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OVERVIEW OF IMPACT EVALUATION WORK IN 2008

1. The Annual Report on Impact 2007 concluded that, in its impact evaluation (IE) work the Evaluation Office would pursue "a mixed method approach, which includes macro-level statistical analysis …as well as case studies of projects". This approach has been pursued in 2008 through a number of inter-related activities.

2. Impact evaluation has become a high profile topic in the international development arena and one subject to considerable debate. Much of the discussion has revolved around the efficacy and acceptability of different methodological approaches. The Evaluation Office has been actively engaged in the international debate. A Senior Evaluation specialist is on the Steering Committee of the Network of Networks on Impact Evaluation (NONIE), on the Coordinating Committee of the United Nations Evaluation Group (UNEG) and is Co-Chair of the UNEG Task Force on Impact Evaluation. This means that the Evaluation Office is fully informed on the current best practice trends in Impact Evaluation and that its experience and products are widely known. One area in which intended collaboration has not yet been activated is with the Early Warning group in UNEP, which has access to substantial data sets, notably of satellite imagery and aerial photography, on environmental change. The agreement, to collaborate in developing impact evaluation uses of these data sets, will be addressed during 2009.

3. Following up on the initial quasi-experimental evaluation of the impacts of Protected Areas on deforestation in Costa Rica (conducted in collaboration with STAP), which was reported in the GEF Annual Report on Impact 2007, two new quasi-experimental impact evaluations have been conducted (also in collaboration with STAP),

by providing limited funds to specialist researchers to analyze existing data sets to explore topics of importance to the GEF. In 2008, two such studies were commissioned and managed by GEF EO:

- Measuring the Social Impacts of Protected Areas: an Impact Evaluation Approach. This focused on the Costa Rica Protected Area system (which has received GEF-support), enabling a comparison with the Evaluation Office 2007 study of the avoided deforestation of the same system. This evaluation is completed.
- Evaluating the Local Socio-Economic Impacts of Protected Areas: A System-Level Comparison Group Approach. This focused on the Protected Area System of Thailand (which is about to receive GEF support). This evaