PGIES components included: 1) adapting policy and legal framework towards IEM – including the revision of land tenure laws pertaining to communal land to allow creation of Community Nature Reserves; 2) sustainable development and community based natural resource management activities in the Village Territories; 3) conservation and sustainable management activities in the CNRs and PUs; 4) co-management approaches for biodiversity conservation in the protected areas; 5) participatory ecosystem monitoring; and 6) (Phase 2 only) learning and adaptive management activities. Alternative livelihood activities were integrated with a revolving credit/loan system. GEF funded a proportion of all project components.

PGIES #988 & 2688 Project Activities

Component 1 (Policy and legal frameworks)	**Components 2 & 3 (Sustainable management in CNRs/PUs and Village Territories)**		**Component 4 (Biodiversity conservation co-management in PAs)**
Policy reviews	Establish CNRs/PUs	**Alternative livelihoods**	Increased patrolling
Legal amendments	Local management plans	Village nurseries	Early warning system
Capacity building for IEM, CBNRM, co-management	Training and awareness-raising	Non-timber forest products	Fire breaks
		Fruit trees in orchards, windbreaks, agroforestry	Poachers converted to Ecoguards
	Damns and dykes for salt control	Beekeeping	
	Compost	Fish processing	
	Improved stoves	Oyster harvesting	
	Tree planting		

INTERMEDIATE OUTCOMES

Phase 1

- *Governance arrangements:* new Senegalese environmental law integrating EIA (Environment Impact Assessment) guidelines established; 19 CNR/PUs legally established.
- *Management approaches*: Local Community Based Management Plans in 168 Villages in 150 VT (Village Territories); 3 Local Management Plans in PUs; 170 village level Local Management Committees; a federal committee of all 15 Inter-Village Committees (IVC); 18 local coastal management plans; 135 members participated in a co-management forum; 170 Village Committees to combat poaching around PAs; local M&E Committees; watering fees tested in Local PUs;
- *Institutional capacity*: radio equipment and other equipment for PA
- *Knowledge management*: Participatory Monitoring and Evaluation Unit; data bank; Information and Rapid Warning System for eco-guards; 231 eco-guards being trained in nursery plant production, fire-free honey production/collection, tree plantation techniques, construction of firebreaks, and wild plant and animal species identification; conflict management training in PUs and 5 conflict reduction strategy meetings; environmental awareness raising, training, information and communication program in 195 villages; 22 mass media events, including TV broadcastings.

Phase 2

- *Governance arrangements:* ratification of the consensual common charter around the Saloum Delta Biosphere Reserve and the Niokolo Koba Biosphere Reserve;
- *Management approaches:* 26 CNRs (Community Nature Reserves)/PUs (Pastoral Units) created and natural resources management plans; operational network of 9 Savings and Credit Funds established (REMEDE) with procedural manuals, bylaws, credit policy, business plan, Board of Directors, Credit Committee and Supervisory Board
- *Knowledge management:* environmental awareness-raising action plan implemented in 35 test schools; awareness/training exchange visits of local councillors (Rural Community Chairman, MPs, Senators and ARD); animal inventories; sign boards; a digital herbarium, a physical herbarium and a leaflet have been produced on endemic species found in the field.

ENV/SE OUTCOMES

Table MFA 1A summarizes the quantitative indicators available for the project. Table MFA 1B documents the outcomes and weighted score calculated for Senegal PGIES.

SYNERGIES

Table MFA 1C lists direct benefits for each intervention where there were reported or inferred environmental or socioeconomic outcomes, to facilitate identification of synergies.

- *Established Community Nature Reserves (CNRs) and Local Management Plans* – in Senegal, communities require permits to access resources as needed (e.g. during dry season) for firewood, building materials and forage. The establishment of CNRs/PUs with local management plans (and Village Territory plans) gave legal access to resources. Prior to the project, herders had no cooperatively managed pastoral areas; with the project they gained legal and secure access to resources in 3 Pastoral Units managed in Ferlo (through Senegal Land Tenure Law). More equitable access to land in buffer zones because of decentralized management noted in Données SE PGIES. The associated environmental benefits of the CNRs include: increased habitat connectivity (including 3 transhumant corridors between two of the target ecosystems), reduced rangeland clearing (due to PUs), and reduced extraction of resources – this in turn contributed to habitat regeneration, and observed increases in wildlife populations (larger herds of Giant Eland, 30% increase in presence of species of global importance). An estimated 2.295 million t CO2e was reduced between 2004 and 2009 due to habitat regeneration in 8 CNRs. Socioeconomic benefits included increased access to resources, reported reduced conflict over resources, and, when combined with credit/savings and sustainable livelihood activities (e.g. non-timber forest products, beekeeping) reported increased income, and improved food security (although not measured).
- *Non-timber forest enhancement/collection* – a variety of income-generating opportunities increased access to or diversity of food (food security) as well as inferred erosion reduction and stored carbon. For example, harvesting non-timber forest products increased income, and increased access to different food sources directly (e.g. through collection of nuts and fruit) and indirectly through the sale of these products and the use of the income to purchase food; fruit trees in orchards, windbreaks, increased access to fruits, and are inferred to reduce erosion and store carbon.
- *Fire Breaks* – fire breaks had multiple benefits, including inferred erosion reduction and carbon sequestration (538 km of firebreaks planted with multiple use, although the specific uses are not noted). The combination of fire control activities resulted in a 90% reduction of bush fires across all

four sites by the end of Phase 2. These activities included increased patrolling, early warning systems, regulations incorporated into local management plans, and planting and opening of fire breaks. Beekeeping was an unanticipated fire control mechanism, in that the vigilance of hive owners to protect the hives also contributed to fire suppression.

- *Mangrove planting* – in Guembeul fauna Reserve, one interviewee noted that local communities used to cut the mangrove forest for fuelwood. Now (referring to 2016), since the mangroves have been replanted, there are fish and shrimp in the CNR which community members are harvesting to earn income (can earn up to 7500 CFA in a day).
- *Reduced risks associated with climate change (resilience)* – the diversification of income generating opportunities and food sources reduces the risk of economic crops or failures, and increases the ability to withstand and/or bounce back from disturbances such as those presented by climate change (e.g. drought, floods, changes in precipitation).

TABLE MFA 1A: MEASURED PROJECT INDICATORS

Biodiversity Outcomes	• Phase 1: 16 CNRs and 3 PUs (in Ferlo), **415 035 ha**, allocated to 195 villages around PAs and connecting PAs using seasonal migratory routes; 3 transhumant corridors between Ferlo and NKNP site. • Phase 2: (cumulative) total of 26 CNRs covering **577 000 hectares** for 203 pilot villages sheltering 99 009 inhabitants. • 90% reduction in fires (by end of Phase 2) • 2,862 ha of mangroves regenerating (Phase 1 and 2 cumulative) • Larger herds of Giant Eland seen in Niako-Nyapo National Park (Phase 1) • Presence of animal and plant species of global importance increased by 30% in each site (Phase 2) • 1667 ha of land rehabilitated with local species (Phase 1 & 2 cumulative) • 353.85 hectares of saline land recovered (Phase 1 and 2 cumulative) • Total control of rangeland clearing reported by end of Phase 1
Livelihood Outcomes	• No data available, although increased income noted in documents and interviews. • Women accounted for 53.8% of beneficiaries of the micro-credit project (e.g. processing of local products, poultry farming, and petty trade)
Climate change related outcomes	• Reduction of emissions to 2.295 million tCO_2e (tons CO_2 equivalent) between 2004 and 2009 in the eight CNRs around Niokolo Koba National Park (TE 2268)
Land and Agriculture Outcomes	• 1397.25 ha of arable lands are fertilized with improved compost (unclear if cumulative) • Phase 2: 538 km of firebreaks planted with multiple use • Phase 2: 465.66 km of shelter belts and hedging plants • 11 integrated community nurseries and 78 village nurseries were established and 4,796,000 plants were produced • Mangrove planting with *Avicennia* (#s not provided)

TABLE MFA 1B: OUTCOMES AND WEIGHTED SCORE SENEGAL PGIES

ENVIRONMENTAL BENEFITS				
Benefit Category	**Category Score**	**Outcome Rating**	**Outcome Score**	**OUTCOMES**
(BD) Ecosystem cover and/ or quality increased and/or maintained	**1.5**			
		R	0.5	**Habitat connectivity:** 26 CNRs covering 577 000; 3 transhumant corridors allowing migration of fauna
		M	1	**Increased ecosystem cover:** 2862 ha of mangrove rehabilitated by Phase 2; 1667 ha of land rehabilitated with local species; 1169.21 ha of wetlands restored
(BD) Biodiversity and/ or species populations (flora or fauna)	**2**			
		M	1	**Increased land based wildlife populations**: larger herds of Giant Eland observed (increases of up to 70 animals including young), attributed to expanded wildlife habitat around PAs from the CNRs; 30% increase in species of global significance in all sites by Phase 2 measured
		R	0.5	**Increased marine populations:** more fish and shrimp reported in the MPA
		R	0.5	**Increased species diversity:** in Saloum Delta, new species of plants and animals (including birds) discovered in the CNR; species that had previously disappeared. NOTE: several documents in the "Senegal Inventory of coordinates & monitoring indicators" show conflicting changes in biodiversity through census over time
(BD) Reduced threats to biodiversity	**1.75**			
		R	0.5	**Reduced extraction of marine resources:** reduced extraction of resources from MPA reported due to access to resources in CNR
		I	0.25	**Reduced firewood/timber extraction:** reduced removal of firewood inferred from 4397 improved stoves reducing need for firewood
		M	1	**Reduced forest fires:** 90% reduction of forest fires across all 4 sites
(LD) Improved soil quality	**0.75**			

		R	0.5	**Reduced salt in soils**: reported soil improvements from rehabilitating 353.85 hectares with salt dykes; recovery of saline soils reported to have increased vegetable and rice production (105 ha of saline soils were reclaimed in Saloum Delta; 2016 ha in Niayes); Because of salt control measures (community built dams in NP) in Missirah, rice productivity has doubled
		I	0.25	**Organic material:** inferred from use of compost over 1397.25 ha
(LD) Soil structure improvements	**0.25**			
		I	0.25	**Reduced erosion:** inferred from fixation of 99.2 km of dunes; tree planting activities in forest, shelterbelts, fire breaks, etc.; rehabilitation with local species
(LD) Reduced threats to land	**1.75**			
		M	1	**Reduced forest fires:** 90% reduction of forest fires across all 4 sites
		R	0.5	**Reduced rangeland clearing:** Total control of rangeland clearing reported by end of Phase 1, attributed to legal land rights provided to herders
		I	0.25	**Reduced firewood/timber extraction:** reduced removal of firewood inferred from 4397 improved stoves reducing need for firewood
(CC) Carbon sequestered	**1.25**			
		M	1	**From habitat regeneration:** reduction of emissions to 2.295 million tCO_2e between 2004 and 2009 in the eight CNRs around Niokolo Koba National Park due to habitat regeneration and buffer zones
		I	0.25	**From tree planting:** of windbreaks, fruit orchards, agroforestry, tree nursery, firebreaks (538 km planted with multiple use), shelter belts (465.66 km), mangroves
(CC) Maintenance of carbon sinks	**1.5**			
		R	0.5	**From forest protection:** Protection of forests in 23 CNRs covering 577 000
		M	1	**From reduced burning:** 90% reduction in bush fires reported end of Phase 2 in all 4 sites
(CC) Reduced GHG emissions	**0.75**			
		R	0.5	**From reduced burning:** 90% reduction in bush fires across all 4 sites;
		I	0.25	**From renewable energy:** inferred from 4397 alternative stoves
Other environmental benefits/ reduced environmental threats	**0**			
Air		N	0	

Waste		N	0	
Chemicals		N	0	
SOCIOECONOMIC BENEFITS				
Income or access to capital	4			
		M	1	**From fish and shrimp farming:** [reported from one case] earn up to 7500 CFA in a day from fish and shrimp in MPA as a result of mangrove rehabilitation
		R	0.5	**From NTFPs** - increased income from CNR products (nuts and fruits) reported but not measured
		R	0.5	**Access to credit:** 116 revolving microcredit projects in Phase 1 (While we may not have numbers, we do know that the mutual savings groups are still functional and providing loans to local businesses)
		R	0.5	From orchard fruit trees/agroforestry (women reported, as stated in TE)
		I	0.25	Inferred from fish processing
		I	0.25	Inferred from oyster harvesting
		I	0.25	Inferred from bee-keeping (activity involving Ecoguards)
		I	0.25	Inferred from poultry (an activity directed at Ecoguards)
		R	0.5	From market gardening (women reported, as stated in TE)
Food security	2			
		R	0.5	**Increased agricultural productivity:** recovery of saline soils reported to have increased vegetable and rice production; Because of salt control measures (community built dams in NP) in Missirah, rice productivity has doubled
		I	0.25	Inferred from planting and harvesting of NTFP (nuts and fruits) (consumption and sale)
		I	0.25	Inferred from orchard fruit trees/agroforestry (consumption and sale)
		I	0.25	Inferred from fish processing (consumption and sale)
		I	0.25	Inferred from market gardening
		I	0.25	Inferred from poultry
		I	0.25	Inferred from oyster harvesting (consumption and sale)
Context-Specific SE Benefits	1.25			
		R	0.5	**Access to natural resources:** reported from CNRs/PUs giving legal access to resources - prior to the project, herders had no cooperatively managed pastoral areas; with the project they have legal and secure access to resources in 3 Pastoral Units managed in Ferlo (through Senegal Land Tenure Law). More equitable access to land in buffer zones because of decentralized management noted in Données SE PGIES; By end of Phase 1, had assisted 170 villages in securing land rights to 19 CNRs/PUs covering 415, 035 ha

		R	0.5	**Greater cooperation:** local management committees and plans (170 LMC, 18 coastal village territory management plans adopted and implemented; 4 Regional Committees established; 15 inter-regional committees) reported to have reduced conflict over land use (The functioning of these committees through meetings, planning, management, arbitration etc. has "fostered greater solidarity and better cooperation between stakeholders"); better cooperation reported in MPA; the management committee (with community members) reduces conflict with park staff, through MPA co-management; Ecoguards reported reduced conflict over natural resources, more "friendliness", and more requests for CNRs from other areas.
		I	0.25	**Benefits to women/access to capital:** Women accounted for 53.8% of beneficiaries of the micro-credit project (e.g. processing of local products, poultry farming, and petty trade) therefore would have access to capital/income

TABLE MFA 1C: DIRECT BENEFITS ASSOCIATED WITH INTERVENTIONS

	ENVIRONMENTAL BENEFITS											SOCIOECONOMIC BENEFITS				
	BD FA						LD FA			CC FA						
	Habitat connectivity	Reduced bush fires	Reduced extraction of resources from forests and PAs	Habitat regeneration	Marine life	Wildlife populations	Reduced rangeland clearing	Reduced erosion	Soil quality	Carbon sequestration	Reduced GHG emissions	Access to natural resources	Reduced conflict over land and resources	Income	Access to financial resources (women)	Amount or diversity of food
Established CNRs/PUs	✓		✓				✓			✓		✓				
Local management plans (CNRM)		✓											✓			
Increased patrolling		✓														
Early warning system		✓														
Fire breaks		✓						I		I						
Mangrove tree planting					✓					I						
Mangrove restricted use				✓												
Bird habitat restoration						I										
Poachers converted to Ecoguards						✓										
Shelter belts/hedges										I						
Dune fixation								I								
Tree/plant planting				I				I								
Damns and dykes for salt control									✓							
Compost									I							
Alternative livelihood activities (un-specified)			✓											✓	✓	
Harvesting non-timber forest products (NTFP)																I
Beekeeping		✓														
Fruit trees in orchards, windbreaks, agroforestry								I		I						I
Improved stoves			I								I					
Village tree nurseries										I						
Fish processing																I
Oyster harvesting			✓													I

✓ = reported outcome; I = inferred outcome

FACTORS CONTRIBUTING TO OUTCOMES

Factor	Outcome	Explanation
PROJECT FACTORS		
Participatory design process	Participation and ownership	• Participatory planning phase, involving local farmers, fishers, herders, NGOs, National Parks and other agencies (2000 participants). Actors endorsed the project at the planning stage, noting especially the benefits of their active role in formulating the plan and model of co-management
Access to credit	Income, reduced extraction of resources, reduced erosion,	• Success of alternative income projects tightly tied to access to credit (e.g., for purchasing of processing equipment, materials, etc.) Phase 1: 116 revolving microcredit projects for income generation involving 108 villages and 6639 beneficiaries were carried out. Microcredit was carried out by the GEF Small Grants Program (SGP) (933 Multiple Benefits Portfolio Analysis; 2268 TE, p 25)
Participatory development of local management plans	Reduced conflict over NR; increased participation with stakeholders, reduced extraction of resources/ rangeland clearing	• Local management plans were developed in a participatory manner, including all stakeholders (e.g. in Ferlo, included transhumants) and incorporating traditional knowledge and sustainable use of natural resources • 168 Villages situated in 150 VT (Village Territories) adopted Local Community Based Management Plans through a participatory process
Local level organizations	Reduced conflict over NR; increased participation among stakeholders	• In case study interviews, the committees were praised for "fostered greater solidarity and better cooperation between stakeholders". Increased cooperation and further requests for CNRs was also reported. In the Mbamboung marine protected area (MPA), the management committee (with community members) reduced conflict with park staff, through MPA co-management
Multi-sectoral collaboration	All	• Partnerships developed with multiple agencies that crossed multiple sectors/focal areas: NP (National Park), Matam Integrated Development Plan (PRODAM), Water and Forestry, Agriculture, Water Resources and Livestock services, ANCAR (National Agency of Rural and Agriculture Advice), ADOS (Drôme Ourossougui Sénégal Association), PAPIL (Small-Scale Irrigation Support Project), Wula Nafa and other NGOs (TE); partnership praised by partners (TE)
Active engagement of women	54% of beneficiaries are women	• Women were actively engaged, with a project target of 50% inclusion
Good collaboration with partner organizations/ NGOs	Adoption of sustainable activities, increased income	• MOU signed with SGP/GEF for four sites (Niayes, PNDS, PNNK, Ferlo) to implement microcredit and community saving initiatives (TE, p. 26). The GEF Small Grants programs directed its funds to the same villages in PGIES for leveraging effect • "PGIES also collaborates closely with other partners at local level ...The representative of the PRODAM has praised the key partnership established with PGIES to achieve a common objective from different entry points" (TE, p. 26)
CONTEXTUAL FACTORS		
Villagers and herders had legal land rights to CNRs/PUs	Access to resources, income, reduced extraction of resources, rangeland clearing	• Success of alternative income generation projects tied tightly to access to CNRs. Access was due to the legal recognition of land and resource rights to the CNRs/PUs provided to the Village Territories. By end of Phase 1, had assisted 170 villages in securing land rights to 19 CNRs/PUs covering 415, 035 ha

Factor	Outcome	Explanation
National level commitment	All	• National commitment to environmental protection (Senegal has signed onto all international conventions stemming from the Rio Conference in 1992, especially on biological diversity, climate change and sustainable land management) 2268 TE • Government has an interest in Carbon trading – has an interest/ incentive to engage in these types of activities (TE)

FACTORS HINDERING OUTCOMES

Factor	Outcome	Explanation
PROJECT FACTORS		
Delays in funding provisions	Delay or cancellation of activities and associated impacts	• There was a funding delay in receiving Phase 2 funding, with Phase 1 activities continuing for a year without GEF support. The project was originally envisioned in three phases, but funding for Phase 3 was not provided. This left some project activities unfinished at some sites – e.g. from interview notes, in Village of Mbambara, noted that women had developed skills to process products, but because Phase 3 funding did not come they did not have the equipment. Also, it is noted in the interview notes (Directorate of National Parks) that the co-management of parks did not happen as the UNDP would not fund this aspect of the project
CONTEXTUAL FACTORS		
Global carbon trading rules	Negative impact on scaling up project	• It was noted in the interview notes (National Agency for EcoVillages association) that carbon could not be sold on the global market because the PGIES project was funded by the GEF and not national funds. Therefore, while carbon sequestration was happening on the ground, this was hindering national level goals of economic development through profiting from carbon sequestration in the global arena. TE notes the positive prospect of carbon trading/REDD to fund CNR networks

TRADE-OFFS

- *Improved PA enforcement/management versus access of villagers to natural resources [BD FA vs SE]* – project activities included increased patrolling/monitoring of NNRS. Specifically, management plans provided a systematic approach to deal with problems such as illegal harvesting of medicinal herbs and wild fungi in the NNRs by villagers from the surrounding villages. While the NNRs were already established – and therefore access to natural resources within the NNRs was already restricted – there was increased enforcement of illegal extraction of resources in the NNRs with this project. This improvement in PA enforcement/management benefits biodiversity, however the tradeoff is that people have even less access to natural resources gathered for food and income.
-
- *Community Nature Reserves (Local benefit vs National benefit)* – the creation of community-managed reserves for local needs is an opportunity cost for the national level – in terms of other uses for that piece of land that would contribute towards broader national economic development goals (e.g. large extraction projects). For example: it was noted in the Terminal Evaluation that there is a risk that zircon extraction in the Niayes may lead to expropriation of land within and disruption of a CNR. The potential in this case is that the environmental and social gains made through the establishment of local management systems could be lost for the gains of national level economic development (TE2268).

SENEGAL ECOVILLAGES: Participatory Biodiversity Conservation and Low Carbon Development in Pilot Ecovillages in Senegal (2011-2016) (GEF ID 4080)

Country: Senegal
Focal Area: MFA - Biodiversity (BD), Climate Change (CC)
Geographic Scope: 225,788 ha (including new CNRs and extensions); 10 pilot villages
Executing Agency: National Agency for Ecovillages (ANEV)
Total Budget: $16 million ($2.9 million GEF; $1.4 million UNDP; $6 million ANEV; remaining from 12 private sector, NGO, national and bi-lateral partner organizations)
GEF Contribution: US$2.9 million
Project management: US$1,217,888

BACKGROUND AND RATIONALE

The SPWA project was designed to address unsustainable management of natural resources and resulting threats to protected areas, driven by rural poverty. The project aims to meet villagers' needs for efficient energy, food, and other resources, as well as sustainable livelihoods and income generation, through sustainable land and resource management without degrading natural habitats and biodiversity. The project approach is based on the Ecovillage model – a model that integrates biodiversity conservation and low carbon development for both socioeconomic and environmental benefits. The Ecovillage model was recognized in Senegal prior to the project, seen in the establishment of a new Ministry of EcoVillages, Reservoirs, Artificial Lakes and Fish Farming (MEBRLAP) and the existence of a National Agency for Ecovillages (ANEV). The project aimed to address the gap of the Ecovillage model not having been tested in Senegal and the lack of a national strategy for replication.

SPWA built on the experience and lessons learned from several prior projects including PGIES (GEF project ID 933 and 2268, CNR establishment and management), the regional program 'Biological Diversity Conservation through Participatory Rehabilitation of the Degraded Lands of the Arid and Semi-Arid Transboundary Areas of Mauritania and Senegal' and PROGERT 'Groundnut Basin Soil Management and Regeneration'. An integrated approach was chosen for the project with the argument that separate non-coordinated projects in the same areas would have reduced overall effectiveness. Within the project design, biodiversity and climate change activities were seen as mutually supportive.

The project was piloted in 10 villages, 7 of which were located near protected areas. Components of the project included: 1) removing barriers to create a national level framework for scaling up the EcoVillages model in Senegal; 2) creation of Community Nature Reserves (CNRs) and/or extension of existing CNRs near pilot EcoVillages to support PAs and extend the PA network; and 3) an integrated suite of low carbon development, natural resource management, and carbon storage activities – e.g. renewable energy to reduce extraction and use of firewood; poultry and beekeeping to reduce poaching in PAs, etc. Activities were selected at the village level through Ecological Management Plans. The project proposal lists 24 collaborating projects/programs/ agencies. GEF funded a proportion of all project components.

SPWA #4080 Project Activities			
Component 1 (legal, policy, institutional)	**Component 2 (CNR establishment/strengthening)**	**Component 3 (CO_2 emissions reductions)**	**Component 4 (Carbon sequestration)**
National Ecovillage strategy	Non-timber forest products	Alternative fuel/ fuel-efficient stoves	Bamboo planting
Framework for Ecological Management Plans	Double vegetable cropping	Building stoves	Mangrove planting
Capacity building	Garden fruit trees	Jatropha for biofuel	Fire breaks
	Sustainable livelihoods (bakery, aquaculture, poultry, soap)	Biogas	Live hedges, woodlots
	Credit and loans	Solar panels (non GEF)	Tree planting in CNR
	Market gardening		Biochar
	Agrofood processing		
	Perennial livestock fodder		
	Compost		

INTERMEDIATE OUTCOMES

- *Governance arrangements:* 13 inter-Ministerial protocols signed and implemented (2 with the departments of Environment Ministry (DEFCCS, DPN), 2 with the departments of Energy Ministry (ASERPERACOP), 5 with the private sector (COSEER, CMA, Station Energy, SWF, Techogas) and 4 with non-Government actors (Vivre en brousse, ADEA,Industry sans frontriere, ADOS); establishment of Village Development Committees (CVD) and inter-village development committees (CIVD).
- *Management Approaches:* Environmental Management Plans in 11 core ecovillages under implementation; 11 local conventions on good natural resource management
- *Institutional Capacities:* capacity levels for PA management and market transformation of energy efficiency increased by at least 5% for each of ANEV, DEFCS, GENSEN, DPN; 30 training sessions benefitting 952 people. Training sessions (1305 people in 2013/2014; 952 in 2014/2015) – officers trained in socio-economic assessments, carbon sequestration studies and biodiversity conservation (Score METT); also trainings on fishing, poultry, soap manufacturing, GIS.

SE/ENV OUTCOMES

Table MFA 2A lists measurable project indicators. Table MFA 2B documents the outcomes and weighted score calculated for Senegal Ecovillages.

SYNERGIES

Table MFA 2C lists direct benefits for each intervention where there were reported or inferred environmental or socioeconomic outcomes, to facilitate identification of synergies.

- *Establishing and extending CNRS* – new Community Nature Reserves (CNR) were established as buffer zones around protected areas and existing CNRs near pilot EcoVillages were extended. In terms of environmental benefits, the intervention contributed to the observed net biomass gain of 1.7 to 2.4 m^3 per hectare per year and an estimated 57,750 CO_2/yr in the CNRs through habitat regeneration and associated planting activities, and benefited biodiversity through increased habitat connectivity (chimpanzee habitat specifically was extended). For socioeconomic outcomes, the CNRs increased villagers' access to resources which, when tied with biodiversity-friendly alternatives, increased income and provided a diversity of food sources.
- *Alternative/Fuel-efficient stoves* – alternative/fuel-efficient stoves (including solar and peanut stoves, and more efficient sand/clay stoves that decreased the need for wood by 40%) resulted in

reduced extraction of fuelwood from PAs, and directly reduced GHG emissions by less wood being burned for fuel, with an estimated 900 ha avoided deforestation. The combined effect of tree planting, renewable energy initiatives (which reduced use of high GHG emitting fuels), and alternative livelihood activities had a combined effect of reducing overall GHG emissions in the EcoVillages. The total carbon balance was estimated at 148,532 t CO2 eq/year with yearly estimates showing steady reductions over the project: from 31,729 t CO2 eq (21% reduction) in 2014, to 42,566 t CO2 eq (29% reduction) in 2015, and 62,110 t CO2 eq (42% reduction) in 2016 as compared to the baseline. The alternative stoves also reduced women's labour from less time/ burden cutting, collecting and hauling firewood, leaving more time for other endeavours. By 2016, 96% of households in 10 Ecovillages had improved stoves.

- *Solar panels* – solar panels directly reduced GHG emissions by removing the need to burn GHG emitting fuels and contributed to an estimated 900 ha avoided deforestation. They also provided electricity, which: 1) contributed to increased school performance as children had lights to study at night [socio-economic data note that children's school results have improved and drop-out rates decreased due to access to electricity, however this was also due to electrification of the villages (Données SE Ecovillage)]; and 2) powered well pumps, increasing water supply which in turn increased access to water and agricultural productivity in the dry season, where farming has been more and more susceptible to reduced rainfall patterns. In the village of Ndick, solar powered pumps and water access has provided drinking water in households and schools and children do not need to leave school to go home for water. Also in Ndick, a villager who used to fish illegally in the Bird Park of Djoudj established his own aquaculture unit to produce his own fish with increased access to water from a solar powered water pump (interview notes page 20), having a direct positive impact on fish populations in the reserve.
- *Biodigesters* – biodigesters for cooking gas and lighting (140 biodigesters) resulted in the reduced extraction of firewood from PAs contributing to an estimated 900 ha avoided deforestation, and directly reduced GHG emissions by removing the need to burn GHG emitting fuels. It is also inferred that the effluent from biogas would improve soil quality as the nutrient rich effluent was used to fertilize vegetable crops.
- *Jatropha/Biofuel* – Jatropha trees were planted as fencing linearly over 63 km and combined 50 ha. The oil from the tree was used an alternative to diesel for rice mills and other essential engines. The intervention reduced GHG emissions from the avoidance of firewood use for milling, and is also inferred to have acted as a soil stabilizer and security fence around villages. 3000 L was harvested in 2016 against a target of 10,000 L.
- *Tree planting* – the planting of bamboo, firebreaks, and live hedges, with calculated carbon sequestration, also was inferred to reduce erosion. Native species were also planted in the CNRs which contributed to habitat regeneration.
- *Reduced risks associated with climate change (resilience)* – the diversity of income generating opportunities associated with the CNRs (and micro-credit through partner organizations) resulted in increased income, which in turn increased the ability of villagers to pay for costs related to school and health, and also reduced rural exodus of youth. Many of the initiatives were food-related (NTFP, poultry, fruit trees, market gardening) which contributed to food security both directly, through the increased diversity or amount of food, and indirectly through sale of products which then provided money to purchase other food items. [*Activities included non-timber forest product collection and sale, garden fruit trees (4 trees per household, 250 ha equivalent), 14 artisanal bakery units, 4 fish ponds, 12 agro-processing units, 150 units of poultry, double vegetable cropping (70 ha), 35 women*

trained in soap making techniques for shea butter and balanites oil, 18 women trained in stove building, 800 beehives, market gardening]. The combined effect of diversified income and food activities with habitat restoration potentially increases community resilience to climate change and extreme weather. The ability to withstand and/or bounce back from disturbances such as those presented by climate change (e.g. drought, floods, changes in precipitation) is improved by access to income and having diverse food options/food security – specifically with respect to having diversified income and food generation opportunities, to reduce the risk of economic or crop failures. Reduced land degradation also strengthens a community's resilience to climate change, as a diverse and healthy ecosystem is also resilient to extreme weather patterns and has the opportunity to adapt to gradual climate changes.

Note: an unexpected benefit of artificial fodder was increased school attendance by children due to the amount of time that was freed up from not having to graze animals due to the growing of perennial livestock fodder. Children used to go to school only 3 to 4 months a year, the remainder used to forage animals outside village. With perennial fodder children able to stay in school instead of herding livestock.

NEGATIVE OUTCOMES

- *Increased income resulted in increased energy needs/use* – as living conditions improve, people are purchasing/ desiring more appliances that need water and energy to use, increasing overall energy use in the EcoVillages. **Interview notes state that this effect was recognized, and that ANEV was looking at how to better address**.
- *Increased income caused social conflict* – increased income resulted in both observed and potential social conflict. The observed conflict was between generations – older men used to be village chiefs, but now youth with more income, who are now staying in the village instead of migrating to urban areas, expect to be chief. This has created conflict which villages are resolving internally. The potential social conflict is between genders – during interviews in Mbackombel, women noted half-jokingly that now that women can afford household costs (food, school, etc.) this allows men to take on second wives, which may be a source of conflict within families.

TRADE-OFFS

- *Improved PA enforcement/management versus access of villagers to natural resources [BD FA vs SE]* – project activities included increased patrolling/monitoring of NNRS. Specifically, management plans provided a systematic approach to deal with problems such as illegal harvesting of medicinal herbs and wild fungi in the NNRs by villagers from the surrounding villages. While the NNRs were already established – and therefore access to natural resources within the NNRs was already restricted – there was increased enforcement of illegal extraction of resources in the NNRs with this project. This improvement in PA enforcement/management benefits biodiversity, however the tradeoff is that people have even less access to natural resources gathered for food and income.
-
- *Jatropha for biofuel vs biodiversity (trade-off between CC and BD)* – Jatropha was planted to use oil to run machinery to replace fuelwood/reduce deforestation. Santangeli et al (2016) discuss the potential trade-offs between land intensive renewable energy (e.g. biofuel) and habitat for

biodiversity. **Project addressed this trade-off by growing Jatropha linearly as fencing, not as a monoculture, thereby reducing opportunity cost to land for biodiversity and food production.**

- *Brazil grass for animal fodder (trade-off between biodiversity goals)* – there is a potential geographic tradeoff with the chosen intervention of perennial fodder. The intention of the activity was to provide a sustained fodder supply for livestock thereby reducing extraction of fodder and grazing in PAs and benefiting biodiversity in PAs. However, Brazil grass is an exotic species, which may have a negative impact on local biodiversity as it is grown near villages for fodder. In the interview notes, ANEV states that Brazil grass has been used in Senegal for 200 years and is not considered invasive. However, this tradeoff needs to be explored further.

TABLE MFA 2A: MEASURED PROJECT INDICATORS	
Biodiversity Outcomes	• 28,875 ha of new and extended CNR established, increasing total area targeted by project to 225,788 ha. Net biomass gain of 1.7 to 2.4 m^3 per hectare per year in the CNRs • 90,000 *Palmyra* nuts in CNRs planted over an area equivalent to 926 ha • The introduction of improved stoves and biogas to improve cooking methods avoided deforestation equivalent of nearly 900 ha.
Livelihood Outcomes	• Estimated revenues from forest fruits was 20% of agricultural income • Kak – sale of 800 kg of acacia harvested in the CNR gained an individual 680,000 CFA francs for family • Thiasky – sale of 900 kg of jujubes earned 225,000 CFA francs to cover the needs of his household; • Mbam, a woman earned 50,000 CFA from tamarind tree collection. • Double vegetable cropping generated 2.5 million FCFA/year, 120,000 FCFA/household • Revenues from gardens increased by 6 due to increased productivity and sales during peak periods • 73% of women were involved in EcoVillage jobs (building improved stoves, gardening, fruit orchards, non-timber products and processing, bakery, soap production and fish breeding).
Climate change related outcomes	The carbon balance in the Eco-villages is estimated at around 148,532 t CO2 eq/year - reduction of carbon emissions has been increasing steadily through the project lifetime, from 31,729 t CO2 eq (21% reduction) in 2014, to 42,566 t CO2 eq (29% reduction) in 2015, and 62,110 t CO2 eq (42% reduction) in 2016 as compared to the baseline. Due to: • sequestration of nearly 57,750 equivalent CO_2/year, or a 39% reduction of emission levels with new CNRs • 110 tons of CO2 per village / year with 207 km of hedges • 40,000 bamboo plants in 4 EV, allowing sequestration of at least 54 tons of CO2 per year • 400 hectares of mangroves planted allow the sequestration of nearly 1,184 t CO2 eq/ year • 22 km of fire breaks planted • Improved cook stoves resulted in reduction of nearly 3,204 t eq CO2 of GHG emissions from avoided deforestation of about 900 ha
Land and Agriculture Outcomes	• 250 eq ha of fruit trees planted • 400 ha mangroves planted • Market gardening production has increased by 4

TABLE MFA 2B: OUTCOMES AND WEIGHTED SCORE SENEGAL ECOVILLAGES

ENVIRONMENTAL BENEFITS				
Benefit Category	**Category Score**	**Outcome Rating**	**Outcome Score**	**OUTCOMES**
(BD) Ecosystem cover and/ or quality increased and/or maintained	**1.5**			
		M	1	Vegetation cover: Net biomass gain of 1.7 to 2.4 m3 per hectare per year in the CNRs from establishment and tree planting; Enrichment planting in CNRs - 100,000 Palmyra nut trees, other numbers of seedlings noted
		R	0.5	Improved connectivity: the RNC Mbam extended to the rural community of Djilor to form an ecological corridor of 1,500 ha including a marine protected area community serving as a biological corridor for conservation of manatees, dolphin and sea turtles in Saloum Delta Biosphere Reserve
(BD) Biodiversity and/ or species populations (flora or fauna)	**0.5**			
		I	0.25	Protection of key species habitat: Additional 7,000 ha chimpanzee habitat protected and managed as CNR (extension towards Guinea border (2013); 2014: Extension of the area of protection of chimpanzees on an area of 12 000 ha in the forest Dakateli
		I	0.25	Population increase: Inferred improvements from transfer of gazelles for tourism promotion
(BD) Reduced threats to biodiversity (includes reduced extraction)	**1.5**			

		R	0.5	**Reduced timber/firewood extraction**: the introduction of improved stoves (efficient and alternative fuel) to improve cooking methods and 95 biodigesters used for cooking gas and lighting kitchens led to avoided deforestation equivalent of nearly 900 ha; 96% of all households in the 10 pilot Ecovillages use improved cook stoves by 2016; 3000 liters of Jatropha oil produced per year against a target of 10,000 liters or 30% achievement. Jatropha linear planting over 63 km and cultivation over 50 ha for oil production purposes (also avoided deforestation for firewood)
		R	0.5	**Reduced bush fires:** reduced bush fires in CNRs and near ecovillages reported
		R	0.5	**Reduced poaching:** from one individual starting own aquaculture unit and stopping illegal fishing in a reserve
(LD) Improved soil quality	**0.5**			
		R	0.5	**Organic material:** reported improvements from use of biochar (5 ha) and compost (380 ha) (production of vegetables doubled in 10 ecovillages); inferred from use of biogas effluent on vegetables
(LD) Soil structure improvements	**0.25**			
		I	0.25	**Reduced erosion:** inferred from planting of live fences, hedges, bamboo, firebreaks, etc. to reduce soil erosion + trees in CNRs
(LD) Reduced threats to land	**1**			
		R	0.5	**Reduced bush fires:** reduced bush fires in CNRs and near ecovillages reported
		R	0.5	**Reduced firewood collection:** from 40% fuel-efficient and alternative fuel stoves (96% had improved stoves by end of project), Jatropha (63 km, 50 ha), 95 biodigesters for cooking and lighting, etc.; avoided deforestation of 900ha
(CC) Carbon sequestered	**2**			

		M	1	**From tree planting:** 207 km of hedges in the 10 core EV, allowing sequestration of 110 tons of CO2 per village / year ; 40,000 bamboo plants in 4 EV, allowing sequestration of at least 54 tons of CO2 per year; 400 hectares of mangroves planted allow the sequestration of nearly 1,184 t CO2 eq/ year; inferred from 22 km of fire breaks, 250 eq ha of fruit trees
		M	1	**From regeneration:** with 28,875 ha of new CNRs established has enabled sequestration of nearly 57,750 equivalent CO_2/year (from regeneration)
(CC) Maintenance of carbon sinks	**1**			
		R	0.5	**Forest protection:** From extension or establishment of CNRs (28,000 ha added; total project area targeted at conserving biodiversity reached 225,788 ha)
		R	0.5	**From reduced bush fires:** in CNRs and near ecovillages reported
(CC) Reduced GHG emissions	**1.25**			
		M	1	**From renewable energy**: calculated 62,110 t CO2 eq (42% reduction) in 2016 as compared to the baseline due to improved stoves, solar panels, Jatropha, which all provide cleaner burning fuels
		I	0.25	**From reduced burning**: inferred from reduced bush fires
Other environmental benefits/ reduced environmental threats	0.08			
Air		**N**	0	
Waste		**N**	0	
Chemicals		**I**	0.25	Reduced contamination: At the project level, currently nearly 60% of the population have the access to latrines (what is the baseline number?) and village center has been set up a system for collecting, sorting and processing of waste
SOCIOECONOMIC BENEFITS				
Income or access to capital	**5.5**			

		M	1	**Double vegetable cropping** over 70 ha generated 2.5 million FCFA/year, 120,000 FCFA/household
		M	1	**From NTFPs:** [all individual cases] from NTFPs: sale of 800 kg of acacia harvested in the CNR gained an individual 680,000 CFA francs for family; sale of 900 kg of jujubes earned 225,000 CFA francs to cover the needs of his household; a woman earned 50,000 CFA from tamarind tree collection;
		R	0.5	**From garden fruit trees:** 4/home garden. Income reported not measured
		R	0.5	**From poultry:** Reported not measured ("in Ndick, higher income comes from chickens and improved livestock breeds that were provided by the project")
		I	0.25	Inferred from soap making
		I	0.25	Inferred from 3 aquaculture units
		I	0.25	Inferred from bakery (14 artisinal units)
		I	0.25	**From beehives:** 800 for benefit of Ecoguards
		M	1	**From market gardens**: Gardening production has increased by 4 and revenues have increased by 6 due to sales during peak periods, showing a 50% increase against a 15% target.
		R	0.5	In Mbackombel, income also comes from movie showing powered by solar.
Food security	**3.25**			
		M	1	**Increased agricultural productivity**: Having access to water for irrigation all year has increased agricultural production and added market gardening. Access gained from both solar panels and installed drilling in the community; production of vegetable crops doubled over a total area of nearly 120 ha in the 10 Ecovillages;
		R	0.5	**Fruit trees:** reported by women due to 250 eq ha of fruit trees fruit trees planted in household gardens (noted that they are eating different kinds of fruit now).
		I	0.25	**inferred from NTFPs–** directly and from sale of products and using income to buy other food items;

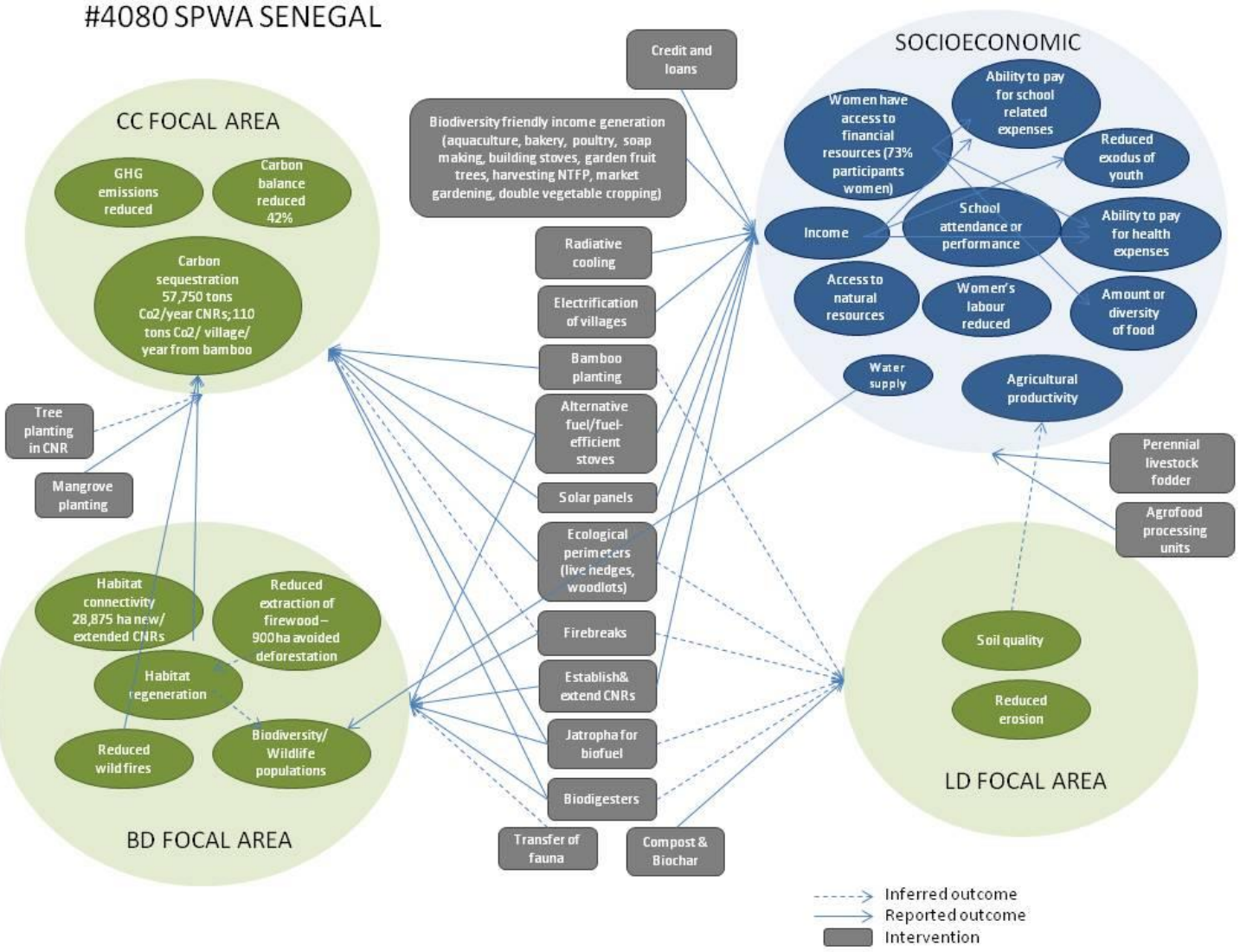
		I	0.25	Inferred from 14 **artisanal bakeries** (consumption and sale)
		I	0.25	Inferred from **3 aquaculture units** (consumption and sale)
		I	0.25	Inferred from 150 units of **poultry** (consumption and sale)
		I	0.25	Inferred from **market gardening** (consumption and sale)
		R	0.5	**Improved storage:** improved storage of milk, meat, cheese and vegetables with electricity and radiative cooling methodology
Other Context-Specific Benefits	**3.5**			
		R	0.5	**Access to natural resources and land rights**: reported from new or extended CNRs; 28,875 ha of new and extended CNR established, increasing total area targeted by project to 225,788 ha.[note that in 2013 reports 52,175 ha of new CNRs created with project assistance; PIR 2015]. Inferred from establishment of CNRs following same legal structure as PGIES
		R	0.5	**Benefits to women/access to income and credit** - from engaging in Ecovillage jobs (73% involved in building improved stoves, gardening, fruit orchards, non-timber products and processing, bakery, soap production and fish breeding); provided extra money that was spent on education, health, and other food; women reported "can solve problems without waiting to ask men for money", have access to income now; 4,386 green jobs were created including 3,199 for women
		R	0.5	**Benefits to women/Reduced Labour** - More energy efficient stoves and cereal mills mean women spend less time/have less burden cutting, collecting and hauling firewood. This leaves women more time for other endeavours; 6 agrofood processing units were established in the project. SE data note that 100% of women in primary Ecovillages, and 70% in the "polarized" villages have access to a mill less than 3 kms away.

		R	0.5	**Educational benefits/More Children going to/staying in school** - with alternative energy sources, more children in school because not collecting firewood (previously went to school only 3 to 4 months of the year); with perennial pasture not collecting fodder for livestock; increased income that farmers earned from non-timber forest products was spent on school costs and children's clothing; Noted in Mbackombel that people can afford school fees and food for children, keeping them in school and improving performance. They can now send children to university; Noted that there is drinking water in households and schools now and that children do not need to leave school to go home for water; Socio-economic data note that children's school results have improved and drop-out rates decreased due to access to electricity. [NOTE: Not all electrification due to project activities; associated with getting on the grid]
		R	0.5	**Educational benefits/Children doing better in school** – solar panels allow children to study at night; Socio-economic data note that children's school results have improved and drop-out rates decreased due to access to electricity. [NOTE: Not all electrification due to project activities; associated with getting on the grid]
		R	0.5	**Social and community integrity**: It was noted that youth have more income, that there are more local jobs available, and are staying in the community. Youth no longer feel they have to leave to find opportunities elsewhere. Interview notes: youth have "more pride, less frustration, are happy to stay".
		I	0.25	**Health benefits/Better access to treatment:** women noted they use income to spend on health expenses as well as education, food etc.; SE data says have income to buy more traditional medicines; inferred from better access to water with solar powered well pumps; In Ndick, the project upgraded the health post by providing equipment.
		I	0.25	**Health benefits/reduced exposure to contaminants**: At the project level, currently nearly 60% of the population have the access to latrines and village center has been set up a system for collecting, sorting and processing of waste

TABLE MFA 2C: DIRECT BENEFITS ASSOCIATED WITH INTERVENTIONS

	ENVIRONMENTAL BENEFITS									SOCIOECONOMIC BENEFITS							
	BD FA					LD FA		CC FA									
	Habitat connectivity	Wildlife populations	Reduced wildfires	Reduced extraction of natural resources	Habitat regeneration	Reduced erosion	Soil quality	Carbon sequestration	Reduced GHG emissions	Access to natural resources	Water supply	Income	Access to financial resources (women)	Agricultural productivity	Amount or diversity of food	Women's labour reduced	School attendance/ performance
Establish and extend CNRs	✓	I			✓					✓							
Transfer of fauna		I															
Credit and loans													✓				
Agrofood processing units																✓	
Alternative fuel/fuel-efficient stoves				✓					✓							✓	✓
Perennial livestock fodder																	✓
Solar panels				✓					✓		✓						✓
Jatropha for biofuel				✓		I			✓								
Compost							✓										
Biochar							✓										
Biodigesters				✓			I		✓								
Double vegetable cropping												✓			I		
Market gardening												✓	✓		I		
Harvesting non-timber forest products												✓	✓		✓		
Garden fruit trees												✓	✓		✓		
Soap making													✓				
Building stoves													✓				
Poultry													✓		I		
Bakery													✓		I		
Aquaculture															I		
Tree planting in CNR								I									
Live hedges, woodlots						I		✓						✓			
Bamboo planting						I		✓									
Mangrove planting								✓									
Firebreaks			✓			I		I									
Electrification of villages																	✓
Radiative cooling															✓		

✓ = reported outcome; I = inferred outcome


#4080 SPWA SENEGAL
CC FOCAL AREA
GHG emissions reduced
Carbon balance reduced 42%
Carbon sequestration 57,750 tons Co2/year CNRs;110 tons Co2/ village/ year from bamboo
Tree planting in CNR
Mangrove planting
BD FOCAL AREA
Habitat connectivity 28,875 ha new/ extended CNRs
Reduced extraction of firewood – 900ha avoided deforestation
Habitat regeneration
Reduced wild fires
Biodiversity/ Wildlife populations
Credit and loans
Biodiversity friendly income generation (aquaculture, bakery, poultry, soap making, building stoves, garden fruit trees, harvesting NTFP, market gardening, double vegetable cropping)
Radiative cooling
Electrification of villages
Bamboo planting
Alternative fuel/fuel-efficient stoves
Solar panels
Ecological perimeters (live hedges, woodlots)
Firebreaks
Establish& extend CNRs
Jatropha for biofuel
Biodigesters
Transfer of fauna
Compost & Biochar
SOCIOECONOMIC
Women have access to financial resources (73% participants women)
Ability to pay for school related expenses
Reduced exodus of youth
Income
School attendance or performance
Ability to pay for health expenses
Access to natural resources
Women's labour reduced
Amount or diversity of food
Water supply
Agricultural productivity
Perennial livestock fodder
Agrofood processing units
Soil quality
Reduced erosion
LD FOCAL AREA
Inferred outcome
Reported outcome
Intervention

FACTORS CONTRIBUTING TO OUTCOMES

Factor	Outcome	Explanation
PROJECT FACTORS		
Leveraged private sector	Broader adoption of activities	• Leveraging private sector allowed project to support 84 Ecovillages (originally intended 10), and have since scaled up to 400 villages (interview notes)
Access to credit	All	• The project partnered with REMEDE (Network of mutual savings and microcredit for the development of the environment, developed as part of PGIES) and SEM-funds (Senegal EcoVillage Microcredits) to finance the microprojects related to income generation, habitat restoration, energy
Women actively engaged in interventions	% of women earning income/access to financial resources (73%)	• 73% of women were involved in EcoVillage jobs (building improved stoves, gardening, fruit orchards, non-timber products and processing, bakery, soap production and fish breeding). With access to credit and diversified income opportunities, women have extra money which was spent on education, health and other food. During interviews they noted that they "can solve problems without waiting to ask men for money" – directly impacting gender equality
Good collaboration with partners	All, scaling up	• PIR 2015 p25 notes: results are generally better than expected. This situation is explained by the enthusiasm generated by the partners (beneficiary, private sector and non-governmental actors, etc.) particularly in scaling up actions conducted by the projects at the level of polarized villages. P 26 "The project has also established an important partnership pane with both state services, local authorities, and NGOs, and private sector projects". 24 partners listed in prodoc
Collaboration of multiple govt sectors	Conflict resolution	• Steering committee formed at national level with various Ministries – Economy and Finance, Environment, Agriculture, Power, Hydraulics, Renewable Energy, etc. Met every 3 months and resolved conflicts (interview notes, p.9)
Dedicated and competent project manager and team	Overall	• Noted by UNDP Technical Advisor in PIR 2015
CONTEXTUAL FACTORS		
Electricity network brought to Ecovillages	Reduced extraction of firewood (for lighting, cooking, etc.)	• Project partnership facilitated bringing electrification to the EcoVillages (see description below). In the Données SE Ecovillage doc it was noted that before project 10% of population had access to electricity, while at end of project the figure was 100%

Inter-sectoral collaboration and partnerships extended and scaled up outcomes

An Inter-Ministerial Protocol was established between the Ministry of Ecovillages (MEBRLAP/ ANEV) and Ministry of Environment (MENP/ DPN; DEFCCS) as well as a multi-departmental steering committee formed at national level (government departments) to reduce conflict (PIR 2015; interview notes). The framework established allowed ANEV to engage with a suite of partners at various levels, locally, nationally, and internationally (PIR 2015). In 2015, 13 protocols were signed and implemented (see intermediate outcomes). Through these relationships 11 EcoVillages were included as pilots (10 originally intended), activities extended to "polarized" villages around each pilot EcoVillage, and:

- *The project facilitated the electrification of the pilot Ecovillages* – PIR 2015 (p 25) notes that the key challenge to electrification was that the country was divided into areas for private sector electricity concessions, and while some operators were ready to meet energy needs there was a long wait time. Through inter-sectoral collaboration the project entered discussions in 2015 with the Ministry in charge of energy to overcome the constraint of bringing power to the villages. In 2016, it was

noted that 100% of the population of the Ecovillages had access to electricity, versus 10% before the project (Données SE Ecovillage doc) indicating successful influence through the inter-sectoral collaboration.

- *Efforts scaled up to additional villages* – "the project supported ANEV to respond to a project financing offer by the Nordic Climate Facility (NCF). The NCF has provided a funding of 450,000 Euros that allowed the signature of a new protocol agreement with a Finnish engineering office (Arbonaut) to support ANEV for a pilot project in 33 other eco-villages located in Bandafassi, south of the Niokolo Koba National Park, and for writing a bankable REDD + project for promoting NTFPs value chains to put Ecovillage in Bandafassi" (DO_Outcome_Table_Proj_17591, p. 2/3).
- *Radiative Cooling* – project enabled a partnership between ITERRAE and Senegalese institutions, including ANEV, Ecole Polytechnique de Thies (ETP), and the Lycée Technique André Peytavin de Saint Louis, to further develop a prototype for radiative cooling developed at Mbackombel (radiative cooling used for improved storage of cereals, dairy, vegetables). (see http://www.greniersdusahel.com/?p=316]. An entire Research Department on radiative cooling will be set up at ETP. (PIR, 2015, p. 18)

FACTORS HINDERING OUTCOMES

Factor	Outcome	Explanation
PROJECT FACTORS		
Delayed procurement process for water pumps	Delay in market gardening initiatives	• PIR 2015 notes the project went through a long procurement processes for water-pumps that delayed the Ecovillages activities for six months till the project mid-term evaluation on January 2015. Notes that the issue resolved by project, and equipment procured and operating by 2015

CHINA IEM DRYLANDS: An IEM Approach to the Conservation of Biodiversity in Dryland Ecosystems (2011-2016) (GEF ID 2369)

Country: China
Focal Area: MFA - Biodiversity (BD), Land Degradation (LD) *[PDF-B revised from LD/OP 12 to LD/BD – CEO p.23]*
Geographic Scope: 3 provinces - Gansu: 2,138 km^2, includes Mt. Taizi PA; Ningxia: 5,400 km^2, includes Haba Lake PA; Shaanxi: 1,147 km^2, includes Mt Luya PA
Executing Agencies: Ministry of Agriculture and State Forestry Agency
Total Budget: $29.5 million total ($4.5 million GEF; $18 million National agency; $4 million IFAD as loan/PPG co-financing; remainder in-kind from beneficiaries)
GEF Contribution: US$4.545 million
Project Management: US$1,326,000

BACKGROUND AND RATIONALE

The PRC-GEF Drylands project was designed to address land degradation (desertification, deforestation) and associated biodiversity loss and declining ecosystem services in three dryland provinces in Western China. The key driver to biodiversity loss was noted as unsustainable land use practices, influenced by high levels of poverty in rural areas. Key threats to land degradation included overgrazing of grasslands, poor agricultural practices, conversion from traditional grazing patterns to more intensive grazing strategies, and deforestation. Also noted were institutional challenges including lack of an overall strategic approach to biodiversity conservation, weak institutional frameworks and governance, lack of financing, shortage of research and technical capacity, low public awareness, and weak coordination and cooperation amongst local, national and international partners.

The project used an Integrated Ecosystem Management (IEM) approach to address the above-mentioned threats and challenges. The approach applied a comprehensive framework to manage natural systems across sectors and boundaries through inter-sectoral and participatory approaches. The approach was integrated in design, with the rationale specifically noting the need for a "broader, multi-sectoral approach" to biodiversity conservation, and the inclusion of adjacent areas and communities in the management of protected areas. The approach was intended, among other objectives, to increase understanding of the inter-relationships between poverty, land degradation and loss of biodiversity. The Project's global environmental objective was stated as "demonstrating cross-area synergies associated with the development of and implementation of site-specific IEM strategies."

The project falls under the PRC-GEF Partnership on Land Degradation in Dryland Ecosystems (2003-2012) and was designed as a 'blended project' with two existing IFAD programs: the South Gansu Poverty Reduction Program (SGPRP) and the Environmental Conservation and Poverty Reduction Program (Ningxia and Shanxi Provinces) (ECPRP). This served to increase project efficiency as Project Management Offices and participating leading groups were already established. Another relevant project is the China Biodiversity Partnership and Framework for Action (CBPF, 2007-2017).

Key components of the IEM in Drylands project were: 1) planning, policy, realignment and institutional strengthening; 2) sustainable land management activities to address the underlying influence of poverty on land degradation; 3) protected area and biodiversity conservation activities; 4) public awareness and education activities; and 5) monitoring, evaluation, and information dissemination. Livelihood activities were chosen as part of a participatory process to upgrade existing Village Development Plans to Village Environmental Development Plans, effectively integrating biodiversity and ecosystem concepts into local planning. The process also included assessment of climate-related vulnerabilities and climate risk mapping. In each township, 3 to 5 villages were selected as demonstration sites to try out various

alternative livelihood activities and share information with other villages. GEF funded a proportion of all project components.

IEM in Drylands Ecosystem #2369 Project Activities

Component 1 (Planning, policy, etc.)	Component 2 (Alternative livelihoods)	Component 3 (PAs and biodiversity conservation)	Component 4 (Education and Awareness)
3 site-specific IEM plans	Medicinal herbs	Improved PA enforcement	Television, newspaper and other media
Policy analysis	Greenhouse mushrooms, fruit, and vegetables	Boundary demarcation	Pamphlets
Training on principles of IEM, biodiversity, land degradation	Artificial pasture	Training	Posters
	Warm sheds (sheep)	Stronger management plans	Youth summer camps
	Seabuckthorn	Upgrade PA from provincial to national status	
	Fruit trees	Habitat restoration in and around PAs	
	Tree seedling nurseries		
	Maize production for animal feed		
	Plastic film and mulch		
	Solar street lamps		
	Solar water heaters (non GEF)		
	Biogas energy technology		
	Improved toilets & roads (non GEF)		

INTERMEDIATE OUTCOMES

- *Governance arrangements:* IEM planning frameworks were endorsed by County and Provincial authorities and were institutionalized into inter-sectoral development planning, decision making and management mechanisms.
- *Management approaches:* 3 site-specific IEM plans; including 2 IEM Plans focusing on National Nature Reserve (NNR), i.e. IEM plan for Mount Taizi NNR in Gansu Province and IEM Plan for Mount Luya Lake NNR in Shanxi Province, and 2 IEM plans dealing with County and River Basin/watershed, i.e. IEM for Yanchi County of Ningxia Province and IEM Plan for Guangtong River Basin in Gansu Province; 28 Village Environment Development Plans (VEDPs) in Ningxia, 178 VEDPs in Gansu.
- *Institutional capacity* – improved in staff of three NNRs in three provinces; biodiversity monitoring programs and GIS spatial databases established and integrated as tools to manage the NNRs.
- *Knowledge management* – training, public awareness raising activities; children's camps; media.

ENV/SE OUTCOMES

Table MFA 3A lists measurable project indicators. Table MFA 3B documents the outcomes and weighted score calculated for China IEM Drylands. Figure MFA 3A, 3B, 3C and 3D show the change in vegetation productivity using the Normalized Difference Vegetation Index (NDVI) at 4 different project sites, based on geospatial analysis.

SYNERGIES

Table MFA 3C lists direct benefits for each intervention where there were reported or inferred environmental or socioeconomic outcomes, to facilitate identification of synergies.

- *Alternative livelihood activities focused on resources that were previously taken illegally from the reserve* – specifically, growing mushrooms and medicinal herbs reduced extraction from reserves while providing an increased income, and warm sheep sheds and artificial pasture reduced collection of grasses for bedding and fodder respectively and also provided income. These activities also increased the amount or diversity of food both directly (through products grown and animals

raised) and indirectly (by selling products and using income to purchase food) therefore contributing to food security. Reduced extraction of resources in turn allowed habitat to regenerate, which contributed to both observed increases in wildlife populations and carbon storage. Increased income increased ability of villagers to pay for school related expenses in one community. In Ningxia 5 farmers' cooperatives established for nursery, livestock, herbs and pasture (interview notes, p 4).

- *Combination of maize production for animal feed, biogas digesters and warm sheep sheds* – these activities were implemented together as part of a "circular agriculture park" run by one company. Described in interviews as intended to reduce grazing pressure on mountains, farmers were commissioned to plant maize to provide fodder to the company, and used this as fodder for their own livestock (instead of grazing on mountain slopes). Animal dung was then used in biodigesters to produce electricity. Grazing on the mountain was reduced by 100% in one Gansu community. The effluent from the biodigester was used as fertilizer to improve soil and agricultural productivity. The system produced enough fertilizer (from biodigester effluent) for the circular park to establish a greenhouse to grow organic fruit and vegetables.
- *Tree planting/grassland restoration* – contributed to observed increases in wildlife populations, improved water quality, reduced erosion and carbon sequestration. A farmer in Gansu noted that: "*Ten years ago, all the land around the PA was barren, now all green with trees and crops. The water is now more pure, which allows more agriculture to be done. Rainfall and animals have increased*" [Interview notes Taizishan NNR and Liewa village].
- *Reduced risks associated with climate change (resilience)* – the combination of diversified income generating interventions (fruit trees, medicinal plants, mushrooms and vegetables in greenhouses, small livestock, tree seedling nursery), many oriented around food items, together potentially increase resilience to climate change by reducing reliance on any one income or food source, and distributing risk across multiple ventures. Also, habitat regeneration can mediate the negative effects of extreme weather (e.g. drought, flooding, storms, etc.). The combined effect of diversified income and food activities with habitat restoration activities is a synergistic potential increase in community resilience to climate change and extreme weather.

NEGATIVE OUTCOMES

- *Wildlife/crop conflicts from increased wildlife populations* – in Gansu, the project interventions were successful at improving wildlife populations of deer and wild pigs to such a degree that the wildlife were destroying local crops, increasing conflict between farmers and wildlife. While biodiversity outcomes were improved, there was a negative impact on socioeconomic outcomes. **Farmers are compensated by the County Forest Bureau, as proposed by the UNDP Project legal team [interview notes, p. 9]**

TRADE-OFFS

- *Land for biodiversity versus food production [trade-off between BD and SE]* – in the description of activities to restore habitat in the NNRs, PIR 2015 (p. 3) notes that "some farmland has been converted to natural vegetation with government resources" to extend the nature reserves. This is a tradeoff between the use of land for biodiversity conservation versus the use of the same piece of land for food production. In other words, it is an opportunity cost to local farmers, as the land could have been used for production of food. *Note: there is not enough information to assess whether this farmland was abandoned or in use at time it was incorporated into the NNR, nor which province was involved.*

- *Improved PA enforcement/management versus access of villagers to natural resources [BD FA vs SE]* – project activities included increased patrolling/monitoring of NNRS. Specifically, management plans provided a systematic approach to deal with problems such as illegal harvesting of medicinal herbs and wild fungi in the NNRs by villagers from the surrounding villages. While the NNRs were already established – and therefore access to natural resources within the NNRs was already restricted – there was increased enforcement of illegal extraction of resources in the NNRs with this project. This improvement in PA enforcement/management benefits biodiversity, however the tradeoff is that people have even less access to natural resources gathered for food and income.

NOTE: Both trade-offs were addressed by the alternative livelihoods component which focused on propagation of resources previously extracted from reserves eliminating the need to extract them, warm sheep sheds and fruit trees providing increased amount or diversity of food, and agricultural intensification activities to increase agricultural productivity.

- *Circular park reducing mountain grazing, tradeoff with local agrobiodiversity [trade-off among biodiversity objectives]* – in Gansu, villagers adopted a sheep/maize/biofuel system where maize was grown for animal feed, whose dung was used in a biodigester to create electricity, and effluent as well as manure was used as fertilizer. This system resulted in reduced grazing in grasslands on sensitive mountain slopes, with 100% effect in one community as all members switched from grazing to growing maize. As household land is now used to produce maize (ultimately for biofuel), this is an opportunity cost for uses that have a higher agrobiodiversity, especially if the volume of fodder needed increases. *It is unclear how much land is used for maize production versus the grasslands that were used for grazing. See Santangeli et al 2016 about renewable energy trade-offs.*

TABLE MFA 3A: MEASURED PROJECT INDICATORS

	Gansu	Ningxia	Shanxi	All sites
Biodiversity	• 8000 mu natural grasslands restored; • Illegal fuelwood, grazing and medicinal herbs reduced to 4%; • Mt. Taizi NNR (forest) vegetation cover: 31.17% to 35.07% since 2012 • Mt Taizi NNR, population number and its habitat of *Crossoptilon auritum* (blue eared pheasant) increased. *Capricornis sumatraensis* (Sumatran serow) has been spotted at Xinying and Dongwan management stations of Mt. Taizi NNR	• 196,000 mu grassland restored • Illegal grazing and medicinal herbs reduced by 100% • 4,500 mu seabuckthorn (*Hippophae rhamnoides Linn*) planted • Vegetation cover in Haba Lake NNR: 33.4% to 36.9% from 2012 to 2014, biomass increased from 86.7 kg/mu to 194 kg/mu. • Vegetation cover in Yanchi County: increased 8.83% from 2010 to 2014. Degraded area reduced 28,300 ha, 5,700 has per year • **(**Haba Lake NNR) - #bird species from 92 species of 29 families of 15 orders to 119 species of 33 families of 15 orders. • Migratory birds such as *Tadorna ferruginea*, *Tadorna tadorna* and *Cygnus cygnus* now stay 10 days longer compared to 2 years ago; • 3 new vegetation species, 28 new animals, 166 new insect species were founded in the PA	• 30,000 mu grassland restored • Illegal harvesting of medicinal herbs reduced by 80% • Vegetation cover: 80% to 83% by 2015 • Increased appearance of flocks of pheasants early in the morning in Mt. Luya NNR	• Fire occurrence down 50% • 15,202 mu native tree species established
Livelihoods	• Poverty[7]: reduction from baseline of 145,700 (2011) to 50,470 (2015); 66%;	• Incomes increase from 4,793 in 2012 to 7,674 in 2015, 15% per year – **60% total**. • Poverty: baseline of 40,580 (2011) to 34,046 (2015), a reduction of 16.1%. • Warm sheep sheds increased income 10,000 CNY each year	• Poverty: baseline of 154,600 (2011) to 85,150 (2015), 45%; • Income from nursery, medicinal herbs and others was 300 CNY/person, 10%	• 48% beneficiaries were women • Local farmers income increased 20% since 2012
Land & Agriculture	• Grassland erosion reduced 22% • Land productivity improved by 7.7% with biofuel/sheep system (maize yields increased to 700kg/Mu/year). • County grain production increased by 80,300 metric tonnes of maize • Maize yields increased 38%, potatoes 62% with plastic mulch	• Grassland erosion reduced 25% • Desertification reduced by 4.9% by 2015	• Grassland erosion reduced 75%	•

[7] *Poverty line measured at 2,300 CNY per person. Results are indicative of a series of government programs and projects, not just this IEM project. TER 2016*]

TABLE MFA 3B: OUTCOMES AND WEIGHTED SCORE CHINA IEM DRYLANDS

Benefit Category	Category Score	Outcome Rating	Outcome Score	Outcomes
ENVIRONMENTAL BENEFITS				
(BD) Ecosystem cover and/ or quality increased and/or maintained	**1.5**			
		M	**1**	**Ecosystem cover increased: Ningxia**: Haba Lake NNR vegetation cover rate increased from 33.4% to 36.9% from 2012 to 2014, and the mean community height increased from 16.7 cm to 18 cm, biomass increased from 86.7 kg/mu to 194 kg/mu. **Gansu**: In Mt. Taizi NNR the forest coverage increased from 31.17% to 35.07% since 2012. Remote sensing indicates forest cover around Taizishan had been maintained. **Ningxia**: Vegetation cover in the project site (Yanchi County) increased 8.83% from 2010 to 2014. Degraded area reduced 28,300 ha, 5,700 has per year. **Shanxi**: Vegetation cover in the Project area in Shanxi was improved from 80% to 83% by 2015. **Habitat restored:** 8000 mu (ha) natural grasslands were restored in Gansu; 196,000 mu (ha) in Ningxia; 30,000 mu (ha) in Shanxi. 15,202 mu (137%) of native tree species were established (target 11,100 mu
		R	**0.5**	**Improved ecosystem quality: Gansu:** Farmer quote: "Ten years ago, all the land around the PA was barren, now all green with trees and crops. The water is now more pure, which allows more agriculture to be done. Rainfall and animals have increased"
(BD) Biodiversity and/ or species populations (flora or fauna)	**1.5**			
		M	**1**	**Increased species diversity: Ningxia**: in Haba Lake NNR the number of bird species and flock increased from 92 species of 29 families of 15 orders to 119 species of 33 families of 15 orders. Migratory birds such as *Tadorna ferruginea*, *Tadorna tadorna* and *Cygnus cygnus* now stay 10 days longer at Haba Lake NNR compared to 2 years ago; **Ningxia**: 3 new vegetation species, 28 new animals, 166 new insect species were founded in the PA

		R	**0.5**	**Increased animal populations: Gansu**: Mt Taizi NNR the population number and its habitat of *Crossoptilon auritum* (blue eared pheasant) increased. *Capricornis sumatraensis* (Sumatran serow) has been spotted at Xinying and Dongwan management stations of Mt. Taizi NNR; **Shanxgi:** increased appearance of flocks of pheasants early in the morning in Mt. Luya NNR; **Gansu**: More rainfall, pheasants, deer and forest cover (as assessed by SFA); **[one individual] Gansu:** Farmer quote: "Ten years ago, all the land around the PA was barren, now all green with trees and crops. The water is now more pure, which allows more agriculture to be done. Rainfall and animals have increased" + The TER mission found from the Project Completion Report, M&E Report and RIMS reporting that, due to introduction of the alternative livelihoods options, biodiversity loss in the Project area had not increased.
(BD) Reduced threats to biodiversity (includes reduced extraction)	**3.5**			
		M	**1**	**Reduced extraction of forest resources: Shanxi:** Illegal harvesting of medicinal herbs was reduced by 80%; **Gansu**: Illegal collection of medicinal herbs (combined with fuelwood and grazing) reduced to 4%; **Ningxia**: Illegal collection of medicinal herbs (combined with grazing) reduced by 100%. **Gansu, Nanxgi, Shanxi:** The Mt. Taizi NNR, Haba Lake NNR and Mt. Luya NNR reported that the harvesting of wild medicinal herbs, wild fungi and fuel wood and grazing have been reduced tremendously, with only a few sporadic cases (common in past).
		R	**0.5**	**Reduced timber/fuelwood extraction: Gansu**: Illegal fuelwood, grazing and medicinal herbs reduced to 4%; Noted that access to clean and affordable energy has reduced extraction and degradation from the three NNRs; **Gansu, Nanxgi, Shanxi:** The Mt. Taizi NNR, Haba Lake NNR and Mt. Luya NNR reported that the harvesting of wild medicinal herbs, wild fungi and fuel wood and grazing have been reduced tremendously, with only a few sporadic cases (common in past).
		R	**0.5**	**Reduced bush fires:** Fire occurrence rate has been reduced by at least 50% in NNRs, attributed to increased capacity and surveillance for fire control

		R	**0.5**	**Reduced extraction from grasslands:** Villagers in the project used to collect grasses from Haba Lake NNR for sheep shed bedding for winter and now it is no longer practiced thanks to the warm sheep sheds supported by the project. This alone has significantly reduced the demand of villagers for biomass from the NNR
		R	**0.5**	**Reduced grazing:** In the village visited in Gansu, all villagers had switched from grazing to growing maze. This would directly reduce pressure of grazing on grasslands; **Gansu, Nanxgi, Shanxi:** The Mt. Taizi NNR, Haba Lake NNR and Mt. Luya NNR reported that the harvesting of wild medicinal herbs, wild fungi and fuel wood and grazing have been reduced tremendously, with only a few sporadic cases (common in past).
		R	**0.5**	**Reduced poaching:** Mt. Taizi NNR reported that illegal poaching and harvesting of nature products in the NNR have been completely wiped out.
(LD) Improved soil quality	**0.5**			
		R	**0.5**	**Increased organic material:** The maize/grain fodder system with improved animal husbandry techniques has increased availability of organic fertilizer from manure – this has reduced the need for the use of chemical fertilizers and improved fertility and organic content in the soils, ultimately improving land productivity. Land productivity improved by 7.7% (Gansu maize yields increased to about 700kg/Mu/year).
(LD) Soil structure improvements	**2**			
		M	**1**	**Reduced erosion**: erosion in grasslands was reduced in **Gansu** by 22%, in **Ningxia** by 25% and **Shanx**i by 75%; (2) **Ningxia**: Trees planted as part of the project decreased wind erosion. The soil is better for planting because the landscape is not moving around; 4,500 mu (ha) of seabuckthorn (*Hippophae rhamnoides Linn*) planted on the hillside of Kelan County for income generation and erosion control. Inferred from tree planting
		M	**1**	**Reduced desertification:** desertification was reduced in Ningxia by 4.9% by 2015
(LD) Reduced threats to land	**2**			
		R	**0.5**	**Reduced bush fires:** Fire occurrence rate has been reduced by at least 50% in NNRs, attributed to increased capacity and surveillance for fire control

		R	**0.5**	**Reduced grazing:** In the village visited in Gansu, all villagers had switched from grazing to growing maze. This would directly reduce pressure of grazing on grasslands; **Gansu, Nanxgi, Shanxi:** The Mt. Taizi NNR, Haba Lake NNR and Mt. Luya NNR reported that the harvesting of wild medicinal herbs, wild fungi and fuel wood and grazing have been reduced tremendously, with only a few sporadic cases (common in past).
		R	**0.5**	**Reduced deforestation** from reduced removal of firewood
		R	**0.5**	**Reduced chemicals:** The maize/grain fodder system with improved animal husbandry techniques has increased availability of organic fertilizer from manure – this has reduced the need for the use of chemical fertilizers and improved fertility and organic content in the soils
(CC) Carbon sequestered	**0.5**			
		I	**0.25**	**From tree planting:** Inferred from tree planting (128,423 mu (ha) of trees planted in the three NNRs)
		I	**0.25**	**From regeneration:** Inferred from reported increases in vegetation cover
(CC) Maintenance of carbon sinks	**1**			
		R	**0.5**	From reported reductions in extraction of firewood and other resources (See above)
		R	**0.5**	From r**educed bush fires:** Fire occurrence rate has been reduced by at least 50% in NNRs, attributed to increased capacity and surveillance for fire control
(CC) Reduced GHG emissions	**0.75**			
		R	**0.5**	**Reduced burning:** Fire occurrence rate has been reduced by at least 50% in NNRs, attributed to increased capacity and surveillance for fire control
		I	**0.25**	**From switch to lower GHG emitting energy:** The government supplied solar water heaters to beneficiary farmers as its co-financing, which decreases use of coal (and GHG emissions); Biogas production itself is carbon-neutral and does not add to greenhouse gas emissions. Use of biogas as alternative energy (1400 units) reduces burning of high-GHG emitting fuels.

Other environmental benefits/ reduced environmental threats	**0.5**			
Air		**I**	**0.25**	Improved air quality: The government supplied solar water heaters to beneficiary farmers as its co-financing, which decreases use of coal. Decreased use of coal would improve air quality.
Waste		**I**	**0.25**	Reduced contamination: inferred from 450 improved toilets and 12 improved garbage systems.
		R	**0.5**	Reduced plastic pollution: Farmers are paid 120 CNY/tonne of used plastic delivered to the recycle stations for recycling, processing and re-use. The plastic pollution has been reduced substantially in rural areas within and beyond the Project. After 5 years, over 70 tonnes of plastic film had been collected and sold to the recycling station for 8,500 CNY
Chemicals		**R**	**0.5**	Reduced chemical release in land/water systems - from maize/fodder system, which has increaesd availability of manure and reduced need for chemical fertilizers.
SOCIOECONOMIC BENEFITS				
Income or access to capital	**7**			
		M	**1**	**From medicinal herbs**: G**ansu**: Herb expensive, used to be collected from the mountains. Project provided technology to cultivate herb using mulching, resulting in greater income for farmers and intact vegetation in the forests; **2) Gansu**: Chinese traditional medicinal herb production in Hezheng County can contribute 5,000 CNY/mu of gross revenue to a beneficiary farmer household each year; **3) Shanxi** (Yumuqiao Village) – farmer's income growth from nursery establishment, Chinese medicinal herbs and others was 300 CNY per capita, representing 10% increase.
		I	**0.25**	**From fruit trees: Gansu**: Villagers planted fruit trees as source of income (in area plant rapeseed but not all can plant because of soil quality). Indigenous fruit juice has a large local market
		R	**0.5**	**From tree seedling nurseries - Gansu:** Sale of seedlings from tree nurseries is providing more income than firewood.
		R	**0.5**	**From mushrooms - Shanxi**: wild fungi from Mt. Luya successfully domesticated for culture in greenhouses and one unit of half mu (ha) of greenhouse can generate 30,000 CNY of gross income annually to beneficiary farmer household

		R	**0.5**	**From greenhouse vegetables: Ningxia**: Greenhouses have increased income by allowing production of fruits out of season (e.g. watermelon), which can then be sold for up to 10x the normal price.
		M	**1**	**From warm sheep sheds/fodder: Ningxia**: warm shed built through the support of the project (and associated raising of sheep) increased beneficiary income of about 10,000 CNY each year; Famer noted that the animal sheds (for sheep rearing) and use of alfalfa as fodders has also provided higher income
		M	**1**	**From maize/circular park system: Gansu**: Maize and indigenous fruit (for juice) plus other fruits now provide much higher income than grazing; Maize and other fodder was purchased from local farmers who earned 1.5 million CNY per year from the sale of fodder to the Cooperative
		M	**1**	**From agricultural improvements (plastic film/mulch) -** due to plastic film and mulch system for water conservation, County grain production increased by 80,300 metric tonnes of maize with incremental benefits of 256 million CNY. The income per household increase was estimated at 6,804 CNY and per capita income increase was 1,279 CNY.
		M	**1**	**From plastic recycling:** a farmer in Shilidun Village, Ghengguan Town, Guanghe County, collected about 14 tonnes/year of plastic film residue for sale to the recycling station at 120 CNY/tonne, at an annual supplementary income of 1,700 CNY to add to their maize and sheep rearing
		I	**0.25**	**From seabuckthorn:** Shanxi: 4,500 mu (ha) of seabuckthorn (Hippophae rhamnoides Linn) planted on the hillside of Kelan County for income generation and erosion control.
				• Compared with 2012 before the project implementation, local farmer's income increased about 20%. Examples: **Ningxia** (Yanchi County) – farmer's income increased from 4,793 CNY in 2012 to 6,975 CNY in 2014. [not stated which activities] Income per capita increased from 4,793 in 2012 to 7,674 in 2015, 15% per year. Lifted 6,000 people out of poverty line. 2) According to the Provincial statistics office, reduction in those suffering poverty in **Gansu** from baseline of 145,700 (2011) to 50,470 (2015) a reduction of 66%; in **Shanxi** from the baseline of 154,600 (2011) to 85,150 (2015) a reduction of 45%; and in Ningxia reduced from the baseline of 40,580 (2011) to 34,046 (2015), a reduction of 16.1%.
Food security	**2.25**			

		M	**1**	**Improved agricultural productivity:** With the plastic film and mulch techniques, maize yields increased to about 830 kg/Mu (increase of 38%) and potatoes to 2,865 kg /Mu (increase of 62%) over former open field production system.
		I	**0.25**	From mushrooms - directly and indirectly from sale
		I	**0.25**	Fruit trees – directly from fruit and indirectly from sale
		I	**0.25**	Warm sheep sheds/fodder – directly from sheep and indirectly from sale
		R	**0.5**	From greenhouse vegetables - The residues from processing dung into biogas was used as organic fertilizer. In Hezheng County greenhouses were set up to use this fertilizer to produce fruits and vegetables
Other context-specific SE benefits	**1.75**			
		R	**0.5**	**Benefits to women/access to income**: It was estimated that of the 270,000 overall beneficiaries, 130,000 (48%) were women; **Gansu**: Women earn from selling seedlings, planting and weeding (for herbal plants)
		I	**0.25**	**Health benefits/improved sanitation**: Inferred from 450 improved toilets, 21 improved garbage disposal mechanisms
		R	**0.5**	**Improved housing conditions:** Introduction of greenhouses (plastic sheets), mulching and animal sheds have increased income and allowed conversion of mud house to concrete, with new appliances, and payment for education in the city for their son. [**one individual from interviews]**
		R	**0.5**	Improved infrastructure: 18 km of roads, 7300 silage and 1800 fodder storehouses and 1248 sheds, 450 solar energy showers,

TABLE MFA 3C: DIRECT OUTCOMES ASSOCIATED WITH INTERVENTIONS

	ENVIRONMENTAL OUTCOMES										SOCIOECONOMIC OUTCOMES					
	BD FA			LD FA					CC FA							
	Increased wildlife populations	Reduced wildfires	Reduced extraction of natural resources	Reduced grazing in grasslands	Reduced erosion	Reduced plastic pollution	Soil quality	Water quality	Reduced GHG emissions	Carbon sequestration	Income	Access to financial resources (women)	Access to electricity	Agricultural productivity	Amount or diversity of food	Village safety
Improved PA management		✓														
Improved PA enforcement	✓															
Tree and grassland planting in and around PAs	✓				✓			✓		I	✓					
Alternative livelihood projects (general)	✓										✓	✓				
Fruit trees					I					I	✓				I	
Tree seedling nursery											✓	✓				
Medicinal herbs			✓								✓	✓				
Seabuckthorn					✓					I						
Greenhouse mushrooms, fruit, vegetables			✓								✓				✓	
Plastic film and mulch														✓		
Plastic film recycling						✓					✓					
Warm sheep sheds			✓				✓				✓				I	
Artificial pasture			✓								✓					
Maize production for animal feed – biofuel combination			✓	✓			✓		✓	I	✓		✓			
Solar powered lights																I
Solar powered water heaters									✓							

✓ = reported outcome; I = inferred outcome

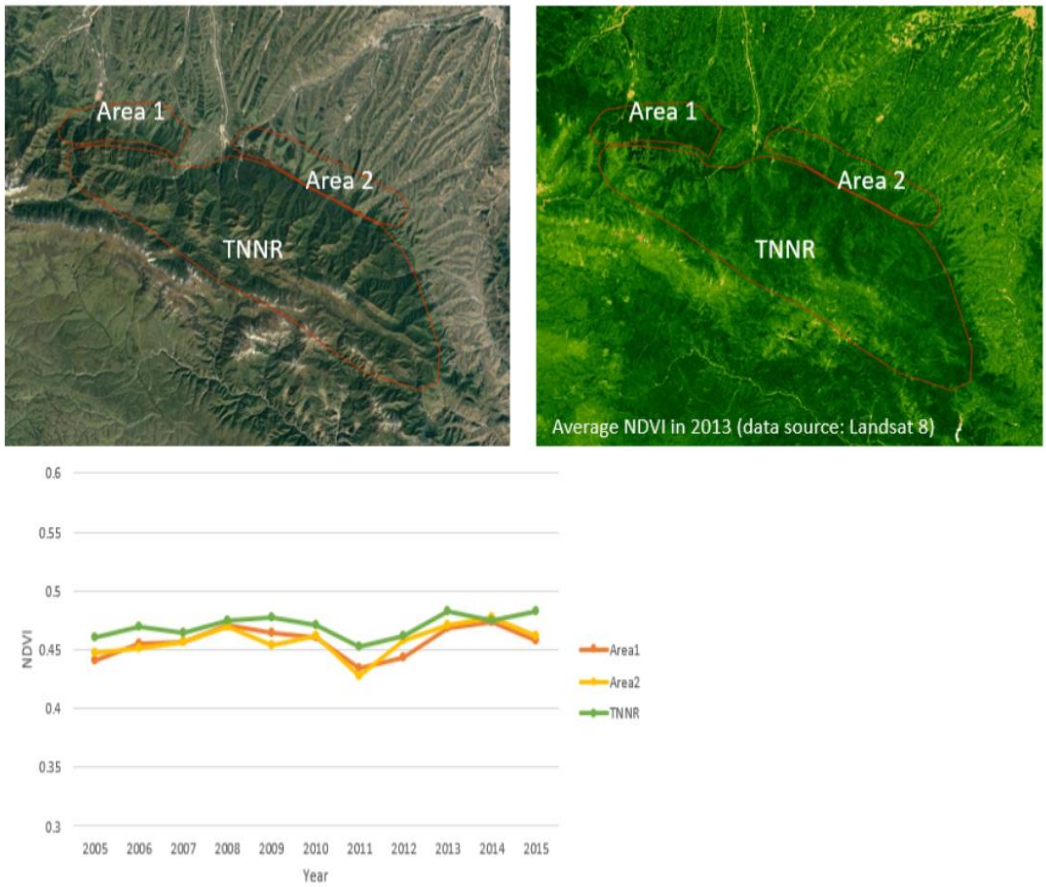


Figure MFA 3A: NDVI comparison between Taizi NNR (TNNR) and its two surrounding areas.

The geospatial analysis results indicate that both the TNNR and its northern surrounding areas show a consistently high (0.46±0.03) NDVI from 2005 to 2015, encompassing the period prior to and after project implementation. No ssubstantial changes have been observed.

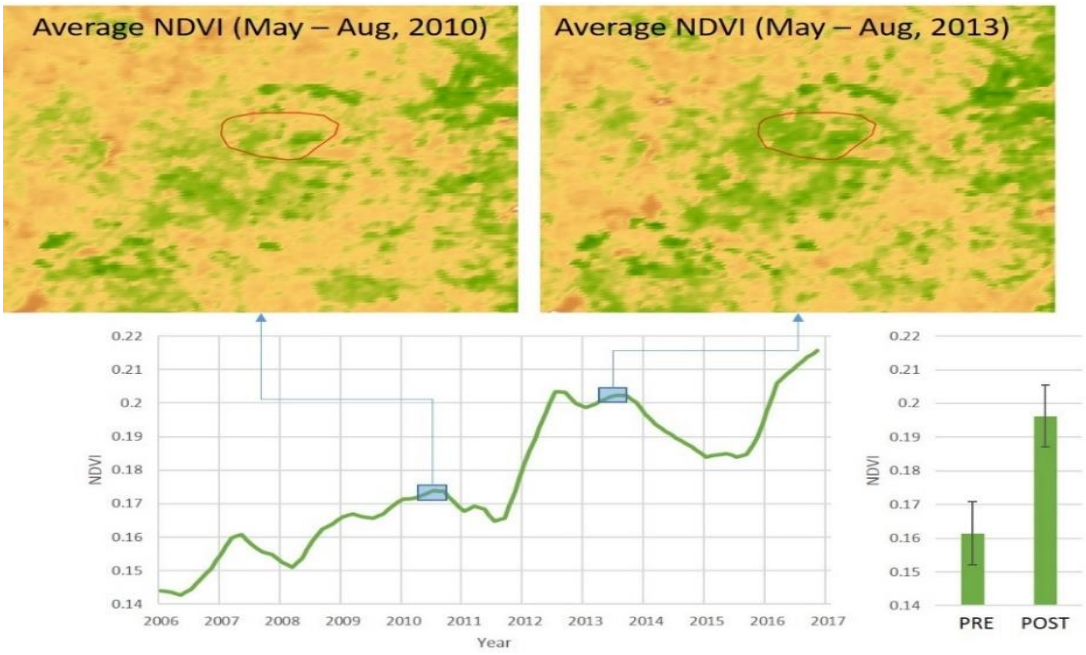


Figure MFA 3B: NDVI Change at Haba Lake Reserve

In Haba Lake NNR in Ningxia, average NDVI during the dry summer period showed a statistically significant increase in vegetation between 2010 and 2013, after project implementation started, as well as at present.

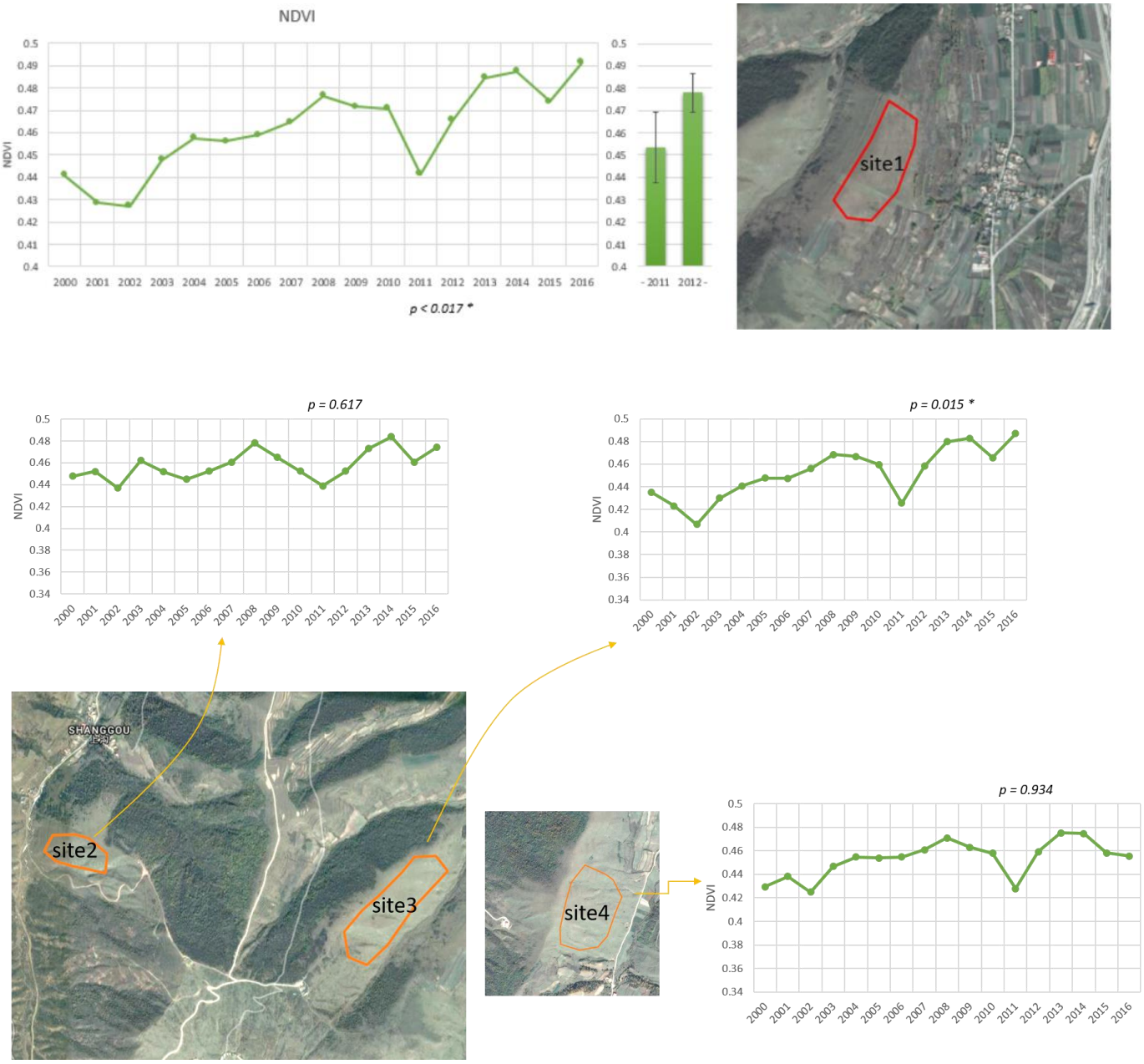


Figure MFA 3C: NDVI change at grassland restoration area in Gansu

NDVI changes suggest continual improvement in the observed grassland area and significant increase since project implementation started in 2011. Annual average precipitation in the selected grassland has been stable since 2000 (average: 7.33 ± 1.25 mm/pentad), suggesting that the improvement was likely due to land management.

FACTORS CONTRIBUTING TO OUTCOMES

Factor	Outcome	Explanation
PROJECT FACTORS		
Participatory selection of local initiatives	Income; Reduced extraction of resources (and in turn increased wildlife populations)	• Livelihood activities were chosen as part of a participatory process to upgrade Village Development Plans to Village Environmental Development Plans (prepared in 444 villages). Each County and Township PMO set up a PRA working group with 3-4 experts to provide technical support and guidance, analyse existing problems, identify solutions and formulate the VDEP with activities proposed, prioritized and costed. A resource map integrated with proposed activities at household and Village levels was developed as the outcome of the planning process. The VDEP included all activities to be implemented at village communal land and farmer household's land. Those on the communal land were incorporated in the VDEP once the majority of villagers endorsed the majority of beneficiaries as well as with the concurrence of specific farmer households involved. The participatory process was attributed to ownership of the VDEPs (MTR 2014)
Women actively engaged in interventions	% engagement of women; women's access to financial resources	• The project encouraged empowerment of women through participation in Project management, decision-making in households, Village Implementation Groups, and public affairs
Environmental awareness activities	Reduced extraction of resources (+ improved habitat and wildlife)	• Increased environmental awareness was noted as contributing to decreased degradation of NNRs (PIR 2015)
Strong links to pre-existing projects	Project efficiency	• The project had strong links with pre-existing projects which served to improve project efficiency – and hence achievement of outcomes. Specifically, the PIR 2015 notes that strong partnerships with GEF programs and institutions through the PRC-GEF Partnership on Land Degradation in Dryland Ecosystem Program assisted in achieving project outcomes. The project was also designed as a blended project with the South Gansu Poverty Reduction Program (SGPRP)(IFAD) and the Environmental Conservation and Poverty Reduction Program (Ningxia and Shanxi Provinces) (ECPRP)(IFAD). This served to increase project efficiency as Project Management Offices and participating leading groups were already established. *[Total project management component US$1,326,000]*
CONTEXTUAL FACTORS		
National grazing ban + financial compensation as incentive	Reduced grazing	• A national level grazing band also contributed to reduced grazing across the project area. This included financial compensation (cash or cash for specific uses such as warm sheds or planting fodder) as an incentive for observing the ban, reinforced by law
Decrease in price of coal	Reduced extraction of fuelwood from reserves	• During the project coal decreased in price. As villagers prefer using coal over firewood, the lowered price increased purchase of coal and contributed to the decrease in collection of fuelwood from PAs. While this benefits by decreased fuelwood extraction, it would have a negative impact on GHG emissions and air quality from the burning

Factor	Outcome	Explanation
PROJECT FACTORS		
		coal. This was compensated for by the provision of solar powered water heaters by the national government
Rise in nature appreciation	Income from tree seedling nurseries	• Nature appreciation has become more popular; there is higher demand for tree seedlings to beautify roads all over China
National greening programs	Habitat restoration; carbon sequestration	• National greening programs (e.g. Great Green Wall project) also contributed to increase in vegetation cover in project area
National level support	Overall outcomes	• A change in government strategy emerged in the early 2000s (influenced by extensive flooding on Yellow River, and recognition of the need to stabilize soil) emphasizing a bottom-up approach that integrated IEM concepts and principles in rural development and environmental protection. The government's commitment to sustainable natural resource and environmental management has been reflected in Central and Provincial SAPs, and five-year plans. (TER 2016)

Change in collaboration patterns between agencies due to inter-sectoral partnerships in the project:
Inter-sectoral participatory approaches were adopted to prepare IEM planning frameworks, which were endorsed by County and Provincial authorities. The IEM approach was institutionalized into inter-sectoral development planning, decision making and management mechanisms giving authorities strong mandates for integrating environmental planning principles into wider decision-making (TER 2016). TER 2016 notes that the project was "instrumental in improving the government's sectoral planning by changing it from top-down approach to a participatory, community-based and multi-sector integration based approach." Other supporting points include:

- Stakeholders in Gansu pointed out that in physically isolated sites, typically only resources from the provincial department of agriculture are used; however, for the project they were able to involve over 20 departments (TER 2016).
- The project … "brought together different departments in developing the implementation action plan in 2012 (finance, development & reform, science & technology, poverty reduction, environment, forestry, water resources, grassroots office, township governments, Haba Lake management bureau). [Interview notes - project briefing at province level in Ningxia]

FACTORS HINDERING OUTCOMES

Factor	Outcome	Explanation
PROJECT FACTORS		
Inadequate capacity of the PMOs	General outcomes	• PIR 2015 noted original indicators were not achievable due in part to inadequate capacity of PMOs, and the logframe was revised to achieve objectives
Varied interpretation of monitoring indicators	Monitoring and evaluation	• TER team found that the meaning of many indicators had been interpreted differently than their interpretation. Also, some indicators seemed too easy (and possibly not related to Project achievements) and others too challenging [TER 2016]
CONTEXTUAL FACTORS		
New government austerity policies	General outcomes	• PIR 2015 noted original indicators were not achievable due in part to new government austerity policies, and the logframe was revised to achieve objectives

Factor	Outcome	Explanation
Lack of government capacity to compensate and move households living in PAs	Biodiversity benefits general	• There are 200HH in Haba Lake NNR. Their agricultural activities are being limited (size of plots, water saving techniques) but presence is still destructive because some have quarry businesses. The government does not have enough funds to compensate and relocate elsewhere. *[Ningxia, Interview notes, Haba lake museum]*

BRAZIL RIO RURAL: Rio de Janeiro IEM in Production Landscapes of the North-Northwestern Fluminense (2005-2011) (GEF ID 1544)

Country: Brazil
Focal Area: MFA –listed as OP 12 in PAD 2005 [*note that in the PAD 2005, p. 11, the project team refocused the project as an OP12 proposal with special relevance to OP 15]*
Geographic Scope: 22 municipalities, 15,000 km^2, 30,000 family farms
Executing Agencies: State Secretariat of Agriculture, Fisheries and Rural Development (SEAAPI)
Total Budget: $15 million total ($6.75 million GEF; co-financing from existing projects, including US$6.3 million from State government, US$1.1 million in credits and in-kind from federal government; remainder in-kind from two NGOs (CI-Brasil and SOS Mata Atlantica), beneficiaries, and FAO)
GEF Contribution: US$6.75million
Project management: $2.6 million

BACKGROUND AND RATIONALE

The Rio de Janeiro IEM project occurred in the North and Northwestern Fluminense (NNWF) administrative regions in the State of Rio de Janeiro (SoRJ), an area with a diverse mix of vegetation and forest types. SoRJ has a territory of approximately 44,000 km^2, a population of 14.4 million people, and the highest percentage of the Atlantic Forest biome with respect to total area of all Brazilian states. The State also had the highest rate of deforestation of all Atlantic Forest states (16.7% between 1990 and 2000), attributed to cattle raising and boom and bust cycles of sugar cane and coffee production, as well as the lowest socioeconomic indicators for income, education and infant mortality.

The Rio IEM project was designed to address deforestation in the area due to land conversion and charcoal production, and soil erosion from deforestation, over-grazing, and unsustainable agriculture. The project took an IEM approach "which emphasizes the linkages among people, natural systems, and ongoing activities dealing with NRM issues in the region" (PAD, 2005, p.4) to implement sustainable land management (SLM) activities. It aimed to overcome recognized constraints to a cross-sectoral IEM approach including: lack of capacity and weak community organizations at local and state levels, lack of producer capital to afford upfront costs for SLM activities, limited number of SLM practices adapted to the conditions of the NNWF area, and insufficient data for effective decision-making.

The project used microcatchments as the basis for an integrated ecosystem planning approach, treating "small and large farmers as complementary elements of a single, expanded system" (PAD, 2005, p 10). It was envisioned as a pilot project targeting small and medium-sized farmers, in 50 microcatchments in 5 watersheds. Project activities supported the development of the *Serra do Mar* Biodiversity Corridor through planning, conservation and connection of forest remnants, and general adoption of improved land management practices, including sustainable use of agrobiodiversity. In general, the approach was chosen to illustrate the potential for improving land use, storing carbon, and emphasizing the importance of the biome and agro-ecosystems in conserving biodiversity.

The two main desired outcomes were to increase capacity for natural resource management and to increase adoption of IEM and SLM concepts and practices. Project activities fell under four components: 1) activities related to planning for IEM; 2) support systems for IEM/SLM adoption, including support for activities under 5 categories: (i) conservation or sustainable use of biodiversity; (ii) rehabilitation of degraded lands; (iii) water resources management and protection; (iv) redirection of productive systems toward those that are socially and environmentally friendly and financially sound; and (v) commercialization of environmentally sound products; 3) community organization, training, and information sharing activities; and 4) monitoring, evaluation and project management. A key focus on

the project was the development of local level community organizations (COGEMs) in target micro-catchments, and providing training and grants for adoption of SLM practices.

The project built on and complemented existing state, federal, and non-government programs including: i) the State Credit Program for Agricultural Production and Diversification (*Moeda Verde*), (ii) the State Microcatchment Program for Rural Sustainable Development (*Rio Rural*) which provides rural extension and infrastructure to rehabilitate microcatchment resources; (iii) the National Smallholder Agriculture Program (PRONAF), providing credit and assistance to smallholders; (iv) the KfW-supported Pro-Atlantic Forest Program which focuses on strengthening protected areas (PAs) in the NNWF; and (v) the GEF-supported Critical Ecosystem Partnership Fund (CEPF), providing support to establishment of private protected areas located in the *Serra do Mar* Corridor.

IEM in NNWF #1544 Project Activities

Component 1 (Planning for IEM)	**Component 2 (Support systems for IEM/SLM adoption)**		**Component 3 (Organization and Capacity building for IEM)**
Studies	Riparian and forest tree planting	Rustic poultry	Establishing community organizations
Strengthening incentive structures	Exclusion of cattle from riparian areas	Beekeeping	Training
Local land planning	Private natural heritage reserves	Agroecological silvo-pastoral system	
	Investment subprojects (varied)	Soil conservation equipment	
	Agroforesty	Minimum tillage	
	Pasture rotation	Rainwater capture facilities	

INTERMEDIATE OUTCOMES

- *Governance outcomes:* Payment for environmental services (PES) system established by decree (by 2011; ICR 2012, p vi) which obligates the State to financially support such system within the State's Water Resources Management Policy; micro-watershed adopted as RJ governmental strategy to promote rural sustainable development.
- *Management approaches:* 5 management strategies for rural development in sub basins developed; 48 local level micro catchment management associations established in 48 microcatchments (COGEMS); 1 COREM (regional) council established; 48 microcatchment development plans; 1254 farm-level investment plans; 10 Statutes of Community Conduct (ECC) developed obligating communities to use conservation practices.
- *Knowledge management outcomes:* 5730 participants in training in environmental education events; 20 environmental projects in local schools; 114000 copies of Rio Rural Newsletter distributed; brochures; website.
- 1574 GEF-funded investment sub-projects implemented (238 recuperation of degraded areas; 120 use and conservation of biodiversity; 329 water resource management; 730 re-orientation of productive systems to sustainable systems; 157 support for commercialization of sust. products).

ENV/SE OUTCOMES

Table MFA 4A lists measurable project indicators. Table MFA 4B documents the outcomes and weighted score calculated for Brazil Rio Rural. Figure MFA 4A shows tree cover changes in the 47 microwatersheds covered by this project --before, during and after implementation -- based on geospatial analysis.

SYNERGIES

Table MFA 4C lists direct benefits for each intervention where there were reported or inferred environmental or socioeconomic outcomes, to facilitate identification of synergies.

- *The combination of riparian tree planting, agroforestry tree planting, and excluding cows from source water areas* – 1,332 ha of riparian and other native forests were rehabilitated for biodiversity conservation and hydrology stabilization through tree planting. This also included restriction of cows from source waters where cattle had previously compacted the soil. 913 springs were protected (288 with GEF funds, 361 with IBRD funds, 264 with farmers' own resources) (interview notes). Multiple environmental benefits included reported improved soil and water quality, increased habitat connectivity, and observed increases in wildlife in Magé (birds, frogs, white-browed guan; as stated in case study interviews). It is inferred that the interventions resulted in habitat regeneration, which in turn would store carbon (an estimated 295 CO_2/year in spring protection subprojects). In one project case study of pineapple irrigation, the increased availability of water from source water protection and other activities allowed farmers to increase irrigation, leading to an increase in production of 12%.
- *Pasture rotation* – sequestered carbon (19,040 tons of carbon sequestration for 224 pasture rotation projects 9,475 tons of carbon sequestration for 336 ha of land put aside for biodiversity conservation instead of pasture); contributed to reduced erosion (measured through reductions in sedimentation values in micro-catchments – reductions of 26% of average and 31% of maximum values in one micro-catchment measured); directly increased income (80% increase in milk production in 90% of subprojects); average increase in soil organic material of 5.04g/dm^3.
- *Agroforestry* – improved soil and water quality, contributed to measured reductions in erosion, and benefits to wildlife (increases in in the number of birds, frogs, white-browed guan, attributed to agroforestry and tree planting). Carbon sequestration was inferred through the incorporation of trees into the system. Socioeconomic benefits included contributions to water supply, and access to a wider diversity of foods grown in the agroforestry system.
- *Beekeeping, habitat connectivity and increased agricultural production* – beekeeping was included as an intervention to increase local livelihoods through sustainable methods. Increased income was measured from sale of honey, and 2 ha of land per project were set aside for protection (of bees and other biodiversity). In another project component, private land reserves were established for the benefit of biodiversity. A bee study (done at Northwest Fluminense University) found that higher fertilization (in tomato and passion fruit) occurred when bees were present. There was higher bee diversity when forest cover was high, which was linked to forest fragmentation, providing scientific evidence for increasing connectivity among private forests. While increased agricultural production due to bees was not measured specifically in this project, the inference is that these two seemingly separate and unrelated activities carried out for two separate objectives together have a synergistic effect at improving a third objective, agricultural productivity[8].
- *Reduced risks associated with climate change (resilience)* – the combination of diversified income generation activities, food sources, access to credit, and habitat generation potentially increases resilience to climate change. The ability to withstand and/or bounce back from disturbances such as those presented by climate change (e.g. drought, floods, changes in precipitation) is improved by access to financial resources (i.e. to cover costs of damage or protection) as well as through a diversification of income generating and food sources (minimizing overall losses given multiple options for crops and income). Habitat regeneration improves ecosystem resilience, reducing impact from natural disasters such as drought, floods, etc. and climatic variability.

[8] Another study cited in ICR 2012 Annex 3 notes: "If we consider that on a property of one hectare, 4,000 coffee plants can be planted, spaced at 2.5 m by 1 m and that a 5-year old coffee plantation produces on average 4,680 beans per plant (collection data), we would have a production of 18,720,000 beans corresponding to 176.56 sacks of coffee. Thus, an average increase of 5% associated with pollinization [sic] services in these areas means 8.8 sacks or more of coffee per farmer, per ha, when the forest is maintained."

Interventions benefiting one focal area and socioeconomic outcomes:

- *Private nature reserve* – biodiversity conservation was fostered by establishing 792 ha of land use mosaics on private lands. Environmental benefits include increased corridor connectivity in microcatchments, and inferred habitat regeneration (and in turn carbon sequestration). Socioeconomic benefits included financial benefits at the municipal and owner level, through a national environmental tax benefit structure.
- *Rustic poultry* – increased income directly from sale of eggs in schools and markets. The use of chicken waste as fertilizer both improved soil productivity and reduced production costs from reduced need to purchase fertilizer (activity resulted in an annual production of 2,475 tons of organic fertilizer/manure with a market value of around R$ 222,750). Food security was improved directly through increased access to chickens, and indirectly by sale of chickens and purchasing of other food items with income gained.
- *Beekeeping* – contributed to increased incomes through sale of honey, and was inferred to improve habitat regeneration through setting aside of 2 ha/project for biodiversity. Also inferred to increase agricultural productivity through pollination, facilitated by increased habitat connectivity from private land reserves.

TRADE-OFFS

- *Exclusion of cattle from source waters (ENV vs SE)* – source water protection involved restricting access of cattle from water sources at headwaters. While this had positive benefits on water quality, the trade-off is reduced access to water for cattle. If the water is not acquired/available elsewhere, this would reduce production/health of the cattle, and in return, income of small farmers or large cattle operators.

Note: Pasture rotation activities increased productivity of milk production in cattle, addressing this trade-off in part.

- *Private natural heritage reserves (temporal, ENV/FA vs SE)* – land that is protected in private nature reserves to create a corridor takes land out of productive use for short-term benefit, including timber, extraction of forest resources, cash-crops etc. This is an opportunity cost for the owner, a time/economic trade-off in terms of deferring short-term benefits for long-term biodiversity protection.

Note: Tax benefits available by law at the national level compensate municipalities and landowners for private reserves, mediating this trade-off (note this law was not a direct activity of the project).

TABLE MFA 4A: MEASURED PROJECT INDICATORS	
Biodiversity Outcomes	• 792 ha of land use mosaics on private lands (ICR 2012) (stated as **16,712 ha** in interview notes); • Corridors increased from 5 to 34 through the planting of trees that connected these forest fragments (private reserves) • 1,332 ha of riparian and other native forests rehabilitated
Livelihood Outcomes	Pasture rotation: 80% increase in milk production in 90% of subprojects; average Internal Rate of Return (IRR) of 59% in 6 subprojects. Profitability of R$ 0.11 to R$ 0.48 per Real spent. Poultry: Average Internal Rate of Return (IRR) of 26.2% for 4 projects evaluated. Profitability of R$ 0.52 to R$ 0.84 for Real spent. Activity resulted in an annual production of 2,475 tons of organic fertilizer/manure with a market value of around R$ 222,750. Beekeeping: Average Internal Rate of Return (IRR) of 32.7% in four subprojects. Profitability ranged from R$ 0.50 to R$ 0.90 per Real . Private reserves: Natividade and Porciúncula municipalities received R$ R$368.446,00 and R$ R$ 360.806,00, respectively, from Environmental Compensation Chambers • 56% of surveyed municipalities reported that diversification of production (poultry, bee-keeping, fish farming, seedling production, and fruit cultivation) as well as new techniques for fertilization, esterqueira and pasture rotation were associated with increased farmer incomes
Climate change related outcomes	• 19,040 tons of carbon sequestration for 224 pasture rotation projects – 80 tons/ha in the air, 5 tons/ha in the soil each project • Additional 9,475 tons of carbon sequestration for 336 ha of land put aside for biodiversity conservation instead of pasture • Estimate: 294.75 tons/year associated with spring protection subprojects (0.73 tons for each R$ 1,000.00 applied by the project). ICR2012 Annex 3 p50
Land and Agriculture Outcomes	• IEM/SLM practices on **31,650 ha** [ICR 2012]; (18,000 ha cited for 2011 in PIR 2012) • Pineapple with irrigation: 12% increase in production representing 2,666 kg/ha, which at a value of R$0.85/kg represented a gain of R$2,261.10/ha or, R$0.77 per Real applied • Reductions of 26% in average values of sediment concentrations and 31% in maximum values of sedimentation in the Breja de Cobica micro-catchment; and 7% in average values for sediment concentrations in suspension, and 8% in maximum concentrations of suspended sediments in Santa Maria/Cambioco micro-catchment. • Increased organic material in four subprojects (67%) averaging 5.04 g/dm^3 or 0.5%; (from pasture rotation)

TABLE MFA 4B: OUTCOMES AND WEIGHTED SCORE BRAZIL RIO RURAL

Benefit Category	Category Score	Outcome Rating	Outcome Score	Outcomes
ENVIRONMENTAL BENEFITS				
(BD) Ecosystem cover and/ or quality increased and/or maintained	**2**			
		R	**0.5**	**Habitat connectivity:** 792 ha of land use mosaics on private lands supporting corridor connectivity in micro-catchments. This increased the number of corridors from 5 to 34 through the planting of trees that connected these forest fragments
		M	**1**	**Increased ecosystem cover:** 1,332 ha of riparian and other native forests rehabilitated for biodiversity conservation and hydrology stabilization; cattle excluded; 649 springs protected by two different financial sources as well as 264 springs protected by farmers with their own resources (interview notes); beneficiaries interviewed for the case studies on the adoption of SLM practices: "The forest is growing and there are many new seedlings"
		R	**0.5**	**Improved ecosystem quality:** ; 36% of respondents in a beneficiary survey noted better water quality, attributed to source protection activities.
(BD) Biodiversity and/ or species populations (flora or fauna)	**0.5**			
		R	**0.5**	**Increased wildlife populations:** After adoption of reforestation and agroforestry activities, farmers reported an increase in the number of wild animals (birds, frogs, white-browed guan) and insects (biological control); inferred that creation of corridors would benefit wildlife populations
(BD) Reduced threats to biodiversity (includes reduced extraction)	**1**			
		R	**0.5**	From exclusion of cattle from riparian areas, reducing destruction to vegetation and soil compaction

		R	**0.5**	Reduced land use: Honey production allowed an average 2 ha per subproject for biodiversity associated with beekeeping and honey production; pasture rotation also set aside land for biodiversity
(LD) Improved soil quality	**2**			
		M	**1**	**Increased organic material** in four subprojects (67%) averaging 5.04 g/dm3 or 0.5% (from pasture rotation); Inferred from manure - Poultry resulted in an annual production of 2,475 tons of organic fertilizer/manure
		M	**1**	Increased nutrients: Report of increased potassium and phosphorus in five subprojects (83%) averaging 10.14 mg/dm3 for phosphorus and 2.14 mmolc/dm3 for potassium
(LD) Soil structure improvements	**1.5**			
		M	**1**	**Reduced erosion:** Reductions of 26% in average values of sediment concentrations and 31% in maximum values of sedimentation in the Breja de Cobica micro-catchment; and 7% in average values for sediment concentrations in suspension, and 8% in maximum concentrations of suspended sediments in Santa Maria/Cambioco micro-catchment. + "There was assuredly a reduction in erosion especially associated with the construction of rainwater capture facilities and surrounding canals, based on reports by farmers visited (and especially in coffee fields)". + Inferred from tree planting, agroforestry, minimum tillage; When there was too much rainfall, erosion was prevented
		R	**0.5**	**Improved water flow from groundwater restoration:** In 2014 and 2015, there was water scarcity in the region, but this time the farmers suffered less. Increased avaialability of water used to irrigate pilot pineapple farm resulting in increased productivity (about 12% in production).
(LD) Reduced threats to land	**1**			
		R	**0.5**	From exclusion of cattle from riparian areas, reducing destruction to vegetation and soil compaction

		R	**0.5**	**Reduced chemical pollution:** Production of chicken manure reduced potential pollution through replacing chemical fertilizer with chicken manure; crop/pasture rotation also reduced need for chemicals; integrated pest management.
(CC) Carbon sequestered	**2.25**			
		I	**0.25**	**From active tree-planting -** Inferred from tree planting in riparian areas, agroforestry,
		M	**1**	**In soil**: From pasture rotation, storage/sequestration in the soil of 80 tons/ha and in the air, about 5 tons/ha in soil. Some 224 pasture rotation subprojects were implemented with an average area of 1 ha/subproject, carbon sequestration totaled 19,040 tons.
		M	**1**	**From allowed regeneration -** Based on 1.5 ha/pasture rotation subproject released for biodiversity conservation (336 ha in total), carbon sequestered in this area was a total 9,475 tons; Estimated - studies indicate the storage of an average 1.5 tons/ha/year in forests in process of natural regeneration. This average would give a sequestration of carbon in the order of 294.75 tons/year associated with spring protection subprojects (regeneration of habitat from source water protection and exclusion of cattle)
(CC) Maintenance of carbon sinks	**0.5**			
		R	**0.5**	**From protection of land:** 792 ha of land use mosaics on private lands supporting corridor connectivity in micro-catchments
(CC) Reduced GHG emissions	**0**			
		N	**0**	
Other environmental benefits/ reduced environmental threats	**0.166666667**			
Air		**N**	**0**	
Waste		**N**	**0**	

Chemicals		**R**	**0.5**	Reduced chemical pollution: Reduced chemicals by replacing chemical fertilizers with chicken manure; inferred from reduced use of pesticides through integrated pest management; also inferred from activities for safe disposal of chemical containers.
SOCIOECONOMIC BENEFITS				
Income or access to capital	**7**			
		M	**1**	**Pasture rotation:** 80% increase in milk production in 90% of subprojects; average IRR 59% in 6 subprojects; profitability of R$ 0.11 to R$ 0.48 per Real spent
		M	**1**	**Eggs and poultry:** Eggs sold at local market and schools IRR of 26.2% for 4 projects evaluated; profitability of R$ 0.52 to R$ 0.84 for Real spent
		M	**1**	**Beekeeping:** IRR of 32.7% in four subprojects; Profitability ranged from R$ 0.50 to R$ 0.90 per Real
		R	**0.5**	**Fish farming -** Some 56% of surveyed municipalities reported that diversification of production (poultry, beekeping, fish farming, seedling production, and fruit cultivation) as well as new techniques for fertilization, esterqueira and pasture rotation were associated with increased farmer incomes
		R	**0.5**	**Seedling production -** Some 56% of surveyed municipalities reported that diversification of production (poultry, beekeping, fish farming, seedling production, and fruit cultivation) as well as new techniques for fertilization, esterqueira and pasture rotation were associated with increased farmer incomes
		R	**0.5**	**Fruit cultivation -** Some 56% of surveyed municipalities reported that diversification of production (poultry, beekeping, fish farming, seedling production, and fruit cultivation) as well as new techniques for fertilization, esterqueira and pasture rotation were associated with increased farmer incomes

		R	**0.5**	**Reduced expenses:** Production of chicken manure resulted in reduced need to purchase synthetic fertilizers - Activity resulted in an annual production of 2,475 tons of organic fertilizer/manure with a market value of around R$ 222,750. Because of agroecology, they do not need to spend on medicines for cattle. Insects from the forests help control the parasites in the cattle.
		M	**1**	**Pineapple with irrigation:** Pineapple irrigation case study: With increased availability of water, farmers were able to increase the irrigation period on one hectare, leading to an increase of about 12% in production representing 2,666 kg/ha, which at a value of R$0.85/kg represented a gain of R$2,261.10/ha or, R$0.77 per Real applied by project
		M	**1**	**Compensation for private land protection:** Once mechanism put into place for municipality to receive money from State for conservation units, financial assets at the municipal level increased. Two examples are from Natividade and Porciúncula municipalities that received R$ R$368.446,00 and R$ R$ 360.806,00, respectively, from Environmental Compensation Chambers; Farmers lobbied for inclusion of mechanism to receive financial benefit for protecting habitat for biodiversity on their own private property – they were able to get financial resources (or tax breaks?) from government.
Food security	**1.5**			
		I	**0.25**	**Poultry and eggs** – from consumption and sale
		I	**0.25**	**Agroforestry** – from consumption of products and sale
		I	**0.25**	**Fruit cultivation** - from consumption and sale
		I	**0.25**	**Fish farming** - from consumption and sale
		R	**0.5**	**Increased agricutlural productivity:** 80% increase in milk production in 90% of subprojects; Study which estimated increased outputs in milk and meat due to irrigation (The expectation with pasture irrigation is for an increase of 5,300 liters of milk/year, compared to actual production without irrigation); Inferred that the rainwater capture was carried out to increase availability of water for agricultural activities.

Other Context-Specific SE Benefits	**2.25**			
		R	**0.5**	**Cooperation/reduced conflict:** The project directly influenced the establishment of 48 rural community organizations that adopted and implemented IEM/SLM strategies in 48 micro-catchments. They used to work individually, now they work collectively and thus are able to access new markets, such as the government food programs.
		R	**0.5**	**Benefits to women/Access to income**: women led 9% of subprojects (245 out of 2,728) valued at some R$607,000 under the direct leadership/responsibility of women. Subprojects included diverse SLM investments, small-scale agro-industries, crafts, clothes-making and group equipment acquisitions
		R	**0.5**	**Social/community integrity:** Beneficiaries reported a reverse migration effect in their immediate areas indicating that their localities had become more promising, economically and socially, to live and work.
		I	**0.25**	**Health benefits/Reduced chemical exposure**: Because of agroecology, they do not need to spend on medicines for cattle. Insects from the forests help control the parasites in the cattle. Indirectly, this also has health benefits, because then their meat has no chemicals/ antibiotics. Inferred from from reduced pesticide and chemical fertilizer use in crops.
		R	**0.5**	**Reduced hazards:** no landslides have occurred since riparian tree planting (past landslides were a large safety hazard)

TABLE MFA 4C: DIRECT BENEFITSS ASSOCIATED WITH INTERVENTIONS

	ENVIRONMENTAL BENEFITS							SOCIOECONOMIC BENEFITS							
	BD FA			LD FA			CC FA								
	Habitat connectivity	Wildlife populations	Habitat regeneration	Reduced erosion	Soil quality	Water quality	Carbon sequestration	Access to financial resources (women)	Income	Financial compensation – municipal level	Financial compensation individual level	Lower agricultural production costs	Water supply	Agricultural productivity	Amount or diversity of food
Investment subprojects (unspecified)								✓	✓						
Private natural heritage reserves	✓		I							✓	✓				
Agro-ecological silvo pastoral system												✓			
Beekeeping			I						✓					I	
Rustic poultry					✓	I			✓			✓			I
Pasture rotation			✓	✓	✓		✓		✓						
Rainwater capture facilities				✓									I		
Agroforestry		✓		✓	✓		I						✓		I
Riparian and forest tree planting	✓	✓			✓	✓	I						✓		
Excluding cattle from riparian areas			I			✓									
Soil conservation equipment				✓											
Minimum tillage				✓											

✓ = reported outcome; I = inferred outcome

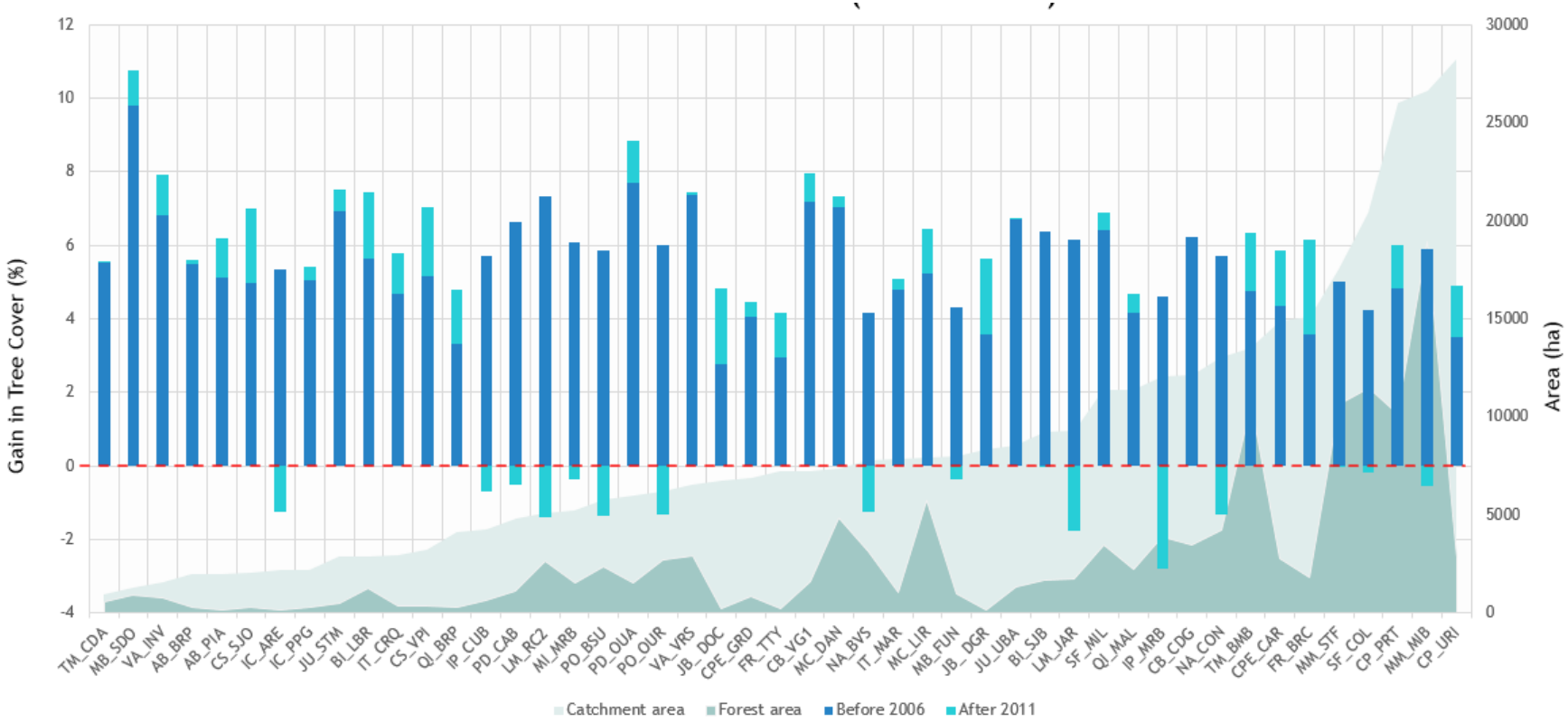
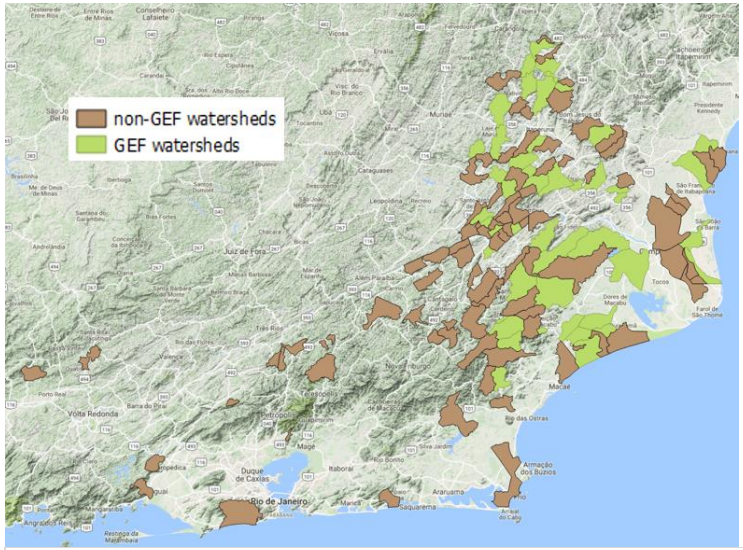
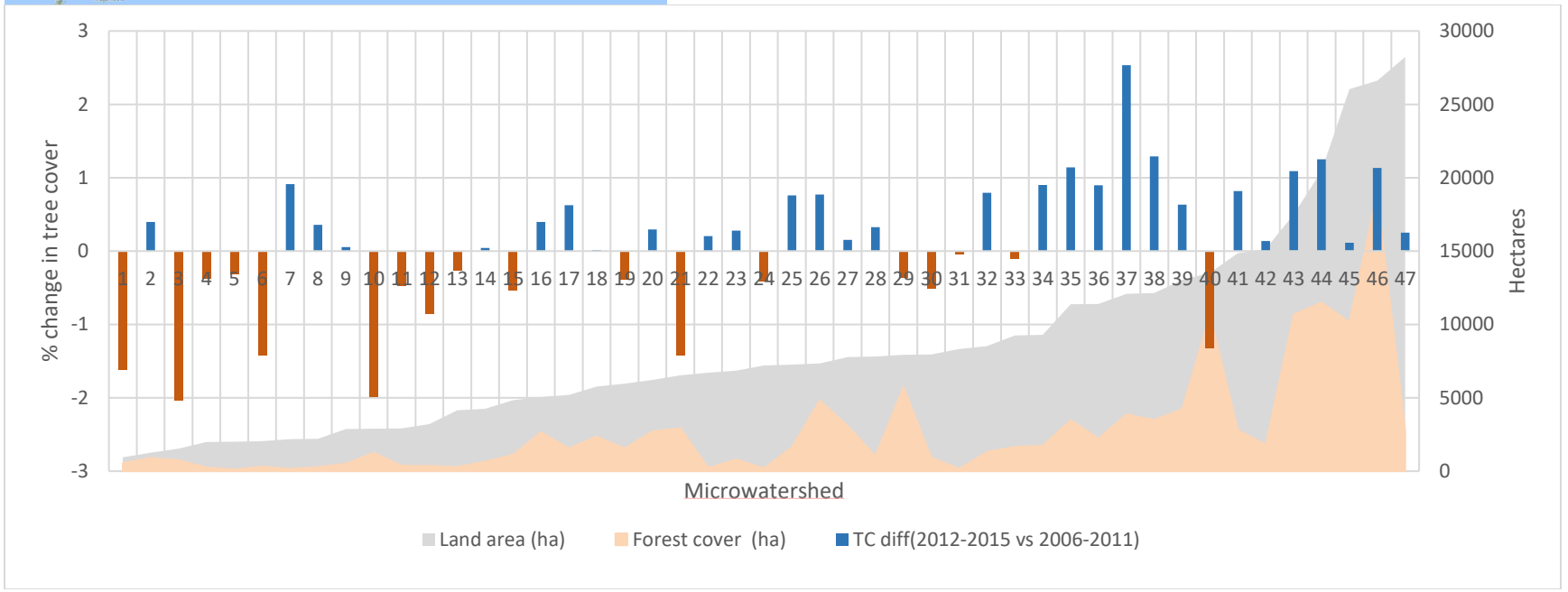


Figure MFA 4A: Tree cover gain in 47 watersheds (2006-2011)

Comparing the tree cover gain before and during project implementation, all 47 watersheds showed a positive trend with an average gain of 5.12%. After the project finished, 31 watersheds demonstrated sustained tree cover gain of 1.17% on average relative to the gain during the project implementation period, while the other 16 watersheds showed tree cover loss with an average of 0.84%. Contextual factors varied greatly across the microwatersheds.



For each GEF-funded microwatershed, at least one similar non-GEF microwatershed was selected for comparison (n=88; factors used for matching included elevation, terrain variation, forest cover, and precipitation). On average, GEF-funded microwatersheds had higher tree cover increase (0.3%/year) relative to the corresponding non-GEF microwatersheds. Out of 47 GEF-supported microwatersheds, 29 had a greater increase, especially in those that were more than 10,000 ha in size.



FACTORS CONTRIBUTING TO OUTCOMES

Factor	Outcome	Explanation
PROJECT FACTORS		
Participatory project development	Ownership, adoption of SLM	• An intensive and broad-based consultation with national, state and local beneficiaries and stakeholders accompanied project preparation and under-pinned the Socioeconomic and Environmental Diagnostic Studies and the Social Assessment. Civil society stakeholders also shaped the initial project concept and selection of project areas. Two NGOs – SOS Mata Atlantica and CI-Brasil – were included as project executors. (ICR 2012 2.1.9) • Participatory construction of commitments assumed collectively by rural communities adopting the micro-catchment and not rural properties as the best and most balanced mechanism for environmental management (ICR 2012 7.15) • The PID/PEM planning process fulfilled a key project strategy – using GEF resources to increase and improve existing investments in sustainable agriculture through organized, participatory mechanisms (see Annex 2 regarding PIDs, PEMs, COGEMs and COREM) (ICR 2012, p. 13)
Local level organization (COGEMs)	Income; access to credit, adoption of SLM, water quality, soil quality, "buy-in" to activities	• Creation of 48 local level organizations (COGEM) in 48 micro-catchments providing active forums for integrating project concepts and activities into ongoing rural development efforts. The COGEMs allowed farmers to access markets and programs that they could not do as individuals. The partnerships and external support provided conditions to include small farmers in National Programmes (Food Program – MDA; National School Feeding Program – PNAE/MDS, PRONAF) where they can sell large amounts of produce directly, as well as achieve rural credit (Banco do Brasil) to increase adoption of sustainable agricultural practices. • The multi-disciplinary Incubator of Sustainable Rural Enterprises (IRS) methodology was adapted successfully to the rural environment, boosting community organizations' capacity for collective action and self-management of natural resources. 588 farmers in 87 groups implemented small-scale agro-industrial ventures producing environmentally sustainable goods and services • 36% noted better water quality, attributed to source protection activities; 68% favorably evaluated activities in re-forestation, soil conservation, use of organic fertilizer, reduced use of agro-chemicals, and activities to inculcate safe disposal of chemical containers. Municipalities noted the positive, motivating role of the COGEMs in these outcomes [ICR 2012] • A new culture of co-responsibility and local empowerment emerged from the COGEMs' partnership with micro-catchment residents to implement the project vision locally (ICR, p. 20)
Technical and financial support	Income; water quality, soil quality, adoption of SLM practices, reduced erosion	• All subprojects were made possible with technical assistance, grants, and local level organization - between R$4000 and R$6000 in MFA, increased to between $5000 and $7500 due to inflation base costs. Upfront SLM costs were a disincentive pre-project. With IEM, project incentives enabled farmers to surmount this obstacle, tiding them through to the results phase where they saw initial costs diluted and understood better the cost-benefit of SLM adoption. (ICR, 2012, p.18)
Multi-sectoral collaboration/ good collaboration	Improved governance (ICR 2012); replication of activities	• Project has provided a central venue for stakeholders to discuss issues and share info (through partnerships) – e.g. Integration of multisectoral public policies for Sustainable Rural Development (Education, Health, Culture); Integration of agricultural and environmental sectors - (Watershed

Factor	Outcome	Explanation
PROJECT FACTORS		
with project partners		Committees; SOS Mata Atlantica/CI; INEA / State environmental agency); (interview notes page 3) • Rio Rural Agroecological Research Network that is composed of 24 institutions • The project established one Regional Microcatchment Council (COREM) with significant stakeholder representation from the microcatchment and municipal levels • The institutional "platform" for SLM and rural poverty reduction – both for the immediate benefit of the Rio Rural/GEF and by definition, the Rio Rural/IBRD project, and longer-term, the State's agro-ecological support programs was strengthened through institutional partnership formation horizontally and vertically, and the intense and often difficult learning process involved in positioning the project for, and implementing, field operations. (ICR, 2012, p. 20) • Integration of agricultural and environmental sectors - (Watershed Committees; SOS Mata Atlantica/CI; INEA / State environmental agency) noted as a success at State level in interview notes, p.3
Women actively engaged in interventions	% of women engaged	• The project made strong efforts to include women including investments in 245 subprojects valued at some R$607,000 under the direct leadership/responsibility of women. Subprojects included diverse SLM investments, small-scale agro-industries, crafts, clothes-making and group equipment acquisitions [ICR 2012]
Environmental awareness activities	Water quality; water supply habitat regeneration	• Awareness-raising included as part of project activities influenced adoption of IEM practices and is attributed to high participation in source protection activities. (Education and awareness included 30 State workshops/events, 3 national workshops, 3 media campaigns, 1 homepage, awareness raising at 20 schools, training of 5,730 beneficiaries, 370 technical executors; 1 Telecentro; Information and communication systems established in 5 microcatchments) • 40% of COGEMs stated that environmental awareness did not exist prior to the project. Many problems were cited: indiscriminate use of agro-chemicals and random disposal of containers; lack of garbage collection; poor or no sanitation and poor water quality/quantity; the project had increased environmental awareness in 84% of municipalities surveyed; 88% of municipalities surveyed called for the continuation of environmental awareness-raising and SLM activities and for carrying through on the Community Conduct Statutes (ECC) [ICR 2012]
Coordination with State policies	all	• ICR 2012 2.1.11: The project's focus on SLM, IEM and biodiversity conservation was consistent with government's established framework and sector development plans (see listing in project description)
Leveraging of additional resources	Extended reach	• The project successfully leveraged an additional US$3.04 million in contributions from diverse sources to support and complement project activities (ICR 2012) • Stemming directly from the Rio Rural GEF experience and demonstrating the project's multiplier effects, seven long-term research units were established (now being maintained under the Rio Rural/IBRD) to increase the scope of adaptive technologies available for farmer adoption (ICR 2012, p 14)
CONTEXTUAL FACTORS		
National Ecological Sales Tax (ICMS-E)	Habitat connectivity	• Financial benefit for private natural heritage reserves available nationally through ICMS-E, an Ecological Sales Tax instituted to "benefit the municipalities that develop actions related to the environment, through the

Factor	Outcome	Explanation
PROJECT FACTORS		
	through private reserves	distribution of resources ICMS - Tax on Goods and Services; through Law #572/2010 – allows RRPN owners able to receive financial resources from ICMS-E
Supportive framework established by national government	Income, adoption of IEM practices, etc.	• The State and Federal Governments had established a policy agenda incorporating the following: (i) the State Credit Program for Agricultural Production and Diversification (Moeda Verde); (ii) State Microcatchment (MC) Program for Rural Sustainable Development (Rio Rural) providing rural extension and infrastructure to rehabilitate microcatchment resources (e.g., erosion control on rural roads); (iii) National Family Agriculture Program (PRONAF), providing credit and assistance for smallholders to improve productive capacity; (ICR, 2012, p. 7)

FACTORS HINDERING OUTCOMES

Factor	Outcome	Explanation
PROJECT FACTORS		
Demanding monitoring and evaluation component		• ICR 2012 p.5 - the project's multi-institutional structure and difficulties in coordinating and operationalizing monitoring activities; the high cost of data collection and production of technical materials; a time-consuming baseline study of mixed relevance to the project; delayed and/or deficient feedback of data to microcatchment communities and technicians; and, information collection campaigns not synchronized with the subprojects themselves to benefit from results and feedback (p.10) – e.g. 50% reduction in erosion was to ambitious for project given long-term impact of activities
Implementation framework over-ambitious		• Implementation framework was demanding for a small demonstration project testing unfamiliar technologies and relying on the collaborative capacity of multiple entities/programs with varying levels of commitment, understanding and/or experience (ICR, p. 6)
CONTEXTUAL FACTORS		
Delay in acquiring co-financing from State	Delay in funding/ activities	• Noted that often a year lag of funding when administrations change over (ICR 2012, 2.2.2) – ICR 2012, p 8 notes that the delay in issuing of State co-financing delayed the project by 2 years; funds were redistributed to finance transit projects, and the GEF project had to wait in line until government co-financing was available. Seasonal sensitivity of agricultural activities were strongly affected by this delay
Change in exchange rate	Budget decreased	• 40% decline in the Real/US$ exchange rate during project affected budget and planned activities, yet only minor adjustments were made to activities (ICR 2012, para 2.2.4)

MALAWI SHIRE MANAGEMENT: Shire Natural Ecosystems Management Project (2012-ongoing) (GEF ID 4625)

Country: Malawi
Focal Area: MFA – Climate Change Adaptation(CCA); Land Degradation (LD); Biodiversity (BD); Sustainable Forest Management (SFM)
Geographic Scope: Shire River Basin, surface area of about 22,317 km^2, 520 km long in total.
Executing Agencies: Ministry of Irrigation and Water Management, Government of Malawi
Total Budget: $73 million total ($6.6 million GEF; $67 million soft loan from World Bank, IDA; remainder in-kind from government of Malawi and local communities)
Project management: $7.4 million
GEF Contribution: US$6.6million

BACKGROUND AND RATIONALE

The Shire Basin Project #4625 is Phase 1 of the 15-year Shire River Basin Management Project (SRBMP) which holds a $125 million IDA credit. It focuses on the Shire River Basin, which provides water for hydropower, agriculture, fisheries, transport, tourism, urban water supply and rural water uses along its 520 km. The Elephant Marshes and other wetlands in the Lower Shire (120,000 ha) play a strong role in attenuating flooding, dry season agriculture, and fisheries, and hold high levels of biodiversity.

SRBMP and Project #4625 aim to address key pressures in the Basin including: land degradation from deforestation for fuelwood, burning for charcoal to sustain urban energy supply, unsustainable land use, and conversion of wetlands to agriculture, high vulnerability to floods in the Lower Shire Valley causing displacement, disease and loss of infrastructure, and climate change. Land degradation is attributed to high population density and poverty. The impact of sedimentation and weeds (from erosion/ deforestation) on electricity generation is a key concern for the country given that 98% of electricity is generated on the Shire River.

SRBMP was designed in response to the lack of a co-ordinated planning mechanism for the Shire Basin. Prior to the project, decisions related to water use were made on an ad-hoc basis as diverse needs arose (e.g. power generation, agricultural, urban and industrial water supply, waterway projects, management for ecological reserves). The project acknowledges in its design that “single-sector, single-project interventions would not contribute effectively to a comprehensive and lasting solution to the challenges the Basin is facing; and a multi-sectoral and longer-term planning framework would be necessary” (CEO Endorsement document, p.11).

Project #4625 was intended to set up the long-term project by increasing the knowledge base for more effective decision-making, establishing coordinated inter-sectoral development planning, undertaking the most urgent water related infrastructure investments, and initiating rehabilitation to protect natural forests, wetlands and biodiversity. It included three components: A) activities to strengthen the institutional capacities and mechanisms for Shire Basin monitoring, planning, and management; B) activities to reduce erosion (sub-catchment management plans, SLM activities, and sustainable livelihood activities), park management improvements in Liwonde NP and Lengwe NP, and forest reserve co-management activities; and C) water related infrastructure, including upgrading the Kamazu Barrage, community flood management, and management planning in the Elephant Marshes. During project implementation, Liwonde NP came under the management of the African Parks Network and project activities related to this park were being re-assessed at mid-term.

Although funded as an MFA project, the GEF-funded components were primarily in the biodiversity focal area, including activities in the national parks, forest co-management, studies to inform management planning in the Elephant Marshes, and capacity building. Looking at the project design, GEF support was added with the rationale that without it "…there would be a significant risk that the strengthened basin planning approach would focus only on resources directly under MAIWD's mandate – notably agricultural land uses, and water resources and associated infrastructure" (CEO Endorsement doc, p.13). GEF funding therefore aimed to focus attention on the role of natural ecosystems in "delivering public goods to the basin". Also, during case study interviews, the Assistant Director of National Parks and Wildlife stated that GEF's role has mainly been ecological management in parks and five forest reserves, that GEF provides safeguards, and that "GEF came as an add-on to the Shire IDA loan that originally fell short on managing environmental impact."

Concurrent projects that the Shire Basin project planned to coordinate with included: UNDP Sustainable Land Management Project (supporting community forest management at Thanbani Forest Reserve in the middle Shire), the FAO Food Security and Sustainable Rural Livelihoods Project, the EU Improved Forest Management for Sustainable Livelihoods Program (Matandwe Forest Reserve in the lower Shire), the JICA Community Vitalization and Afforestation project, and planned watershed management investments in the upper Shire by the Millennium Challenge Account.

Shire Basin #4625 Project Activities

Component A (Shire Basin Planning)	**Component B (Catchment management)**	**Component 3 (Water related infrastructure)**
Mapping	PA Management in Lengwe and Liwonde NP	Climate resilient livelihoods and wetland management study
Biodiversity surveys	- patrolling, road network enhancement for patrolling and tourism	Elephant Marsh Management Plan
Information management	- benefit sharing agreements (park gate fees)	Data collection (ecology, hydrology, use, sedimentation, etc.)
Capacity building	- beekeeping, goats, maize grinding mills	Baseline maps
	- establish community-based organizations	
	Forest co-management (training, patrols, etc.)	**Non-GEF**
	Tree planting in Forest Reserves	Kamuzu Barrage rehabilitation
	Non-GEF:	Small scale water infrastructure
	Capacity building for sub-catchment management	Early flood warning systems
	SLWM technologies	
	Alternative livelihoods grants	

INTERMEDIATE OUTCOMES

- *Management approaches:* 15 management plans developed; management plans for Liwonde and Lengwe National Parks; Shire Basin Plan development in progress; forest co-management in 5 reserves; Lengwe Wildlife Association Trust established in 2015 as umbrella organization for 28 CBOs and 4 zone committees to share proportion of park revenues.
- *Institutional capacity outcomes:* LFMB (Local Forest Management Board), BMCs (Buy Malawi Campaign), IGA groups (Income Generating Activities) developed, and quarterly review meetings are organized; 111 participants of training activities; vehicle and motorcycles for patrols in Lengwe NP.
- Knowledge management: Two studies were undertaken in the Elephant Marsh: 1. Climate Change Resilience Study (MRAG); 2. Community support and investments through GEF-5 funding; biodiversity surveys.

ENV/SE OUTCOMES

Few outcomes were measured or reported for this project due to: the project experienced multiple delays in funding and procurement which affected project activities (MTR, 2015), the project was still under implementation at the time of the current study, and several activities were related to knowledge management and capacity building. Table MFA 5A lists measurable project indicators. Table MFA 5B documents the outcomes and weighted score calculated for Malawi Shire Basin.

SYNERGIES

Table MFA 5C lists direct benefits for each intervention where there were reported or inferred environmental or socioeconomic outcomes, to facilitate identification of synergies.

- *Increased patrols in co-managed forest reserves* – increased patrolling in the co-managed forest blocks resulted in reported reductions in extraction of fuelwood and burning for charcoal, which in turn is inferred to reduce GHG emissions from reduced burning. The maintenance of these carbon sinks was estimated to store 79.8 million tonnes of carbon across all 9 sites. In the Matandwe and the Zomba/Malosa Forest Reserves, the reduced extraction and burning from improved patrolling and associated law enforcement as well as tree planting helped maintain the forest regeneration that was noted under the previously implemented EU project. The forest regeneration was connected with: increased production of some non-timber forest products (NTFPs) such as medicinal products (e.g. Tseketseke and Mwamunasakalamba, local VIAGRAs) whose sale is a reliable source of income; and, improved water flow in a number of streams such as Jerenje, which has facilitated the introduction of new crops such as strawberry, maize and vegetables grown during the dry season through irrigated farming.
- *Increased patrols in Lengwe National Park* – increased patrolling and improved road/trail networks to support more patrolling resulted reduced poaching and reduced burning for charcoal, as reported by the Park Manager at Lengwe NP (no data available). This in turn is inferred to have reduced GHG emissions from reduced burning.

Also of note:

- *Increased income gained in a co-managed forest reserve* – from beekeeping, timber sales, etc. was used towards community improvements and starting savings/credit loan program. Note that the forest reserve co-management system was already established prior to the project (see section on factors), and GEF funding was put towards increased training and capacity building.
- *Tree planting in the forest reserves involved multipurpose tree species* – 116,811 tree seedlings were planted in Nsanje; in Zomba, there was enrichment planting with 4,000 tree seedlings of *Albizia lebbeck, Khaya anthotheca &Afzelia quanzensis* in Mtogolo Block along Nkanya and Maera rivers; in Matawande there was an enrichment planting program in the FR and on customary land in the co-management program impact area. Species selected have multiple uses including forage, wood, food/fruit, shade, etc:
    - *Albizia lebbeck* not native to Malawi but grown as forage: http://www.fao.org/ag/agp/agpc/doc/publicat/gutt-shel/x5556e0a.htm
    - *Khaya anthotheca* is a mahogany indigenous to eastern Africa: http://www.fao.org/docrep/x5327e/x5327e18.htm
    - *Afzelia quanzensis* native to southern and east Africa: http://www.worldagroforestry.org/treedb/AFTPDFS/Afzelia_quanzensis.PDF

TRADE-OFFS

- *Increased patrolling in reserves (ENV vs SE):* Communities around national parks are encroaching into the PAs for a variety of resources – including meat for home consumption or sale, timber, fuelwood, and burning of wood for charcoal that is sold for city use. By increasing patrolling – and management of the PA overall (with fencing etc.) – community members have reduced access to these resources. This directly affects food security (meat that was hunted in the reserve) as well as income (from charcoal, sale of fuelwood etc.).

****NOTE: Separate funding under IDA (for same project) dedicated to improved livelihood activities in same village/area as PA management could address impacts of restricting access to forests. No outcomes for this component were available, either because the activities had not occurred or because they were reported elsewhere.**

TABLE MFA 5A: MEASURED PROJECT INDICATORS

Biodiversity Outcomes	• 250 ha that were previously encroached in Mangochi FR have been redeemed • 116,811 tree seedlings planted in Nsanje • 4000 tree seedlings in Zomba [*Albizia lebbeck, Khaya anthotheca &Afzelia quanzensis*]
Livelihood Outcomes	• Kamanga block – Nsanje District. Group raised K617,270 from sale of trees and firewood from the block.
Climate change related outcomes	None available
Land and Agriculture Outcomes	None available

TABLE MFA 5B: OUTCOMES AND WEIGHTED SCORE MALAWI SHIRE BASIN

Benefit Category	Category Score	Outcome Rating	Outcome Score	Outcomes
ENVIRONMENTAL BENEFITS				
(BD) Ecosystem cover and/ or quality increased and/or maintained	**0.5**			
		I	**0.25**	**Maintenance of ecosystem cover**: In Matandwe FR notable forest regeenration/rehabilitation seen after EU project. Improved patrolling/law enforcement helped maintain; Zomba/Malosa FR forest recovery through natural regeneration seen in Mtuluma, Mtogoloand Mlumbe from EU project - maintaned with reduced tree cutting and burning for charcoal from patrols.

		I	**0.25**	**Maintenance of ecosystem quality:** In Zomba/Malosa FR, due to reduced logging from patrol and law enforcement there the increased water flow in a number of streams such as Jerenje from the EU project has been maintained
(BD) Biodiversity and/ or species populations (flora or fauna)	**0**	**N**	**0**	
(BD) Reduced threats to biodiversity (includes reduced extraction)	**2**			
		R	**0.5**	**Reduced timber/firewood extraction:** Tree cutting/extraction: Zomba/Malosa FR – reduced tree cutting
		R	**0.5**	**Reduced land use within reserve:** Liwonde FR, DFO Machinga managed to evacuate 22 farm families who had encroached the reserve at Mapira; Mangochi FR, 250ha that were previously encroached have been redeemed and encroachers have peacefully abandoned the illegal practice [not specified what "illegal practice" was]
		R	**0.5**	**Reduced burning/bush fires:** Incidences of charcoal burning and illegal burning has been reduced in the PA with improved roads (still serious where the roads are impassable); Zomba/Malosa FR – reduced burning for charcoal
		R	**0.5**	**Reduced poaching:** Fewer snares for poaching (before more than 2000) from increased patrolling in PA
(LD) Improved soil quality	**0**	**N**	**0**	
(LD) Soil structure improvements	**0.5**			

		I	**0.25**	Reduced erosion: Inferred from tree planting in forest reserves: 116,811 tree seedlings planted in Nsanje; in Zomba, enrichment planting in Mtogolo Block along Nkanya and Maera rivers in which 4,000 tree seedlings of Albizia lebbeck, Khaya anthotheca &Afzelia quanzensis; Matawande FR – intensified enrichment planting program in the FR and on customary land in the co-management program impact area.
		I	**0.25**	Maintenance of improved groundwater flow: In Zomba/Malosa FR, due to reduced logging from patrol and law enforcement there the increased water flow in a number of streams such as Jerenje from the EU project has been maintained
(LD) Reduced threats to land	**1**			
		R	**0.5**	**Reduced burning/bush fires:** Incidences of charcoal burning and illegal burning has been reduced in the PA with improved roads (still serious where the roads are impassable); Zomba/Malosa FR – reduced tree cutting and reduced burning for charcoal
		R	**0.5**	**Reduced timber/firewood extraction**: Tree cutting/extraction: Zomba/Malosa FR – reduced tree cutting
(CC) Carbon sequestered	**0.5**			
		I	**0.25**	**From planting:** Inferred from tree planting in forest reserves: 116,811 tree seedlings planted in Nsanje; in Zomba, enrichment planting in Mtogolo Block along Nkanya and Maera rivers in which 4,000 tree seedlings of *Albizia lebbeck, Khaya anthotheca &Afzelia quanzensis*; Matawande FR – intensified enrichment planting program in the FR and on customary land in the co-management program impact area.

		I	**0.25**	**Inferred from habitat regeneration:** Matandwe FR: notable forest regeneration/rehabilitation in reserve with improved patrolling/law enforcement (forest reserves established previously by another project); Zomba/Malosa FR forest recovery through natural regeneration seen in Mtuluma, Mtogoloand Mlumbe (from reduced tree cutting and burning for charcoal).
(CC) Maintenance of carbon sinks	**0.75**			
		R	**0.5**	Reported reductions in tree cutting in forest reserves due to increased patrolling; reduced charcoal burning in PAs. Reported that across full Shire Basin (broader project area), 79.8 million tonnes of carbon (79,757,354 Mega Grams) were stored in all 9 PA sites (in BankJuly16, data up to July 2016)
		I	**0.25**	Inferred from maintenance of forest reserves established under EU project
(CC) Reduced GHG emissions	**0.5**			
		R	**0.5**	**From reported reduced burning:** Incidences of charcoal burning and illegal burning has been reduced in PA; improved forest patrols has reduced tree cutting and reduced burning for charcoal
Other environmental benefits/ reduced environmental threats	0			
Air		**N**	**0**	
Waste		**N**	**0**	
Chemicals		**N**	**0**	
SOCIOECONOMIC BENEFITS				
Income or access to capital	**3**			
		M	**1**	**From sale of trees and firewood**: Kamanga block – Nsanje District. Group raised K617,270 from sale of trees and firewood from the block

				(10% goes to local forestry board, 30% to government, 60% to community).
		I	**0.25**	**From NTFPs** - [example from one FR] Forest regeneration in Zomba/Malosa FR has led to an increased production of some non-timber forest products (NTFPs) such as medicinal products -Tseketseke and Mwamunasakalamba (local VIAGRAs) whose sale is a reliable source of income generation.
		R	**0.5**	**From beekeepng**: [example from one FR] In Zomba/Malosa - Beekeeping in these areas is contributing to improved incomes and livelihoods.
		R	**0.5**	**Access to credit**: Kamanga block – Nsanje District. Used some of moneyraised (K617,270 from sale of trees and firewood) to set up a village savings and loan group.
		I	**0.25**	**Inferred from grinding mills:** [Nsanje] three maize mill houses have been built in Chapananga, Ndakwera and Ngabu zones while one maize mill house has been rehabilitated at Lundu. All the four maize mills have been procured, delivered, installed and are operational. Each maize mill received 100 liters starter pack diesel
		I	**0.25**	**From goats:** 60 goats distributed to forest blocks in Nsanje (Sept 2016 ppt, NSANJE DFO SRBMO)
		I	**0.25**	**From crops**: example from one FR] Local income levels reported but not measured in one FR due to improved irrigation and growing of new crops such as strawberry, maize and vegetables
Food security	**0.5**	**I**	**0.25**	**From goats:** 60 goats distributed to forest blocks in Nsanje (Sept 2016 ppt, NSANJE DFO SRBMO)
		I	**0.25**	**From crops**: example from one FR] Local income levels reported but not measured in one FR due to improved irrigation and growing of new crops such as strawberry, maize and vegetables

Other Context-specific SE benefits	**1.5**	**R**	**0.5**	**Health benefits/clean water supply**: Well management blocks, with the consequent improved stream flow, is also contributing to a supply of healthy water for domestic/household use.
		R	**0.5**	**Health benefits/improved access to treatment**: In Zomba/Malosa, income gained reported to be assisting the community to "take care of the sick, the needy, the old and orphans"
		R	**0.5**	**Infrastructure improvement**s - Zomba/Malosa FR - Income gained put towards community infrastructure improvements (building roads, schools)

TABLE MFA 5C: DIRECT OUTCOMES ASSOCIATED WITH INTERVENTIONS

	ENVIRONMENTAL OUTCOMES					SOCIO-ECONOMIC OUTCOMES
	BD FA				CC	
	Reduced extraction of natural resources	Habitat regeneration	Reduced burning for charcoal	Reduced poaching	Carbon sequestration	Income
Tree planting in forest reserve					I	
Sustainable harvest of forest resources in Forest Reserves						✓
Beekeeping in Forest Reserves						✓
Patrols in co-managed reserves	✓		✓			
Road network enhancements in Lengwe NP			✓			
Increased patrolling in PA (Lengwe NP)			✓	✓		

✓= reported outcome; I = inferred outcome

FACTORS CONTRIBUTING TO OUTCOMES

Factor	Outcome	Explanation
PROJECT FACTORS		
Multi-sectoral collaboration through Technical Team	General	• A multi-sectoral Technical Team was appreciated by agencies interviewed in MTR as it helped in connecting the different sector ministries and Departments in a collaborative venture. From MTR 2015 p. 45: "This arrangement was beginning to have added positive effects beyond the SRBMP - Phase 1, as participating Departments seem to have found 'contact points' for other activities within their sector requiring support from another ministry or Department. For instance, in the Department of Irrigation under MoAIWD, the already existing relationship between officers is used to link with

Factor	Outcome	Explanation
PROJECT FACTORS		
		Department of Forestry and Land Resources Conservation on activities outside the ambit of the SRBMP - Phase 1". The caveat was that an assessment of time and resource allocation was necessary, as technical team members were finding it difficult to fulfil the 80/20 time division, and instead spent less than 1% of time on the project
CONTEXTUAL FACTORS		
Support of law enforcement agencies in Forest Reserves	Decreased extraction of natural resources; reduced burning for charcoal	• Decreased extraction from reserves was due to patrolling by front line staff, guards and community, along with law enforcement from Police and Judiciary support (Forest Co-management Brief 2016)
Forest Co-management approach already established in Malawi	Income in Kamanga Block	• The forest co-management approach already existed and was refined in Malawi over past 20 years: includes Village Natural Resource Committees (VNRMCs) to establish Village Forest Areas (VFAs) on customary land and/or co-management within forest reserves, formal co-management agreements in each block between the community and the District, which provide legal access to forest resources in return for mutually agreed procedures for harvesting, monitoring and management [CEO Endorsement doc p14] • The Kamanga Block was established under the EU funded Improved Forestry for Sustainable Livelihood Programme (IFSLP) 2013. GEF funding used to increase training about sustainable forest management, leadership, etc.

FACTORS HINDERING OUTCOMES

Factor	Outcome	Explanation
PROJECT FACTORS		
Poor fund disbursement mechanisms	Many indicators not met for YR3	• A variety of factors noted in MTR 2015 (p.19-20) attributed to delays in project – strict procurement rules affects timely implementation (delays in procuring contracts, consultants, etc.); complex, lengthy procedures of disbursing funds to communities (through Program Implementation Committees); delays in transfer of funds from the District Councils (DC) to extension workers
Key stakeholders not engaged	Many indicators not met for YR3	• Limited role of government extension workers at grass root level - contracts primarily attained by international consultancy teams. Many government District staff felt sidelined by the Project, as they were not actively involved and part of the planning and implementation was done by Implementation Service Providers (international consultancy firms). Noted this may compromise on ownership and sustainability of activities after Project lifespan [MTR 2015, p 15.] During a 2015 workshop, it was recommended that the "Role of the international consultancy firms as ISPs should be revised and focused on providing support to the existing government staff at District and local level, who should be responsible for assisting community-based organisations (CBOs), such as Village Development Committees (VDCs), Village Natural Resource Management Committees (VNRMCs) and Civil Protection Committees (CPCs) with the planning and implementation of Project activities at local level [MTR 2015, p140]

Factor	Outcome	Explanation
Inadequate engagement of partner institutions working in Shire River Basin	Many indicators not met for YR3	• While a Shire Basin Stakeholder Forum was developed, stakeholders were not involved in planning or implementation, and during a workshop in 2015 had limited knowledge of the objectives of the project, and of roles of other agencies working in the Shire (MTR 2015) • No/limited coordination and collaboration between SRBMP - Phase 1 and other projects and NGOs executing similar activities in the areas (MTR 2015) • Lack of clear guidelines of involvement of local District level government agencies; project does not engage partner organizations in implementation activities [MTR 2015, p 142]
Ineffective communication mechanisms	Many indicators not met for YR3	• Lack of information sharing – reports completed but not circulated, study results not used (MTR 2015). Suggestions were to put reports on websites, share quarterly reports directly with the Shire Basin Stakeholder Forum • Lack of feedback processes (MTR 2015) • No interface between the Implementation Service Provider for Catchment Management and any of the NGOs and other projects implementing similar activities in the Project areas, which exposes the Project to the risk of duplicating efforts in similar areas and compromises the desired need of enhancing synergies in the implementation process. (MTR 2015, p142) • Individuals interviewed in forest co-management activities noted the lack of communication and feedback from project, given that no next steps were given after initial planning process (MTR 2015 p.36) • Members of the Area Development Committee in the Chikwawa District noted the ADC is "aware of the Project but it does not exactly know what its objectives are except that there are activities in the Lengwe National Park as Project vehicles seem to visit the park frequently" (MTR 2015, p. 36). Similarly, community members near the Kamuzu Barrage were not aware of project activities, and had the perception that "someone was trying to build a lodge by the water". "The views expressed by the visited community raise an interesting question regarding the effectiveness of sensitization and communication approaches employed by the Project" (MTR, p. 37)
Inefficiencies in project design	Many indicators not met for YR3	• Implementing income generating activities within the communities is seen as a complex procedure requiring time, which was not factored into design – e.g. many of the processes appear out of the control of the relevant offices and experts dealing with community income generating approaches as currently designed (MTR, 2015, p 43) • Shire River Basin Organization was not yet functional at MTR, yet Shire River Basin Plan had already been developed – risk of lack of ownership of the plan for implementation (MTR, 2015)
Activities under-budgeted	Many indicators not met for YR3	• "The budgets allocated for some of the major works and field activities seem underprovided. These include those for water holes and check dams, road and bridge alignment, new fencing and road grading. These need to be carefully assessed and calculated since they have a bearing on achievement of some of the sub-objectives of the SRBMP - Phase 1. (MTR, 20115, p. 43) • "the District Councils that were expected to lead implementation with ISP support perceive they were given a mandate, but were under-resourced, especially on operational costs, to achieve the mandates related to the Project." (MTR 2015, p 45) • Functioning of the Shire Basin Stakeholder Forum was hampered due to budget constraints.(MTR 2015)
CONTEXTUAL FACTORS		

Factor	Outcome	Explanation
Large flood, January 2015	Many indicators not met for YR3	• A January 2015 flood forced the project to refocus activities, and link them closely to the recovery agenda (2015 PIR pg. 2). In Lengwe National Park, the flood washed out the bridge and access road to the park; budget was re-allocated to address this (GEF inputs to MTR Aide Memoire, 2015)
Lack of supporting laws at national level		• (MTR 2015, p. 43) gaps and contradictions in the legislation guiding catchment guidelines likely to affect operation of national catchment guidelines, notably between the Water Resources Act (2013) and Forestry Act (1997)

SENEGAL PAFA: Climate Change Adaptation Project in the Areas of Watershed Management and Water Retention (2012-2016) (GEF ID 4234)

Country: Senegal
Focal Area: SFA - Climate Change (CC)
Geographic Scope: 20 valleys, 49 sites
Executing Agencies: Ministry of Agriculture, Ministry of Hydraulics & National Water System, and Ministry of the Environment, Nature Protection, Water Retention and Artificial Lakes
Total Budget: $15 million ($5 million GEF; $8.5 million IFAD; $1.4 million in-kind national government, beneficiaries)
GEF Contribution: US$5 million
Project Management: US$1,427,00

The PAFA project was designed to address decline in agricultural productivity due to climate change impacts including decreased rainfall, declining groundwater levels, drought, and associated erosion and salt intrusion. It responds directly to Senegal's National Adaptation Programme of Action (NAPA) – specifically, NAPA's recognition of the benefits improved water retention capacity and increased irrigation efficiency can have to counteract the effects of climate change on water resources, agricultural production, food security, land degradation and biodiversity.

PAFA was designed to complement IFAD's Value Chain Support Project (VCSP) which focuses on finding alternative agricultural markets to the declining groundnut industry. The PAFA project adds to VCSP by reducing climate-induced risks to agricultural production. Both projects target three agro-ecological zones: 1) the littoral zone, consisting of a mangrove ecosystem; 2) the continental zone, consisting of lowlands and inland valleys; and 3) the northern zone, consisting of artificial wetlands. PAFA and VCSP were delivered as a 'blended project' to increase cost-effectiveness, using implementation structures already established in the VCSP project.

PAFA components included: 1) activities to increase awareness of the impact of climate change on agricultural production and to better integrate climate change into policies for water and agricultural management at the national level; 2) integrated management of water harvesting structures and activities to restore surface water and groundwater exchange; 3) water efficient irrigation and improved water use efficiencies; and 4) participatory monitoring of water resource and climate change indicators. GEF funded a proportion of all project components.

The project design places special attention on women given their integral role in household food (rice, garden vegetables, salt) and their vulnerability from high poverty levels and increased water stress. Diversification activities were focused on women-favoured activities such as growing vegetables and rice, beekeeping, salt production, and aquaculture. Local farmer organizations contributed a portion of infrastructure costs, and were trained on maintenance of the water supply infrastructure.

Note that the project had a delayed start date (2014) and effectually only operated with funding for 2 years due to IFAD fiduciary procedures not allowing for project extensions. The majority of project activities completed were related to training, workshops, and knowledge management in addition to some water harvesting improvements/works and associated training and agricultural activities. Also of note is that the indicators in the logframe were primarily output measures (# of training workshops, # of infrastructures established, etc.); there was no inclusion in the monitoring and evaluation plan to measure climate (e.g. carbon sequestration), agriculture (e.g. productivity), or income indicators.

PAFA #4232 Project Activities			
Component 1 (Capacity building, national level)	**Component 2 (Water harvesting, watershed management)**	**Component 3 (Water conservation and efficient irrigation)**	**Component 4 (Monitoring and evaluation)**
Training	Water storage units	Salt tolerant/short-cycle rice	Protocols
Workshops (IPCC scenarios)	Solar power water pumps	Market gardens	Data collection
Exchange visits	Wells, pumps and irrigation system	Climate adapted seeds	Data management and analysis
Radio	Anti-salt dykes	Water efficiency training	YEGLE (data on prices, inputs, stocks)
Local investment plans	Recovery of saline soil with salt-tolerant plants	Alternative livelihoods:	
Inventory of good practices	Bottom Phosphorus (soil fertility)	Poultry raising	
		Bee-keeping	

INTERMEDIATE OUTCOMES

Institutional Capacities

- 4 information and awareness workshops with different Regional Committees on Climate Change (COMRECC) - over 150 actors bringing together administrative authorities, parliamentarians, Local Elected Officials, representatives of technical services, private sector, civil society and the press.
- Training sessions on climate-proof water management.
- 2 local development plans based on lessons learned and on the information gathered for reviewing to include climate variability and climate change (Passy and Keur Samba Gueye).
- Training workshops for management bodies of water harvesting facilities to educate and enhance their service capacity, and maintenance of structures and their equipment.

ENV/SE OUTCOMES

There were no measured indicators reported (Table SFA 1A). Table SFA 1B documents the outcomes and weighted score calculated for Senegal PAFA.

SYNERGIES

Table SFA 1C lists direct benefits for each intervention where there were reported or inferred environmental or socioeconomic outcomes, in order to facilitate identification of synergies. There were no synergies identified in this project.

INTERVENTIONS BENEFITING ONE FOCAL AREA AND SE OUTCOMES

- *Water supply activities and impact on agricultural productivity, income, and food security* – a combination of activities (water storage units, solar pumps, anti-salt dykes, wells/irrigation) provided year-round water supply, where prior to the project water was only available for part of the year (due to a combination of land degradation, droughts, climate change). This increased water supply was essential for benefits seen from other project activities, specifically agricultural activities including market gardens, salt tolerant rice, and climate adapted seeds. Examples:
    - With the use of solar energy to mobilize water resources, women returned to tending their market vegetable garden, which they had abandoned because of the amount of work to fetch water. In Keur Saloly, women now have income from selling vegetables. Market gardening also improved food security, as women noted their eating habits have changed at home, adding vegetables to their lunch and dinner meals.
    - The culture of growing rice was abandoned in many zones because of lack of water. With access to water there is increased confidence in growing rice and more requests for rice

seeds and interventions. In Keur Saloly, before the project community members had income for only 5 months of year. Now that they are growing their own rice they do not have to buy rice, and can sell onions and peanuts. Noted in interview notes that before project only 20-30% could eat, now 100% can. Before the project, remittance money was used to purchase food. Now they grow enough of their own.

Also note: the increased income gained from project activities increased the ability of villagers to pay for school and religious expenses. For example, it was reported in the interviews in Keur Saloly that people in the village can now afford expenses related to religious festivals – before only 30% of households could buy sheep for Muslim feast of Eid, now 90% can.

TRADE-OFFS

- *Soil improvements with bottom phosphorus improving agricultural productivity at expense of water quality (SE vs FA LD):* There is a potential trade-off with agricultural productivity from increased phosphorus application to soil and water quality, in terms of run-off from soil into water ways (depends on amount used, degree to which it runs off, etc.).

TABLE SFA 1A: MEASURED PROJECT INDICATORS

Biodiversity Outcomes	• None available
Livelihood Outcomes	• None available
Climate related outcomes	• None available
Land and Agriculture Outcomes	• 10,000 acacia plants were planted for saline land reclamation and erosion control • 4370 meters of dykes (anti salt and restraint) and 3 spillway works, over 10,900 meters of dykes and also rehabilitated one ouvrage d'art (bridge across the river). • 77 ha of rice schemes operated by 6 producer organizations to benefit 295 households; • 17 market garden perimeters over 60.5 ha, 6 equipped with solar pumps and 6 pumps; • The introduction of the use of bottom phosphating in 2013, test on 150 ha with support from INP

TABLE SFA 1B: OUTCOMES AND WEIGHTED SCORE SENEGAL PAFA

Benefit Category	Category Score	Outcome Rating	Outcome Score	Outcomes
ENVIRONMENTAL BENEFITS				
(BD) Ecosystem cover and/ or quality increased and/or maintained	**0**	**N**	**0**	
(BD) Biodiversity and/ or species populations (flora or fauna)	**0**	**N**	**0**	

(BD) Reduced threats to biodiversity (includes reduced extraction)				
(LD) Improved soil quality	**1.25**			
		M	**1**	**Increased agricultural productivity** from use of "bottom phosphate" showed positive increase in yields in the pilot of millet, sesame and cowpeas (on 150 ha has achieved average yields for 32.7 ton / ha millet souna, for 700 kg / ha sesame, for 800 kg / ha cowpeas); also reported increases in agricultural productivity from reduced salt in lands.
		I	**0.25**	**Reduced salt in lands:** 10,000 acacia plants were planted for saline land reclamation and erosion control; Anti-salt dykes (4370 m)
(LD) Soil structure improvements	**0.25**	**I**	**0.25**	**Reduced soil erosion:** 10,000 acacia plants were planted for saline land reclamation and erosion control
(LD) Reduced threats to land	**0.25**	**I**	**0.25**	**Reduced salt in lands and water -** from 4370m of anti-salt dykes.
(CC) Carbon sequestered	**0.25**	**I**	**0.25**	**Tree planting:** 10,000 acacia plants were planted for saline land reclamation and erosion control)
(CC) Maintenance of carbon sinks	**0**	**N**	**0**	
(CC) Reduced GHG emissions	**0**	**N**	**0**	
Other environmental benefits/ reduced environmental threats	0			
Air		**N**	**0**	
Waste		**N**	**0**	
Chemicals		**N**	**0**	
SOCIOECONOMIC BENEFITS				
Income or access to capital	**1.5**			

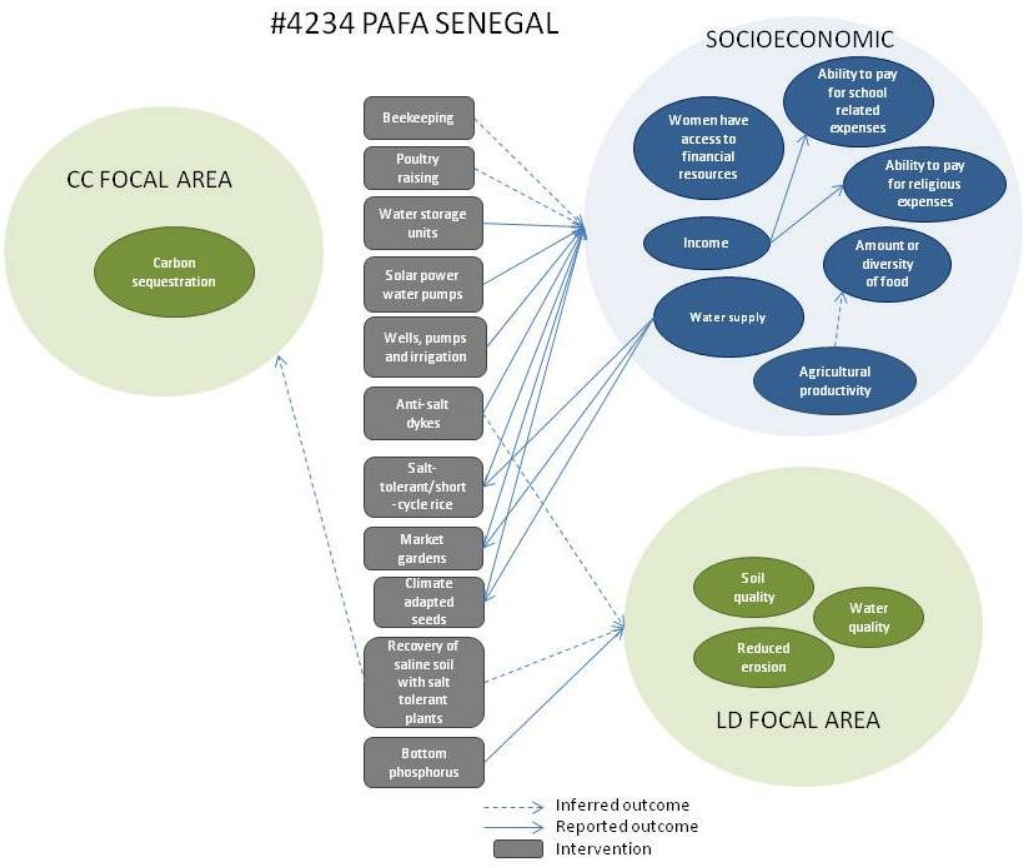
		R	**0.5**	**From rice:** 77 ha of rice/rice and onions planted for 6 producer groups consisting of 295 households. This resulted in increased income for community members; Keur Saloly before the project community members had income for only 5 months of year. Now that they are growing their own rice they do not have to buy rice, and can sell onions and peanuts; Before the project, remittance money was used to purchase food. Now they grow enough of their own.
		R	**0.5**	**From onions and peanuts:** see above
		I	**0.25**	**From poultry:** Women engaged in income generating activities such as poultry raising and bee-keeping. Does not state how much income increased.
		I	**0.25**	**From bee-keeping:** Women engaged in income generating activities such as poultry raising and bee-keeping. Does not state how much income increased.
Food security	**2**			
		R	**0.5**	**Changed eating habits:** Women noted their eating habits have changed at home, they are able to make different meals for lunch and dinner with vegetables
		R	**0.5**	**From market gardening** - women returned to previously abandoned market gardening with the water (17 market gardens over 60.5 ha),
		R	**0.5**	**From growing own rice** - Water storage units, solar power pumps, wells, irrigation, anti-salt dykes – all provided improved access to water in the dry season for agriculture –people started cultivating rice again (77 ha of rice/rice and onions planted for 6 producer groups consisting of 295 households);
		R	**0.5**	**Improved agricultural productivity**: Use of "bottom phosphate" showed positive

				increase in yields in the pilot of millet, sesame and cowpeas
Context-Specific SE Outcomes	**2.25**			
		R	**0.5**	**Benefits to women/access to income:** The combination of access to water and salt tolerant/short-cycle rice benefited women in terms of increased income; Women gained income from tending to or returning to market gardens, which were irrigated through the project activities; inferred from poultry and beekeeping (not reported or measured)
		R	**0.5**	**Educational benefits:** Women visited on mid-term evaluation noted that with the income they have from the initiatives, they are now contributing to their children's education
		R	**0.5**	**Social and community integrity/reduced exodus:** Climate adapted seeds used in market gardening seen by youth as a source of income, and more are staying in the community
		R	**0.5**	**Social/community integrity/participate in religious festivals:** People in village can now afford expenses related to religious festivals – e.g. before only 30% of households could buy sheep for Muslim feast of Eid, now 90% can
		I	**0.25**	**Health benefits:** can infer from increased access to water and food from irrigation

TABLE SFA 1C: DIRECT OUTCOMES ASSOCIATED WITH INTERVENTIONS

	ENVIRONMENTAL OUTCOMES				SOCIOECONOMIC OUTCOMES				
	LD FA			CC FA					
	Soil quality	Reduced erosion	Water quality	Carbon sequestration	Water supply	Agricultural productivity	Amount or diversity of food	Income	Access to financial resources - women
Anti-salt dykes			I		✓				
Water storage units					✓				
Solar power water pumps					✓				
Wells, pumps, irrigation					✓				
Sal tolerant plant-saline soil recovery	I	I	I	I					
Bottom phosphorus						✓			
Salt tolerant/short-cycle rice							✓	✓	✓
Market gardens							✓	✓	✓
Climate adapted seeds								✓	
Poultry									I
Beekeeping									I

✓ = *reported outcome;* I = *inferred outcome*



FACTORS CONTRIBUTING TO OUTCOMES

Factor	Outcome	Explanation
PROJECT FACTORS		
Collaboration between project partners	Capacity building, awareness-raising, and knowledge management	• Noted that success of project to date was due to cooperation between partners who had signed commitments to execute PAFA (MTR, 2015, para 19). Para 11 mentions the following partners: Direction des Environment et des Establissements Classés (DEEC), Directorate of Water Resources Management and Planning (DGPRE), National Institute of Pedology (INP), Senegalese Institute of Agricultural Research (ISRA), Université Cheikh Anta Diop (UCAD), and technical partners

FACTORS HINDERING OUTCOMES

Factor	Outcome	Explanation
PROJECT FACTORS		
Complications in joint funding arrangement	Delay in project activities	• Noted in MTR 2015, para 23, and the interview notes that the project had a delayed start – intended start date was 2012 yet project did not start until 2014. Interview notes (p. 1) elaborate that because the project was tied to an IFAD loan, which ended 2016, GEF funding could not be extended beyond that date, and the project effectually only operated for 2 years with GEF funding. • The funding delays further affected activities because they were time sensitive, needing to align with farmers planting/harvesting schedules (interview notes, p.2)
CONTEXTUAL FACTORS		

CHINA IEAD NINGXIA: Integrated Ecosystem and Agriculture Development NINGXIA (2009-2016) (GEF ID 2788)

Country: China
Focal Area: SFA - Biodiversity (BD)
Geographic Scope: 3,655 km^2 in province of Ningxia
Executing Agency: Ningxia Hui Autonomous Region Finance Department's Foreign Debt Management Office
Total Budget: $215 million ($4.5 million GEF; $100 million loan ABD; $111 million government co-financing to loan)
GEF Contribution: US$4.5 million
Project Management: US$ 7,131,200

The Ninxgia IEAD project was designed to address land and water degradation, including salinity, desertification, soil erosion, polluted waterways, and lack of vegetative cover on farming areas and grasslands. Key drivers being addressed included unsustainable farming practices due to poverty (majority of poor residents were resettled through a government poverty reduction program between 1983 and 1997), improper land restoration practices (such as tree planting and dune flattening) and uncoordinated land and water management and policies, all exacerbated by an area with low levels of precipitation. Tourism development has also altered wetlands and waterways in the area. Land degradation was noted as a key contributor to biodiversity loss in the Yinchuan plains and wetlands, an important international flyway for birds.

Ningxia IEAD is a subproject under the PRC-GEF Partnership on Land Degradation in Dryland Ecosystems. It was designed to complement the Capacity Building to Combat Land Degradation Project (CBCLDP), and the China Biodiversity Partnership Framework (CBPF). The project aligns with the Ningxia Hui Autonomous Region (NHAR) government objectives of combating land degradation, improving biodiversity conservation, sustainable natural resource management, and reducing economic disparity.

The majority of the project budget was put towards a 31 km extension of the Xixia Canal into the project area to replace the current low-efficiency Xigan Canal, and to serve a 15,546 ha irrigation area. The extension was accompanied with irrigation management, water user groups, and water efficiency training. The NHAR government agreed to the transfer of 38 million cubic metres of water savings to the Yinchuan wetlands for restoration. The NHAR also provided financial subsidies to poor villagers to adopt more sustainable land use as part of the project. In general, poverty as a driver for land degradation was addressed by connecting farmers with large agri-business enterprises such as the Ninxgia State Farm Group, focused on grape, beef and dairy cash-crops. The RRP states that local villagers would be contracted for habitat restoration, irrigation work and other project activities.

GEF financing was secured to "ensure the IEM approach is followed to contribute to restoring the productive and protective functions of the area's ecosystem resources" (RRP, 2008, p.10). GEF-funded components included: 1) IEM capacity building; 2) land and water resource planning and management; and 3) conservation and tourism activities, including creation and management of the Helan Piedmont Conservation Management Area (HPCMA) and tourism infrastructure such as viewing platforms, accommodations, wastewater treatment, and education centres. GEF funding was not put towards the water infrastructure, resettlement costs (770 households), or livelihood improvement activities.

Note that while the project was labelled SFA by GEF due to funding coming solely from the BD focal area allocation, the second and third components were designed to reduce land degradation.

#2788 Ningxia Project Activities

Component 1 (Building IEM Institutions)	Component 2 (Land and Water Resource Management)	Component 3 (Rural Livelihood Improvement – non GEF)	Component 4 (Conservation and Tourism)
Legal and institutional studies/seminars Training and capacity building Information systems and monitoring	Integrated water and resource management planning (IWRPI) Conservation agriculture Fertilizer management **Non-GEF:** Xixia Canal extension Resettlement/compensation Water efficiency training Revised irrigation scheme	Increased beef production Increased dairy livelihood Vineyard planting Nurseries Ecological agriculture training	Wetland restoration Tourism infrastructure Tourism and business plans Conservation programs Habitat management Establish Helan Piedmont CMA Training IEM Demonstration Centre

INTERMEDIATE OUTCOMES

- As a result of monitoring data, 3 laws were issued by Yinchuan municipality: land use zones in wetlands; no tall buildings, chemical factories or drainage discharge in Yellow River or artificial river. Wetland management now included in 13th 5-year plan of province (interview notes, p. 9).
- Established project performance monitoring system and environmental monitoring system (includes watchtowers, cameras, monitoring stations).
- 74 training activities on IEM, management approaches, vineyard management, livestock production, wetlands and biodiversity protection, sustainable agriculture. Farmer field school established.
- IEM Demonstration Centre built; wetlands public education centre in Sand Lake.

ENV/SE OUTCOMES

Table SFA 2A lists measured project indicators. Table SFA 2B documents the outcomes and weighted score calculated for the project.

SYNERGIES

Table SFA 2C lists direct benefits for each intervention where there were reported or inferred environmental or socioeconomic outcomes, to facilitate identification of synergies.

- *Increased land/wetlands under protection* – contributed to observed increases in wildlife populations, habitat regeneration and increased water supply. Habitat regeneration is inferred to store carbon.
- *Vineyards* – increased income, reduced erosion, and stored carbon (inferred). The vineyard intervention was made possible through drip irrigation (1740 ha) and water-saving irrigation (2400 ha).

Interventions benefiting one FA and socioeconomic outcomes:

- *Conservation agriculture* – 106,885 ha of conservation agriculture improved water and soil quality by reducing amount of agrochemicals used, and contributed to increased water supply through improved water use efficiency.
- *Water supply increases* – increased water supply occurred from a variety of project activities including extension of the canal, water efficiency training, habitat restoration/planting, dredging of wetlands, and conservation agriculture.

TABLE SFA 2A: MEASURED PROJECT INDICATORS

Biodiversity Outcomes	Habitat • 53,150 ha of sensitive area added to HCMPA to reach a total size of 193,536 ha • Yinchuan wetlands up to 13,000 ha • Shahu Lake wetlands reached 7,134 ha Vegetation cover: • Sand Lake: increased from 22.3% to 30% • East Foot of Helan Mountain: 12.5% in 2008 to 13.0% in 2011 Wildlife • Bird population increased from 10k to 70k (2010 to 2016), and species increased from 179 to 239. (Boahu) Water quantity • Water supply in all project area: 19,200,000 m^3 in 2008 increased to 36,570,000 m^3 • Water supply in Sand Lake 8 million m^3 in 2008 to 20.17 million m^3 in 2014 • Amount of supply water in the six lakes was 21.44 million and amount of storage water in the six lakes was 69.88 3million m^3.
Livelihood Outcomes	• Incomes increased from RMB 6,569/yr (2009) to RMB 10,037/yr in 2012 – **53%** • Farmers outside the project area: RMB 4,630 in 2009 to 6,330 in 2012 • 9 out of 10 monitored enterprises increased their income. • 15,000 households in Yinchuan have increased income
Land and Agriculture Outcomes	• 106, 855 ha of conservation agriculture established • Agrochemical usage reduced by 9.6% • Water use reduced by 60% per unit of cultivated area. • Fertilizer used in the State Farm vineyard is reduced by 57.1%.

TABLE SFA 2B: OUTCOMES AND WEIGHTED SCORE CHINA NINGXIA

Benefit Category	Category Score	Outcome Rating	Outcome Score	Outcomes
ENVIRONMENTAL BENEFITS				
(BD) Ecosystem cover and/ or quality increased and/or maintained	**1.5**			
		M	**1**	**Improved ecosystem cover**: Vegetation cover rate increased from 22.3% to 30% in Sand Lake. Vegetation Coverage of the East Foot of Helan Mountain: 12.5% in 2008 to 13.0% in 2011
		R	**0.5**	**Improved ecosystem quality:** Habitat restoration through direct planting and dredging noted as improving wetlands. Water supply 19,200,000 m3 in 2008 increased to 36,570,000 m3; (2) Water supply in Sand Lake 8 million m3 in 2008 to 20.17 million m3 in 2014; (3) Amount of supply water in the six lakes was

				21.44 million and amount of storage water in the six lakes was 69.88 3million m3.
(BD) Biodiversity and/ or species populations (flora or fauna)	**2**			
		M	**1**	**Increased population:** Bird population increased from 10k to 70k (2010 to 2016); Increase in bird population from reed plantings;
		M	**1**	**Increased species diversity**: species increased from 179 to 239. (Boahu) Fifteen globally threatened wild species protected with improved habitat
(BD) Reduced threats to biodiversity (includes reduced extraction)	**0.25**	**I**	**0.25**	**Reduced land converson from habitat extension in PA:** Wildlife conservation area increased to 193,536 ha from 32,210 ha(baseline in 2007).Wetland conservation area of Shahu Lake and Yuehai Lake reached 7,134 ha, while Yinchuan wetland area achieved 13,000 ha. Helan mountain conservation area reached 193,536 ha from incorporation of 53,150 ha of sensitive area where production is prohibited.
(LD) Improved soil quality	**0.5**	**R**	**0.5**	106,885 ha of conservation agriculture – reported that improved soil and water quality.
(LD) Soil structure improvements	**0.5**	**R**	**0.5**	**Reduced erosion**: Reported that vineyards helped to stabilize the soil
(LD) Reduced threats to land	**1**			
		M	**1**	**Reduced chemicals/improved water quality:** Fertilizer used in the State Farm vineyard is reduced by 57.1%; agrochemical usage reduced by 9.6% due to 106, 885 ha of conservation agriculture. This would reduce runoff of fertilizer into wetlands and associated water system, improving water quality
(CC) Carbon sequestered	**0.5**			
		I	**0.25**	**From habitat regeneration**: from vegetation cover rate increases in wetlands and Sand Lake
		I	**0.25**	**From planting:** Inferred from vineyard planting
(CC) Maintenance of carbon sinks	**0**	**N**	**0**	

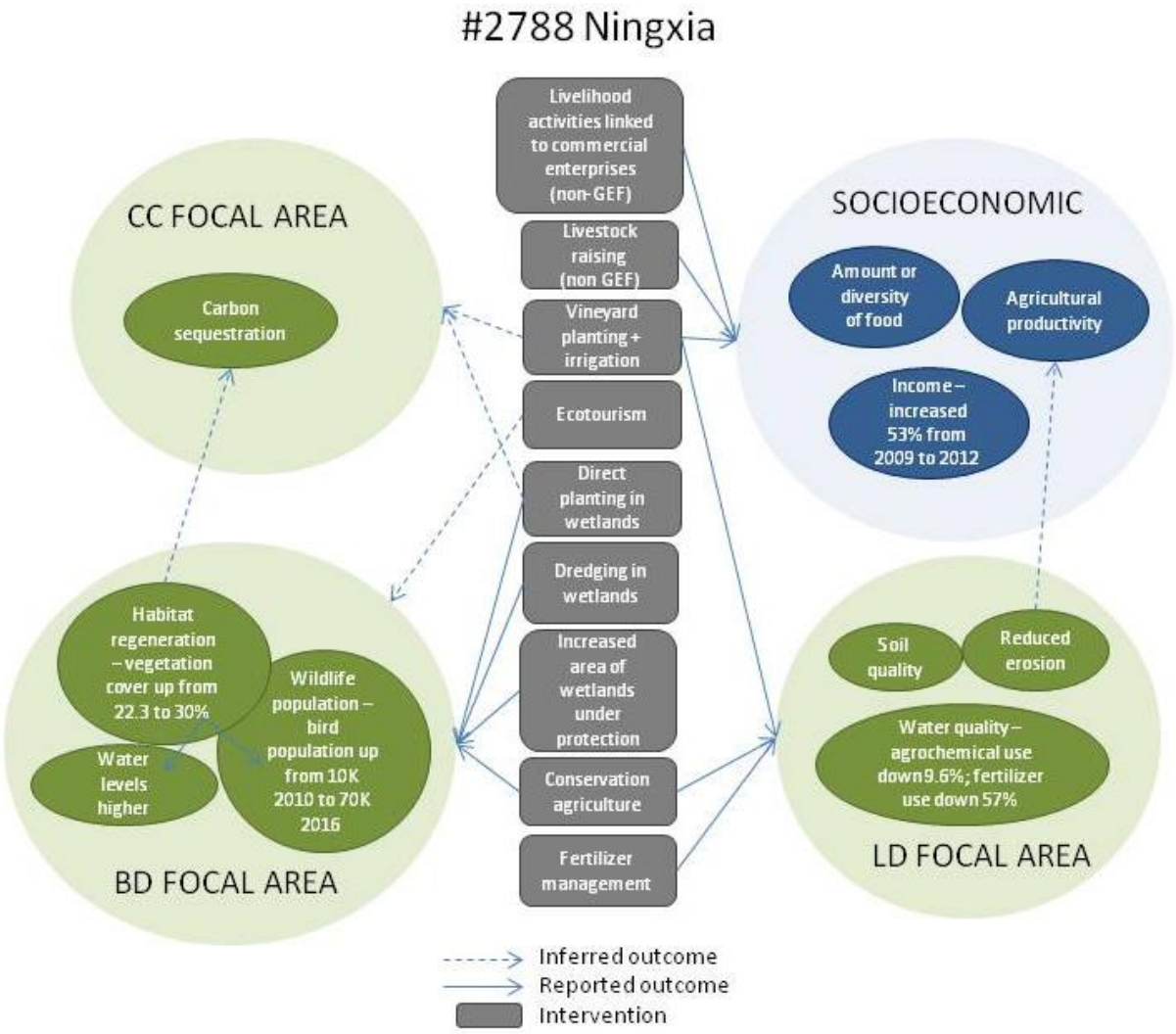
(CC) Reduced GHG emissions	**0**	**N**	**0**	
Other environmental benefits/ reduced environmental threats	**0.67**			
Air		**N**	**0**	
Waste		**M**	**1**	Reduced water use: With conservation agriculture and improved water efficiency in households, water use reduced by 60% per unit of cultivated areaby June 30, 2015
Chemicals		**M**	**1**	Reduced chemicals: Agrochemical usage reduced by 9.6%; Fertilizer used in the State Farm vineyard is reduced by 57.1%.
SOCIOECONOMIC BENEFITS				
Income or access to capital	**2**			
		M	**1**	**Income increased (enterprises combined):** 9 out of 10 monitored enterprises increased their income; 15,000 households in Yinchuan have increased income; Farmers in the project area: annual income increased from RMB 6,569 in 2009 to RMB 10,037 in 2012. Farmers outside the project area: RMB 4,630 in 2009 to 6,330 in 2012. **From Vineyards**: Irrigation works and irrigation equipment were installed in 2,400 ha of vineyards.
		M	**1**	**Income increased (enterprises combined):** 9 out of 10 monitored enterprises increased their income; 15,000 households in Yinchuan have increased income; Farmers in the project area: annual income increased from RMB 6,569 in 2009 to RMB 10,037 in 2012. Farmers outside the project area: RMB 4,630 in 2009 to 6,330 in 2012. **Beef and milk:** Activities in Sand Lake included: cow breeding (12,698 in 2013), milk production (3261 tons), 960 dairy farmers in 2013; cattle breeding (8,659 in 2013), beef production (1,329 tons in 2013), 100 cattle farmers in 2013; Alfalfa plantation area (866 ha in 2010 to 2,955 in 2013), alfalfa production (10,390 tons in 2010 to 23,000 tons in 2014), 520 alfalfa

				households supported by the project – for livestock feed
Food security	**0.25**	**I**	**0.25**	**Beef and dairy:** Inferred from beef and dairy production around Sand Lake
Context-specific benefits	**0.25**	**I**	**0.25**	**Health benefits:** Can infer from reduced agrochemical chemical use

TABLE SFA 2C: DIRECT OUTCOMES ASSOCIATED WITH INTERVENTIONS

	ENVIRONMENTAL OUTCOMES							**SE OUTCOMES**	
	BD FA			**LD FA**			**CC FA**		
	Increased wildlife populations	Habitat regeneration	Water levels higher	Soil quality	Reduced erosion	Water quality	Carbon sequestration	Income	Amount or diversity of food
Fertilizer management						✓			
Conservation agriculture			✓	✓		✓			
Increased area land/wetlands under protection	✓	✓	✓						
Dredging in wetlands		✓	✓						
Direct planting in wetlands		✓					I		
Vineyard planting + irrigation (non GEF)					✓		I	✓	
Xixia Canal extension (non GEF)			✓						
Livestock raising (non GEF)								✓	I
Livelihood activities attached to commercial enterprises (unspecified)								✓	
Improved ecotourism infrastructure									

✓ = reported outcome; I = inferred outcome


#2788 Ningxia
Livelihood activities linked to commercial enterprises (non-GEF)
Livestock raising (non GEF)
Vineyard planting + irrigation
Ecotourism
Direct planting in wetlands
Dredging in wetlands
Increased area of wetlands under protection
Conservation agriculture
Fertilizer management
CC FOCAL AREA
Carbon sequestration
SOCIOECONOMIC
Amount or diversity of food
Agricultural productivity
Income – increased 53% from 2009 to 2012
Habitat regeneration – vegetation cover up from 22.3 to 30%
Wildlife population – bird population up from 10K 2010 to 70K 2016
Water levels higher
BD FOCAL AREA
Soil quality
Reduced erosion
Water quality – agrochemical use down 9.6%; fertilizer use down 57%
LD FOCAL AREA
Inferred outcome
Reported outcome
Intervention

NEGATIVE IMPACTS

- *Increased wildlife populations caused negative impact on water quality* – the project was successful at increasing bird populations in the wetland areas to such a degree that water quality was affected with bird droppings/waste [Interview notes, Shahu visit]. **Attempts were made to address this impact by planting lotus to improve water quality (interview notes, p. 9)**

- *Negative impact of livestock raising on water quality in Sand Lake* – increasing local livelihoods through connection with commercial enterprises for raising beef and dairy cattle has potentially decreased water quality in Sand Lake. There are some indicators for decreased water quality over the project time period, however it is not clear specifically the cause (Sand Lake had the following water quality data collected between 2008 and 2014: water quality (mg/L): N total (1.4 in 2008 increased to 1.57 in 2014). P total (0.068 in 2008 increased to 0.24 in 2014), Ph value (8.7 in 2008 to 8.95 in 2014), COD (3.1 in 2008 to 35 in 2014), transparency (0.33 meter in 2008 to 0.3 meter in 2014).

TRADE-OFFS

- *Ecotourism to benefit biodiversity with revenues vs land degradation/negative biodiversity impacts from ecotourism (trade-off between BD objectives)* – a key project component was to link conservation with ecotourism based commercial enterprises to increase revenues for conservation with a target of increasing visitors to the sites. There is no data on what was actually completed, but the RRP (2008) includes planned activities including viewing platforms, aquaculture, tourist accommodations with wastewater treatment, scientific education center, habitat restoration, processing plant for aquatic vegetarian food. Ecotourism was identified as a risk/threat to the project area in the CEO Endorsement (p 41-42) due to pressure of past poorly planned tourist infrastructure. It notes the need to take a careful balance between tourism and conservation to not degrade the landscapes and wildlife that attract tourists to the reserves. Outcome measures from the PIR 2015 note an increase in visitors to the sites (Shahu Lake had 137.3 million visitors and 0.78 million visitors to Yinchuan wetlands). There is a trade-off in this project between the benefits of ecotourism to biodiversity – through increased revenue from visitors funding biodiversity programs – and the potential negative effects of tourism on biodiversity through land degradation, without certain conditions in place.

NOTE: There is no indication of whether a tourism management plan was created (in an attempt to mitigate the trade-off) and if so, what it entailed.

- *Wetland protection for biodiversity versus use of that land for food production (FA BD vs SE)* –53,150 ha of sensitive land where production is prohibited were incorporated into the Helan Mountain Conservation Management Area to reach a total size of 193,536 ha (PIR, 2015). This specifically notes that production in the protected area is prohibited, representing a trade-off between land for biodiversity and land for use by local villagers for producing food.

NOTE: Trade-off was potentially addressed by conservation agriculture activities (106, 855 ha established), however there is insufficient data on location, type of crops grown, use, etc. to adequately assess. In the project design documents, conservation agriculture is included to improve efficiencies in water and chemical use, not food production specifically.

FACTORS CONTRIBUTING TO OUTCOMES

Factor	Outcome	Explanation
PROJECT FACTORS		
Women actively engaged in interventions	No data is available on extent of women's engagement	• Design aspects ensure gender is addressed to achieve equal participation of women in project activities, including contract farming arrangements • The RRP (2008) notes a significant finding in design studies was the inability of Hui women, who are Muslim, to find off-farm employment due to their inability to migrate to work for religious reasons and the limited casual local work opportunities – the implementation of beef/dairy cattle and halal slaughterhouses would address this, however there is no data on success
CONTEXTUAL FACTORS		
Links to local, national and international markets and supply chains	Income from commercial enterprises	• The success of the livelihood activities was tied to the success of commercial and state-owned enterprises and their links to local, national, and international markets and supply chains
National greening programs	Habitat restoration; carbon sequestration	• National greening programs (e.g. Great Green Wall project) also contributed to increase in vegetation cover in project area

FACTORS HINDERING OUTCOMES

Factor	Outcome	Explanation
PROJECT FACTORS		
Benefits of activity on other sectors not considered	Carbon sequestration, biodiversity	• In trying to stabilize soil around the vineyard, there was no consideration for which species were being planted; they were trying out exotic species that could survive in the climate. No consideration for any carbon benefits within this activity

CHINA GANSU BD: Strengthening Globally Important Biodiversity Conservation through Protected Area Strengthening in Gansu Province (2011-2015) (GEF ID 3864)

Country: China
Focal Area: SFA - Biodiversity (BD)
Geographic Scope: Gansu province, 58 Nature Reserves covering 9,940,782 ha
Executing Agency: Gansu Forestry Department (+UNDP as GEF agency)
Total Budget: $9 million ($1.7 million GEF; $7.3 million Gansu provincial government)
GEF Contribution: US$1.7 million
Project Management: US$ 1,973,800

BACKGROUND/RATIONALE

The Gansu project is a sub-project under the China Biodiversity Partnership and Framework for Action (CBPF). The project was designed to improve management capacity and financial sustainability of the Gansu protected area (PA) system, in order that PAs are better able to address current biodiversity threats – land conversion, habitat fragmentation, overgrazing, overharvesting of resources, and unplanned tourism development.

Gansu's protected area system includes 15 national level reserves, 39 provincial level reserves, and 4 county level reserves covering 22% of the provincial land area. The reserves are managed by different government bureaus based on categories such as land, water, wildlife, and minerals, and use different management models. This has resulted in key challenges to the effectiveness of the PAs in protecting biodiversity, specifically: lack of coordinated planning and operation across the PA network, lack of effective PA management, lack of capacity for monitoring and evaluation, and weak frameworks for sustainable management and financing.

The Gansu project aimed to strengthen the existing Gansu PA system by improving capacity, management and sustainable financing mechanisms. The two components of the project included: 1) strengthening provincial policy framework and institutional capacity for sustainable management and financing of Gansu's PA system. A key target was to double revenue to PAs by project end; and 2) demonstrating sustainable PA management and financing in four demonstration sites in the Taohe Basin. GEF funded a proportion of each project component.

Component 2 included mechanisms to build partnerships with local communities and equitably share resources. It included: a) co-management agreements – where direct payment and/or employment were provided in return for natural resource protection, and b) benefit sharing agreements between communities and the private sector negotiated by the PA, where socioeconomic benefits (e.g. jobs, electricity) were provided in exchange for natural resource protection by villagers. Jobs included maintenance of tree seedling nurseries, forest maintenance, and patrolling.

#3864 Gansu Project Activities

Component 1 (Provincial level capacity)	**Component 2 (Local level management and financing in 4 demo PAs)**
PA system development and management strategy	PA management plans (including tourism, business, etc.)
Economic evaluation of PA system and financing plan	Biodiversity monitoring plans
Consolidate legislation and regulatory frameworks	Financial planning tools
Establish Gansu PA forum	Performance management system
Provincial level PA database	Staff incentive system
	Collaborative management agreements with villagers (54)
	Benefit sharing agreements with villagers (4)
	PA income diversification (e.g. tree seedling nurseries)
	Training

INTERMEDIATE OUTCOMES

- *Governance arrangements*: a draft of PA system strategy was prepared; biodiversity was mainstreamed by consolidating 20 regional and 48 local laws (from different sectors) into a single BD policy framework.
- *Management approaches*:
  - Each of the four demonstration PA's developed management plans and business plans
  - 1 basin-wide tourism plan developed
  - 54 protection agreements signed with villagers and herdsmen in 4 pilot PAs (8 for biodiversity protection; 16 co-management for wetlands, grasslands, natural resources; 5 liability statements for patrolling for forest protection and fire prevention; 1 fire prevention; 2 protection). Benefits to community were direct income and jobs [TE, 2014, p 32/32]
  - 4 benefit-sharing agreements signed (PES) between private sector and communities
- *Institutional capacities*: best practices in PA management, skills development and administrative processes. Increase of USD 93.37 million in the available total annual budget for PA management.
- *Knowledge management*: Taohe forum to disseminate project information and exchange ideas among key stakeholders. The demonstration PA produced knowledge products.

ENV/SE OUTCOMES

As a primarily capacity building project, environmental and social indicators were not measured. Table SFA 3A documents reported outcomes and the weighted score for the project.

SYNERGIES

Table SFA 3B summarizes direct benefits for each intervention where there was reported or inferred environmental or socioeconomic outcomes, to facilitate identification of synergies. No synergies were identified in this project.

INTERVENTIONS BENEFITING ONE FOCAL AREA AND SE OUTCOMES

Benefits between one focal area and socioeconomic benefits occurred primarily in the approach used by the reserves to compensate villagers in return for forest protection. From TE, 2014, Annex 3 these were:

- Taohe Nature Reserve – community villagers were paid to maintain tree nursery lot (source of 60% of revenue for PA); villagers paid for patrolling; villagers paid for forest maintenance.
- Lianhuashan Reserve – villagers with 30 years of experience hired for maintaining tree nursery.
- Taizishan NR – 2000 people maintain tree seedling nurseries, earn CNY 5000/year.

Interventions included:

- *Hiring local villagers to maintain tree seedling nurseries* – provided income to the PAs (60% of PA revenue cited for Taohe Nature Reserve, TE 2014, p. 5 of Annex 3). This provided an income to villagers, and as part of signed agreements from villagers, reduced extraction of resources from PAs.
- *Hiring local villagers to patrol PAs* – as above, villagers gained an income and resulted in reduced extraction of resources from PAs from patrolling.
- *Benefit sharing agreements* – the main benefit sharing agreement in Taohe PA provided hydropower to 41 families within the PA in return for forest protection. Can infer this would reduce extraction of

resources. The other benefit sharing agreements described have less benefit: Gehai Zecha PA – ecotourism (no information); Lianhuashan PA – herbal products (owner has funded some school expenses for some children living near one of PAs; Taizishan PA – tree nursery (profits shared if income reaches a certain level) [TE, 2014, p. 33 & 46].

TABLE SFA 3A: OUTCOMES AND WEIGHTED SCORE CHINA GANSU

Benefit Category	Category Score	Outcome Rating	Outcome Score	Outcomes
ENVIRONMENTAL BENEFITS				
(BD) Ecosystem cover and/ or quality increased and/or maintained	**0**	**N**	**0**	*No indication that the tree seedling nurseries were planted in the reserve – they were sold for income generation*
(BD) Biodiversity and/ or species populations (flora or fauna)	**0.5**	**R**	**0.5**	**Improved ecosystem quality: Gansu:** Farmer quote: "Ten years ago, all the land around the PA was barren, now all green with trees and crops. The water is now more pure, which allows more agriculture to be done. Rainfall and animals have increased"
(BD) Reduced threats to biodiversity (includes reduced extraction)	**0.5**	**R**	**0.5**	**Reduced extraction:** Decreased amount of "incidents" (resource extraction) in PA have been reported in Taohe PA, attributed primarily to increased patrolling.
(LD) Improved soil quality	**0**	**N**	**0**	
(LD) Soil structure improvements	**0**	**N**	**0**	
(LD) Reduced threats to land	**0.5**	**R**	**0.5**	**Reduced extraction:** Decreased amount of "incidents" (resource extraction) in PA have been reported in Taohe PA, attributed primarily to increased patrolling.
(CC) Carbon sequestered	**0.25**	**I**	**0.25**	**Tree seedlings**: Inferred from tree seedlings which would sequester carbon in the plant growth above and below the soil
(CC) Maintenance of carbon sinks	**0.5**	**R**	**0.5**	**Reduced extraction:** Decreased amount of "incidents" (resource extraction) in PA have been reported in Taohe PA, attributed primarily to increased patrolling.
(CC) Reduced GHG emissions	**0**	**N**	**0**	
Other environmental benefits/ reduced environmental threats	0			
Air		**N**	**0**	
Waste		**N**	**0**	
Chemicals		**N**	**0**	

SOCIOECONOMIC BENEFITS				
Income or access to capital	**2.5**			
		M	**1**	**From tree nurseries**: In Taizishan PA, 16 "stations", total area of 2500 ha, 0.12 billion seedlings, estimate value of CNY 0.8 million. About 2000 people each earn CNY5000 per year maintaining the tree nurseries; Tree nurseries provide more income than firewood
		M	**1**	**From forest maintenance payments:** In Taohe PA payment was provided to individuals for forest maintenance. Amount provided in 2013 was CNY2 million.
		R	**0.5**	**From patrolling:** in Taohe PA villagers paid for patrolling.
Food security	**0**	**N**	**0**	
Context specific SE benefits	**1**	**R**	**0.5**	**Access to electricity:** The Taohe PA benefit sharing agreement provided the entire village of Jilang with electricity (41 households)
		R	**0.5**	**Education benefits:** ability to attend school: Lianhuashan PA – herbal products (owner has funded some school expenses for some children living near one of PAs)

TABLE SFA 3B: DIRECT OUTCOMES ASSOCIATED WITH INTERVENTIONS

	ENVIRONMENTAL OUTCOMES		**SOCIOECONOMIC OUTCOMES**	
	BD	**CC**		
	Reduced extraction of resources from PA	Carbon sequestration	Increased income	Access to electricity
Benefit sharing agreements	I			✓
Increased patrolling in PA	✓		✓	
Tree seedling nurseries for sustainable PA funding		I	✓	
Payment to villagers for forest maintenance	I		✓	

✓ = reported outcome; I = inferred outcome

TRADE-OFFS

- *Increased PA patrolling versus access to natural resources (ENV vs SE)* – increased patrolling in the protected areas reduces incidences of resource extraction, thereby benefiting biodiversity. The patrolling was done by hired local villagers, therefore some beneficiaries benefited through an

improved income. However other local villagers would have less access to natural resources for food and income.

NOTE: Trade-off was addressed by increasing villagers' income through direct payments (for maintenance) and employment (maintaining tree nursery lots, patrolling) as part of collaborative agreements. This is in contrast to the China MFA case study where the trade-off was addressed by removing the need to access PA resources by providing food and needed items through propagation and farming (e.g. mushrooms, medicinal herbs, etc.). In the case of Liewa village near Taizishan NNR, a joint site with IFAD 2369 (MFA3), the trade-off would be addressed both by increased income in the SFA and through project activities in the MFA #2369. The main difference between the two approaches would be a question of sustainability of the SFA approach (e.g. if payments end, will protection activities continue?)

- *Revenue for biodiversity conservation versus revenue for local villagers (ENV vs SE)* – tree seedling nurseries were established as a revenue source for the PAs. TE2014 notes that the tree nurseries managed by the PAs are in direct competition with nurseries run by individuals/local villages around the PA, with the local villagers responding by accepting lower prices for tree seedlings. This trade-off therefore involves increasing revenues for biodiversity conservation that decrease revenues of local villagers also engaging in tree nurseries for income (as seen in the IEM #2369 MFA project). There is also a trade-off between beneficiaries – those who are hired to manage the PA tree nurseries, versus other beneficiaries participating in community or individual tree nurseries pressured to accept lower prices and lower income.

FACTORS CONTRIBUTING TO OUTCOMES

Factor	Outcome	Explanation
PROJECT FACTORS		
Good participation of provincial government agencies	Capacity building	• Good stakeholder participation at the provincial level was attained through membership of various provincial government departments on the project Steering Committee
CONTEXTUAL FACTORS		
Rise in nature appreciation in country	Income from tree seedling nurseries	• Nature appreciation has become more popular among Chinese; there is higher demand for tree seedlings to beautify roads all over China
Government PA policies	Increased funding to PAs	• Annual budgets for PA management in Gansu have steadily risen due to government driven policies and strategies. Increase in budgets were therefore attained independent of project activities [TE2014, p. 11]

FACTORS HINDERING OUTCOMES

Factor	Outcome	Explanation
PROJECT FACTORS		
Lack of integration with existing policies and procedures	General	• Tourism plan, business plan, and monitoring protocols were not linked into existing PA Master Plans (platform for setting management objectives) and database created was not integrated into ongoing monitoring and reporting for PAs (TE 2014)

Factor	Outcome	Explanation
		• TE 2014 notes that there were no apparent linkages between this project and other projects occurring simultaneously under different funders in the same region
Limited participation of key stakeholders	General	• Participation in the project by the State Forestry Department and Environmental Protection Bureau were limited (TE 2014). • Forest police, responsible for enforcing illegal activities within PAs, were not involved in project (TE 2014) • Placing the PMO in a different office from Gansu Forestry Department decreased advocacy efforts and hampered capacity building efforts (TE, 2014, p ii)
Staff turnover		• Project had 3 project managers in first 2.5 years (TE 2014 p.ii)
Over-reliance on score cards for assessing progress	Reduced overall effectiveness	• Indicators did not adequately capture added value of the project (TE, 2014, p. iii) – e.g. an emphasis was placed on doubling revenues to PAs, however this was largely achieved at project initiation independent of project activities (due to government policies)
Project design flaws		• Changes in government natural resource management policy between 2009 and inception of project in 2011 were not reflected in design, monitoring, etc. • Project was over ambitious: the financial sustainability target was unrealistic in 4-year time frame of project [TE, 2014, p. 10] • There were insufficient opportunities to learn from international experiences for a project based on learning from best practices [TE, 2014, p. 10]

BRAZIL IL: Catalyzing the Contribution of Indigenous Lands to the Conservation of Brazil's Forest Ecosystems (2009-2016) (GEF ID 2934)

Country: Brazil
Focal Area: SFA - Biodiversity (BD)
Geographic Scope: 32 indigenous lands covering **46,408 km^2**
Executing Agency: Ministry of Environment (MMA), Brazilian Foundation for Indigenous Affairs (FUNAI), and Indigenous Organizations
Total Budget: $37 million ($6 million GEF; $18 million cash FUNAI, $2 million in-kind FUNAI, $5 million cash MMA, $1.6 million in-kind MMA, $2.1 million cash The Nature Conservancy (TNC), $1.3 million in-kind TNC, $303,000 in-kind from indigenous organizations, $400,000 UNDP)
GEF Contribution: US$6 million
Project Management: US$ 4.2 million

BACKGROUND/RATIONALE

GATI was designed to build capacity for realizing and strengthening the role of Indigenous Lands (ILs) in biodiversity conservation. ILs are seen in the project as an opportunity to complement the existing conservation system given their territory coverage (13.8% of land in Brazil across 700 ILs), their state of conservation, the typically low-resource land uses by indigenous peoples, and connectivity between biomes. The opportunity to extend Brazil's protected area network through ILs was promoted with the rationale that while federal, state and municipal conservation units in the National Conservation Units System (SNUC) cover 12% of forested areas, they do not cover all priority areas and are unequally distributed across the five biodiversity rich forest biomes.

Significant work and support for the concept of ILs role in biodiversity conservation had already occurred in the country prior to the project. Notably, indigenous representatives and the Ministry of Environment prepared a 2002 Action Plan for Biodiversity Conservation in Indigenous Lands, and the 2006 National Strategic Plan for Protected Areas (PNAP) was produced recognizing the role of ILs in conservation. Despite recognition at the national level, there had been no coordinated efforts to advance the role of ILs in conservation. Also, ILs continued to face a number of pressures from outside land uses (monoculture agriculture, cattle ranching, urbanization, current and projected construction, etc.); extraction (logging, hunting, fishing, minerals, bio-piracy, tourism); and over-extraction of resources by indigenous peoples within ILs (for subsistence, commercialization, and due to erosion of traditional values and knowledge).

In 2005, the Inter-Ministerial Working Group (IWG) was created including the Ministry of Environment, indigenous representatives, the National Indian Foundation (FUNAI) and the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA). The IWG began to develop a GEF project proposal, and held regional consultations with indigenous peoples in 2008 on proposed project elements before submission. The project emphasized the need to balance and promote the dialogue between two systems of knowledge and logical assumptions – those of the western society and the indigenous peoples.

The resulting GATI project aimed to test a range of management practices for indigenous lands in different forest biomes, and to provide an enabling environment to replicate the approach in other ILs. GATI consisted of three components each targeting a different level: 1) Systemic Level – project activities aimed to fill gaps in policies and management capacities to optimize the role of ILs in biodiversity conservation, 2) IL Level – environmental management practices for conservation were modelled in ILs across diverse forest biomes; and 3) Local Level – sustainable forest practices based on ethno-management principles were piloted in selected ILs, to increase knowledge and skills among indigenous peoples for sustainable production practices that meet socioeconomic needs while not degrading resources. The project originally intended to have 10 'Reference Area' ILs and 22 additional ILs in a network, however all 32 ILs became Reference Areas with a lower level of support.

The original project start date was 2010, however the IWG decided to postpone project activities until consultations on a key piece of legislation – the National Policy for Territorial and Environmental Management of Indigenous Land (PNGATI) – were completed. PGNATI provided "legitimacy" for the implementation of GATI (MTR 2014, p.27). Additional delays to project start-up were mentioned including political-institutional changes and budget constraints (MTR 2014, p.36), and the project end date was extended from 2014 to 2016. Partner agencies in executing project activities included The Nature Conservancy (TNC), Social Environmental Institute (ISA), International Institute for Education in Brazil (IEB), Conservation International (CI), "Outro Olhar" NGO, and Anaí (Associação Nacional de Ação Indigenista) in addition to GIZ, the UNDP and GEF (interview notes, page 1).

#2934 GATI Project Activities

Component 1 (Systemic Level)	**Component 2 (Indigenous Lands Level)**	**Component 3 (Local Level)**
Supportive government policies	Ethno-mapping	Agroforestry & agroecology
Institutional capacity building	Territorial management plans	Tree and palm planting
Partnership building with IPs	Environmental management networks	Crop rotation and composting
Surveillance plans/protocols		Market access for sustainable products
		Workshops and training
		Ecotourism

INTERMEDIATE OUTCOMES

- *Governance outcomes*: contributed to the creation of the National Policy for Environmental and Territorial Management of Indigenous Lands (PNGATI).
- *Management approach outcomes*: support to the elaboration and implementation of Territorial and Environmental Management Plans(PGTAs); completed 8 ethnomanagement plans and acquiring funding for additional plans.
- *Institutional capacity outcomes*: PGNATI training courses.
- *Knowledge management outcomes*: alternative tool to METT created and tested for IL purposes; collaboration with the National Forest Inventory; ethnomapping and ethnomanagement workshops.

ENV/SE OUTCOMES

Table SFA 4A lists measurable project indicators. Note that few environmental and socioeconomic outcomes were measured. Table SFA 4B documents the outcomes and weighted score calculated for Senegal PGIES. Figure SFA 4A shows tree cover changes in indigenous lands covered by this project, based on geospatial analysis.

SYNERGIES

Table SFA 4C lists direct benefits for each intervention where there were reported or inferred environmental or socioeconomic outcomes, to facilitate identification of synergies.

- *Agroforestry and tree planting* – typically discussed together, agroforestry was done through microprojects, with individual grants up to R$4000. The PIR 2015 mentions agroforestry projects in Terena IL, Caieiras Velhas II/Tupiniquim IL, and Lalima IL, and reforestation projects in Potiguara IL, Caieiras Velhas II/Tupiniquim IL, and Guarani de Bracuí IL. Species mentioned in interviews include: “jussara Palm”, “açaí”, and “pupunha”. After reforestation and agroforestry activities, community members saw an improvement in soil and water resources. Women reported an income from vegetables grown in the agroforestry system and access to quality food without use of chemicals. It is inferred the tree planting stored carbon.
- *Composting and crop rotation* – in the Mangueirinha IL, before the project they used fire to clean the field, which would sometimes get out of control. After participating in agroforestry system workshops, they learned about organic compost and crop rotation and observed soil improvements from implementing these activities. They now produce more types of crops, including fruit, nuts, rice, sweet potato and yucca instead of just corn (interview notes, Cacique of Mangueirinha IL, p. 11 & 14). The reduced bush fires in turn are inferred to have reduced GHG emissions and reduced deforestation.

Also of interest:

- *Patrolling the IL* – patrolling helped stop illegal hunting, and community members noticed an increase in wildlife. Patrolling also deterred illegal logging and extraction of resources from the reserve, contributing to reduced deforestation (reflected in low deforestation rates measured).

TRADE-OFFS

- none identified

TABLE SFA 4A: MEASURED PROJECT INDICATORS

Biodiversity Outcomes	• 95 Indigenous Lands in the Cerrado Biome show very low rates of deforestation, on the order of 4% of their total area (slightly more than 90,000 km^2). Compared to: conservation areas (22%) and agricultural settlements (40%) (PIR 2015) Amazon region: 1,37% deforestation in IL and 12,30% in buffer zones. Cerrado: 6,23% and 35,21% respectively. Pantanal region: 34,59% compared to 46,23% in buffer zones. South-Southeast (Caatinga): 20,28% in IL and 40,23% outside IL. Northeast region (Atlantic), 44,14% in IL and 51,07% in buffer zones.
Livelihood Outcomes	No data available
Land and Agriculture Outcomes	No data available

TABLE SFA 4B: OUTCOMES AND WEIGHTED SCORE BRAZIL IL

Benefit Category	Category Score	Outcome Rating	Outcome Score	Outcomes
ENVIRONMENTAL BENEFITS				
(BD) Ecosystem cover and/ or quality increased and/or maintained	**2.5**			
		M	**1**	**Increased ecosystem cover**: Caieiras Velhas II/Tupiniquim IL 50 hectares have been reforested through an environmental compensation project
		R	**0.5**	**Improved ecosystem quality:** after reforestation and agroforestry activities, they could clear see an improvement in soil and water resources
		M	**1**	**Deforestation rates maintained:** low rates of deforestation still recorded - 95 Indigenous Lands in the Cerrado Biome continue to show very low rates of deforestation, on the order of 4% of their total area (slightly more than 90,000 km2). This compares very favorably with the rate for conservation areas (22%) and agricultural settlements (40%) and clearly demonstrates the effectivity of ILs in conserving biodiversity of the Cerrado, Brazil´s second largest biome + The project analysis of satellite images in 10 areas showed levels of deforestation fell in 9 areas. Furthermore as reported last year only 1% of the total area deforested in Amazonia was in ILs compared to 27% in UCs.
(BD) Biodiversity and/ or species populations (flora or fauna)	**0.5**	**R**	**0.5**	**Increased populations:** During the years that patrolling occurred, it helped avoid illegal hunting in indigenous lands and along with an internal hunting moratorium “they realized an increase in the number of wild animals”
(BD) Reduced threats to biodiversity (includes reduced extraction)	**1.5**			
		R	**0.5**	**Reduced burning:** by using compost to replace slash/burn
		R	**0.5**	**Reduced logging**: Patrolling deterred illegal logging and extraction of resources from reserve
		R	**0.5**	**Reduced poaching:** During the years that patrolling occurred, it helped avoid illegal hunting in indigenous lands

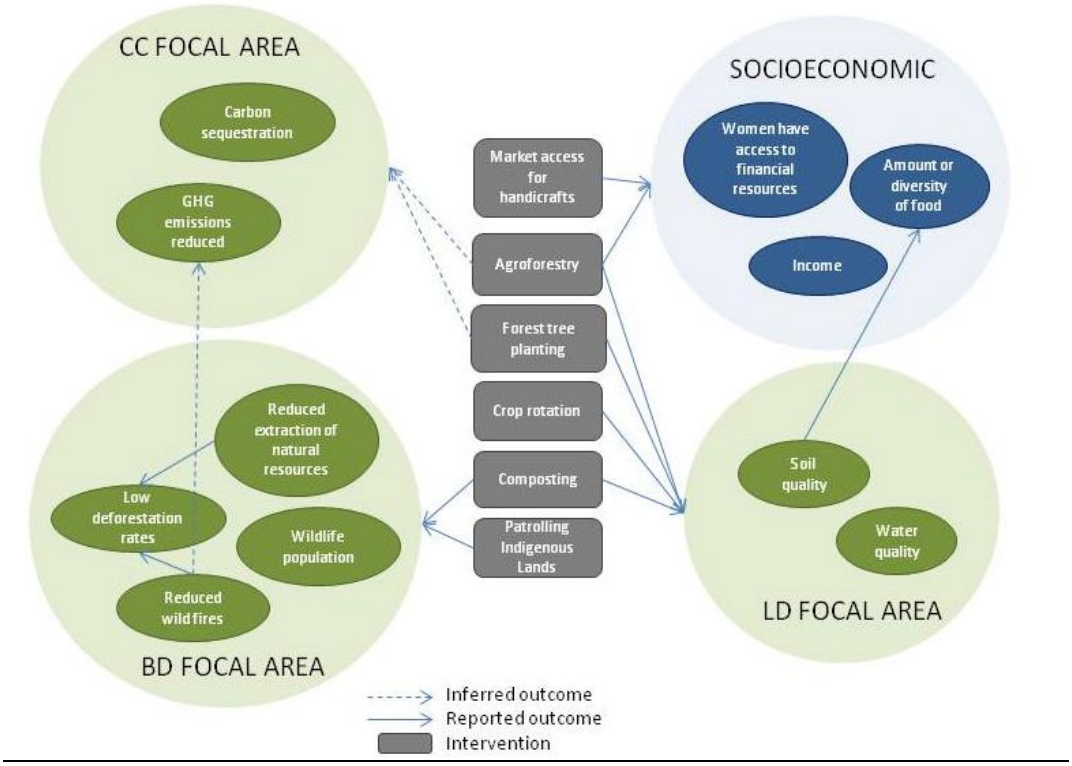
(LD) Improved soil quality	**0.5**			
		R	**0.5**	**Soil improvements**: After reforestation and agroforestry activities, they could clear see an improvement in soil and water resources; Beneficiaries reported a positive soil response due to compost and rotation activities; now produce fruit trees, nuts, rice, sweet potato and yucca instead of just corn
(LD) Soil structure improvements	**0.25**	**I**	**0.25**	**Reduced erosion:** Inferred from tree planting
(LD) Reduced threats to land	**1**			
		R	**0.5**	**Reduced burning:** by using compost to replace slash/burn
		R	**0.5**	**Reduced logging**: Patrolling deterred illegal logging and extraction of resources from reserve
(CC) Carbon sequestered	**0.25**	**I**	**0.25**	**From tree planting** - From agroforestry: 7 ha in Terena reference area; 16 families in Caieiras Velhas II/Tupiniquim IL; From tree planting: Caieiras Velhas II/Tupiniquim IL 50 hectares have been reforested through an environmental compensation project; 64 hectares have been planted in Portiguara; In Guarani de Bracuí About sixty (60) thousand seedlings of “jussara Palm”, three (03) thousand seedlings of “açaí”, and five (05) thousand seedlings of “pupunha” were planted
(CC) Maintenance of carbon sinks	**1.5**			
		M	**1**	**Deforestation rates maintained:** 95 Indigenous Lands in the Cerrado Biome continue to show very low rates of deforestation, on the order of 4% of their total area (slightly more than 90,000 km2). This compares very favorably with the rate for conservation areas (22%) and agricultural settlements (40%) and clearly demonstrates the effectivity of ILs in conserving biodiversity of the Cerrado, Brazil´s second largest biome
		R	**0.5**	**From reported reduced logging**: Patrolling deterred illegal logging and extraction of resources from reserve
(CC) Reduced GHG emissions	**0.25**	**I**	**0.25**	**Reduced burning:** Reduced fires by using compost to replace slash/burn

Other environmental benefits/ reduced environmental threats	0			
Air		**N**	**0**	
Waste		**N**	**0**	
Chemicals		**N**	**0**	
SOCIOECONOMIC BENEFITS				
Income or access to capital	**1**			
		R	**0.5**	**From agroforestry:** Lalima IL, the 15 women reported increased household income from the sale of vegetables from the agroforestry project
		R	**0.5**	**From handicrafts:** Outro Olhar" NGO helped indigenous women produce and sell their handicraft in the local market. This activity provided an economical upgrade in women´s lives and they could be able to buy home appliances.
Food security	**1**			
		R	**0.5**	**Reported from agroforestry** - In Lalima IL, benefit of agroforestry project was cited as having access to quality food without contamination by agricultural chemicals
		R	**0.5**	**From improved crop practices:** Beneficiaries reported a positive soil response due to compost and rotation activities; now produce fruit trees, nuts, rice, sweet potato and yucca instead of just corn; can plant other crops such as maize and beans
Context-specific SE benefits	**1**			
		R	**0.5**	**Benefits to women/access to income**: Women have more income (sale of vegetables – 15 women reported); "Outro Olhar" NGO helped indigenous women produce and sell their handicraft in the local market. This activity provided an economical upgrade in women´s lives and they could be able to buy home appliances.
		R	**0.5**	**Health benefits/reduced chemical exposure:** In Lalima IL, benefit of agroforestry project was cited as having access to quality food without contamination by agricultural chemicals.

TABLE SFA 4C: DIRECT OUTCOMES ASSOCIATED WITH INTERVENTIONS

	ENVIRONMENTAL OUTCOMES						SOCIOECONOMIC OUTCOMES		
	BD FA			LD FA		CC FA			
	Increased wildlife populations	Reduced extraction of natural resources	Reduced fires	Soil quality	Water quality	Carbon sequestration	Income	Women have access to financial resources	Amount or diversity of food
Patrolling indigenous lands (IL)	✓	I							
Crop rotation				✓					
Composting			✓	✓					
Forest tree planting				✓	✓	I			
Agroforestry				✓	✓	I	✓		✓
Market access for handicrafts								✓	

✓= reported outcome; I = inferred outcome



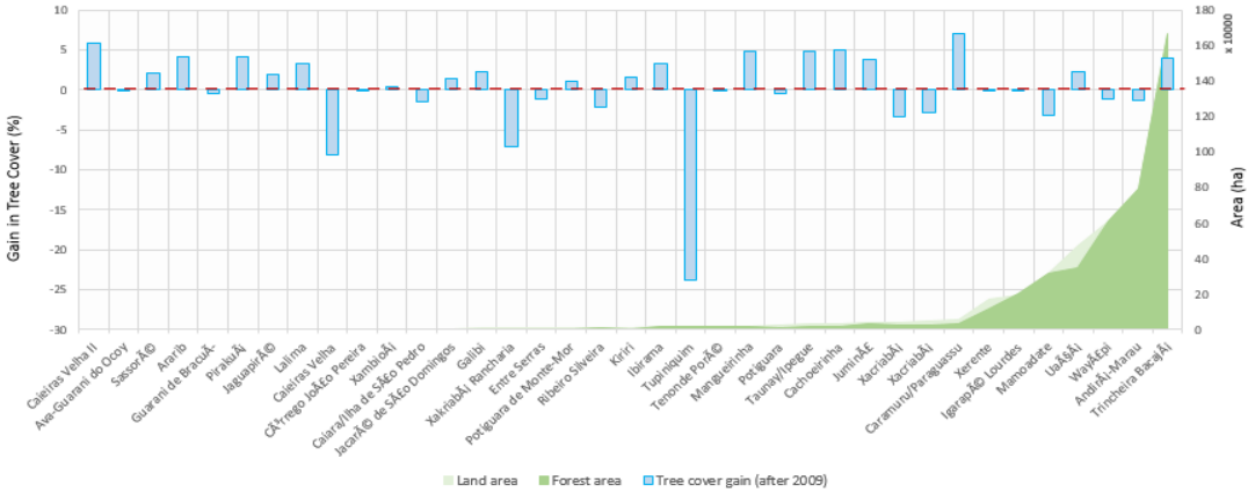


Figure SFA 4A: Tree cover gain after 2009 at 37 targeted watersheds

Nineteen indigenous lands saw an average tree cover gain of 3.68% after the project started in 2009, while 18 watersheds saw tree cover loss (negative tree cover gain) with an average loss of 1.57% over the same period.

FACTORS CONTRIBUTING TO OUTCOMES

Factor	Outcome	Explanation
PROJECT FACTORS		
Grants and technical support for local activities	Reduced deforestation/ increased vegetation cover	• Agroforestry and tree planting were done with microprojects with grants up to R$4000. The grants were noted as being key to increase local level ownership of the project and advance the discussion of sustainable use, and BD conservation. (PIR 2015, p 60) • The project also offered technical support through partner organizations (PIR 2015)
Participatory development of IL Environmental Management Plans	Local support for project activities	• The management plan was developed by creating different thematic working groups in the community who then developed a list of problems and solutions, and therefore the plan is aligned with what they want to do. They wrote the plan themselves in their own language, and also made a video version of the plan, which they preferred to the printed documented. While they think the process of developing the plan took too long, they feel that it really represents the community, especially since it is in their own language (Angra dos Reis - Guarani de Bracuí Indigenous Land Interview notes, page 16) • Participatory process with IP in the ILs was slow, but benefited in terms of increasing awareness about project objectives and there have been no grievances reported (PIR 2015, p 57)
Collaboration with local or regional partners	Efficiency of resource use	• PIR notes the best results were obtained where there were strong local or regional partner organizations assisting in project implementation [PIR 2015] • Through partnership agreements the project was able to carry out many activities including ethnomapping, agroforestry courses/ workshops, agroforestry activities (PIR 2015)
Training courses	Buy in to objectives of project; collaboration and partnerships	• The PNGATI training courses have been instrumental in bringing together indigenous representatives and government employees, both from Funai, the agency responsible for indigenous affairs and ICMBio, the agency responsible for conservation areas. While there are a number of ongoing disputes concerning overlap of indigenous lands and conservation areas, the 5-module courses, lasting almost a year, have promoted dialogue between what have up to now been almost opposite sides of the issue. As a result, managers of conservation areas are increasingly viewing indigenous communities as potential partners in conservation of biodiversity and natural resources [PIR 2015, p 65]
CONTEXTUAL FACTORS		
Supportive national policies or programs		• Brazil was first signatory to the Convention on Biological Diversity, ratified by Legislative Decree number 2, of 05 June, 1992 and actively supports biodiversity management programs and protection of the traditional knowledge of indigenous peoples and local communities associated with biodiversity [2934 prodoc] • The Brazilian National Protected Areas Plan (PNAP), approved in 2006, acknowledges the role of ILs for realizing conservation goals and the Inter-Ministerial Working Group had been discussing strategies for situations of overlap between indigenous lands and conservation areas (PNAP Annex 3.2-I-(e)). [PIR2015]

Factor	Outcome	Explanation
		• The National Policy for Environmental and Territorial Management of Indigenous Lands (PNGATI) was signed in 2012 – it promotes the protection, restoration, conservation and sustainable use of the natural resources of ILs, assuring the integrity of the indigenous heritage, the improvement of their quality of life and the conditions of cultural and physical reproduction of their current and future generations, respecting their sociocultural autonomy, and the current legislation. (interview notes, p 4) Project activities were tied tightly to this piece of legislation, and part of project activities involved workshops on PGNATI

FACTORS HINDERING OUTCOMES

Factor	Outcome	Explanation
PROJECT FACTORS		
Low compensation for patrols	Could have had more impact on reduced extraction of resources, poaching, etc.	• Indigenous peoples were paid for patrolling the ILs, however they were only paid $53/day for 6 days/month – as this was not enough to sustain their livelihoods, they were not able to spend enough time patrolling as they needed to tend their farms for income (interview notes, p. 9)
Low capacity within partner organizations	Delays in project activities	• Changes within Funai have resulted in a reduced capacity to move forward with the satellite monitoring system, such that this initiative is on hold for the moment. [PIR 2015, year 2013]

MALAWI CARLA: Climate Adaptation for Rural Livelihoods and Agriculture (2012-2016) (GEF ID 3302)

Country: Malawi
Focal Area: SFA – Climate Change (CC)
Geographic Scope: Mwakabanga **(**Karonga District), Kafulama (Dedza District), and Moses (Chikwawa District)
Executing Agency: Ministry of Agriculture, Irrigation and Water Development (MoAIWD)
Total Budget: $9.3 million ($3 million GEF; $1.4 million in kind government of Malawi; $3.7 million African Development Bank grant through SCPMP; $1.2 million UNDP)
GEF Contribution: US$3 million
Project Management: US$ 934,216

BACKGROUND/RATIONALE

CARLA was designed to address the increasing vulnerability of Malawi to the impacts of climate change. Specifically, the low adaptive capacity at community and national levels to respond to changes over the past 30 years, including floods, droughts, dry-spells, late rains, and other climate variability, which have affected crop growth, yield, and household food security. CARLA encompasses two of the five priority projects listed in the National Adaptation Programmes of Action (NAPA). It also addresses one of the core challenges identified in the Malawi Growth and Development Strategy (MGDS) 2006-2011.

CARLA integrates improved watershed management, adaptation of farming systems, and community economic development (e.g. value-added processing of crops, marketing) with the rationale that climate change is a multifaceted challenge that requires a multifaceted and integrated response. Watershed management activities were done to address the increase in flooding and erosion exacerbated by clearing of vegetation and deforestation on marginal lands for agriculture and charcoal production.

CARLA had two project components: 1) community-level climate change adaptation activities to improve resilience and adaptive capacity as it relates to agriculture and livelihoods in vulnerable areas. Activities at the community level were identified through a community participatory planning process from a list of potential options; and 2) activities to strengthen national and district capacities to better support community-based climate change adaptation actions. CARLA was implemented in three of the six NAPA priority Districts, with the intention of expanding activities to the other priority areas in a second phase. Within each district, a pilot CARLA community was selected as a model, and the project team worked with District agencies to extend approaches to other communities in the district.

CARLA was designed to integrate with The Smallholder Crop Production and Marketing Project (SCPMP), a project funded by ADB and occurring in the same districts as CARLA. SCPMP activities involved intensification and diversification of agricultural systems to address poverty reduction and food security. Irrigation and support for water user groups and farmer associations would be funded with SCPMP, and in turn CARLA intended to add value to SCPMP by adding the consideration of climate change impacts and adaptation to irrigation and training components. CARLA was also linked to the National Program for Managing Climate Change in Malawi – Formulation Phase (CCP) and the Malawi African Adaptation Program (AAP).

#3302 CARLA Project Activities		
Component 1: (Community level climate change adaptation)		**Component 2 (National/District Level**
Vulnerability assessment	Irrigation (boreholes/solar panel/pumps)	Capacity Development)
Community Climate Change Adaptation	Flood barriers (e.g. wooden check dam)	Training
Action Plan	Goat pass-on	Capacity development
Training workshops/exchanges	Seedling nursery	Guidance documents
Technical support	Fish ponds	Knowledge sharing activities
	Crop residue as mulch	
Drought tolerant crops	Livestock intensification	
Re-vegetation of river/stream margins	Value-added products	
Multi-purpose trees	Credit/loans	

INTERMEDIATE OUTCOMES

- Staff training more than 100% for each subject covered.

ENV/SE OUTCOMES

Table SFA 5A lists measurable project indicators, however note that few indicators were measured/available at the time of this study. Table SFA 5B documents the outcomes and weighted score calculated for the project.

SYNERGIES

Table SFA 5C lists direct benefits for each intervention where there were reported or inferred environmental or socioeconomic outcomes, to facilitate identification of synergies.

- *Tree planting* – tree planting was done for erosion control and gully remediation (in addition to check dams). Contributed to reduced erosion and remediation of the gullies (MB Notes from Malawi visits p 10, presentation), habitat regeneration, and is inferred to have stored carbon.

INTERVENTIONS BENEFITING ONE FOCAL AREA AND SE OUTCOMES

- *Irrigation in combination with drought-tolerant crops* – the combination of activities increased productivity per hectare of maize from 1.0 ton/ha to 3.0-4.0 ton/ha (MB Notes, page 12, Mr Vinda Kishombe, Senior Agriculture Specialist, AfDB). Villagers reported growing more maize, and different types of vegetables such as tomatoes, pumpkins. Farmers were able to have good crop outcomes even with droughts.
- Note also: Income levels of beneficiaries under the project increased through sales of both livestock (5,802 goats distributed across three project sites) and crops (green maize, vegetables, seedlings). Increased income was used towards improved housing (corrugated iron sheets, cement), parts for ox-carts, and to pay for school related expenses (Status Report 2016. 1.1, 1.2).

TRADE-OFFS

- *Conservation agriculture versus cash crops (ENV vs SE)* – 472.5 ha were under soil and water conservation agriculture (MTR 2014). Farmers were resistant to join the project because they grew cotton, and did not want to "lose their cotton". Using land for growing other crops under conservation agriculture, for the benefit of soil and water quality, would negate use of land for growing cotton, a known income earner (Interview notes page 7, section 3.6).

NOTE: Unable to assess if this trade-off was addressed. However, participants did earn income through other project activities such as goat pass-on, seedling nursery, and crops.

- *Crop residue used as mulch versus used to feed livestock (ENV vs SE)* – the project promoted using crop residue on conservation agriculture lands as mulch, to help retain water and nutrients in the soil and add organic matter as it breaks down. Crop residues were previously used as fodder to feed livestock and interview notes comment on this being a competition for crop residue as a resource. This is an opportunity cost in that using the crop residues to enhance soil quality (and in turn agricultural productivity of food crops) negates the use of crop residues to feed and increase livestock productivity.

TABLE SFA 5A: MEASURED PROJECT INDICATORS

Biodiversity Outcomes	None available
Livelihood Outcomes	None available
Land and Agriculture Outcomes	• Maize improved from 1.0 ton/ha to 3.0-4.0 ton/ha [with irrigation and drought tolerant crops] (interview notes) • 472.5 ha under soil and water conservation agriculture (MTR 2014) • 6,294 fruit trees were propagated • 821,735 trees planted across the three project site areas. • 200.5 ha of land have been associated with irrigation projects

TABLE SFA 5B: OUTCOMES AND WEIGHTED SCORE MALAWI CARLA

Benefit Category	Category Score	Outcome Rating	Outcome Score	Outcomes
ENVIRONMENTAL BENEFITS				
(BD) Ecosystem cover and/ or quality increased and/or maintained	**0.5**	**R**	**0.5**	**Improved ecosystem cover**: Planting trees and construction of check dams showing positive signs in restoring catchment areas and eradicating gullies (deeply carved ravines facilitated by deforestation as water washes soil away), e.g. at Mlongoti vge in Dedza (presentation)

(BD) Biodiversity and/ or species populations (flora or fauna)	**0**	**N**	**0**	
(BD) Reduced threats to biodiversity (includes reduced extraction)	**0**	**N**	**0**	
(LD) Improved soil quality	**0.5**	**R**	**0.5**	**Agricultural productivity:** The project promoted using crop residue on conservation agriculture lands as mulch, to help retain water and nutrients in the soil and add organic matter as it breaks down. Agricultural productivity of maize improved from 1.0 ton/ha to 3.0-4.0 ton/ha
(LD) Soil structure improvements	**0.75**	**R**	**0.5**	**Reduced erosion:** Construction of wooden check dams at Mlongoti village in Dedza showing positive signs in eradicating gullies; Planting trees and construction of check dams showing positive signs in restoring catchment areas and eradicating gullies (deeply carved ravines facilitated by deforestation as water washes soil away), e.g. at Mlongoti vge in Dedza (presentation)
		I	**0.25**	**Improved groundwater flow:** From planting and remediation of gullies.
(LD) Reduced threats to land	**0**	**N**	**0**	
(CC) Carbon sequestered	**0.5**			
		I	**0.25**	**Tree planting:** Inferred from 821,735 trees planted across the three project site areas
		I	**0.25**	**Habitat regeneration**: from observed regeneration of catchment areas
(CC) Maintenance of carbon sinks	**0**	**N**	**0**	
(CC) Reduced GHG emissions	**0**	**N**	**0**	
Other environmental benefits/ reduced environmental threats	0			
Air		**N**	**0**	
Waste		**N**	**0**	
Chemicals		**N**	**0**	
SOCIOECONOMIC BENEFITS				
Income or access to capital	**1.5**			
		R	**0.5**	**From goats:** Income levels of beneficiaries under the project have

				increase through sales of both livestock (goats) and crops (green maize, vegetables)
		R	**0.5**	**From seedling nursery:** Man in Dausi village in Chikwawa District roofed his house with corrugated iron sheets after selling potato vines
		R	**0.5**	**From crops:** Income levels of beneficiaries under the project have increase through sales of both livestock (goats) and crops (green maize, vegetables)
Food security	**1.75**			
		M	**1**	**Improved agricultural productivity:** maize has improved from 1.0 ton/ha to 3.0-4.0 ton/ha. This is the result of investments in irrigation and promotion of drought tolerant crops; Farmer at Moses village had a good maize crop in her irrigated plot despite occurrence of drought in the area
		R	**0.5**	**Vegetables:** Chikwawa – community now growing more maize, and different types of vegetables such as tomatoes, pumpkins and other – with solar powered pump
		I	**0.25**	**From fish ponds:** By 2014, for each pond of 20 meters by 50 meters a total of 1000 fingerlings were provided. Each fish farming group comprises members ranging between 10-35. By 2013/2014 7 fish ponds established. Inferred directly and from sale.
Context specific SE benefits	**1.25**			
		R	**0.5**	**Education benefits:** Woman at Mwanyesha 3 village able to send her children to school after selling goats.
		I	**0.25**	**Health benefits:** Inferred from improved food security and access to water
		R	**0.5**	**Household infrastructure**: A woman in Ndelema village in Dedza District constructed a house thatched with corrugated iron sheets when she sold goats and potato vines. (2) Woman in Mwanyesha 3 village in Karonga District procured spare parts for her ox-cart and plastered her house with cement when

				she sold goats that she received under the project.

TABLE SFA 5C: DIRECT OUTCOMES ASSOCIATED WITH INTERVENTIONS

	ENVIRONMENTAL OUTCOMES				SOCIOECONOMIC OUTCOMES		
	BD	LD		CC			
	Habitat regeneration	Soil quality	Reduced erosion	Carbon sequestration	Income	Amount or diversity of food	Agricultural productivity
Crop residue as mulch		I					
Fish ponds						I	
Irrigation (boreholes, solar panels)						✓	✓
Drought tolerant crops							✓
Conservation agriculture		I				I	
Goat pass-on					✓	I	
Seedling nursery					✓		
Wooden check dam	✓		✓				
Tree planting	✓		✓	I			

✓= reported outcome; I = inferred outcome

FACTORS CONTRIBUTING TO MULTIPLE BENEFITS AND OUTCOMES

Factor	Outcome	Explanation
PROJECT FACTORS		
Active engagement of women	# of women engaged (exact number not available)	• Project had affirmative action to ensure that at least 50% of the beneficiaries must be women • In interviews, noted that the majority of the project beneficiaries are women and most of them hold leadership positions in the various community level structures that the project has facilitated to establish and strengthen in the district. It was noted that women are taking the leading role in making decisions on the type of interventions undertake and the majority are in the forefront making such decisions; in terms of gender mainstreaming, participants should be 50/50 but at times it has been more women. Women are more affected by climate change [MB notes on Malawi visits, page 12, Mr Vinda Kishombe, Senior Agriculture Specialist, AfDB)

FACTORS HINDERING MULTIPLE BENEFITS AND OUTCOMES

Factor	Outcome	Explanation
PROJECT FACTORS		

Factor	Outcome	Explanation
Poor project management	Lack of indicator data; slow/delayed project delivery	• Delays in recruitment, ineffective project management, lack of tracking of expenses, staff turnover or lack of staff procured [MTR 2014] • Insufficient monitoring at field and headquarter levels [PIR 2015] • CARLA project Steering Committee met only once since project inceptions [MTR, 2014, p 21] • Role of "Technical Advisor" unclear – recommended title be renamed to Project Manager [MTR 2014, p 21] • Delays in procurement of materials (MTR, 2014) because of no procurement officer
Poor financial management	Delays in implementation	• Erratic flow of funds to the field, which was due to significant concerns over project financial management [MTR 2014, p.18] • Accounting record files were corrupted and not backed up, unjustified expenditures, lack of authorizing signatures on expenses, lack of cash flow analysis, some creditors of inputs not paid due to insufficient funds [PIR 2015] (all three Districts) • Frequent changeover in accounting staff
Lack of ownership at local level	Adoption of activities	• While designed to be participatory, indication in progress reports about challenges in implementation due to beneficiary resistance and suggestions on how to overcome – e.g. resistance to afforestation because of lack of immediate benefits (MTR 2014, p.19), selling livestock prematurely or lack of knowledge on how to raise leading to increased mortality (MTR 2014, p. 17-18). This suggests that full community-level involvement in selection of activities was not occurring. Note that in CEO Endorsment doc, while Climate Change Action Plans were to be built by a participatory process, the project team had already developed a recommended package for consideration by communities.
Poor coordination with existing programs	Inefficiencies in project delivery	• The program experienced overlap with another project, the DFID funded ECRP which had operated for a year, and overlapped with some CARLA villages (in Chickwawa). There were problems of duplicate activities and double counting of results. There were meetings held at National level with project coordinators where agreements are being made to identify areas of complementarity and responsibilities by the two institutions. Some interventions were not in the CARLA design so ECRP did them in the CARLA villages such as village savings and loans (VSL) [MB notes on Malawi visit, p.26] • CARLA was designed to be integrated with SCPMP – however CARLA didn't start until 2012, which was the last year of SCPMP, therefore difficult to carryout activities concurrently (MTR, 2014, p 22)
Lack of multi-sectoral collaboration		• Challenges at district level, where the implementing staff still continue to operate in silos. At the headquarters project management meetings between Department of Irrigation (DoI) and EAD (Environmental Affairs Department) were being held irregularly (MTR, 2014, p 21) • The slow progress on the project has been attributed to inadequate project management due to failure to fully operationalize the implementation modalities as agreed in the Memorandum of Understanding (MOU) between the Department of Irrigation (DoI) and Environmental Affairs Department (EAD), inadequate capacity of the Internal Project Coordination Unit set up after the phase out of SCPMP PCU which led to poor financial management and project monitoring [MTR, 2014, p 17]. Need to strengthen the operational part of the

Factor	Outcome	Explanation
		MOU through joint supervision of project activities at higher level (PS & Director's level) (same, p 21)
CONTEXTUAL FACTORS		
Lack of capacity at the District level	Delay of project activities	• Delays in procurement of equipment and supplies (seedlings) in Chikwawa attributed to lack of capacity at the District level and change-overs in staff (PIR 2015) • Irregular district-level coordination meetings

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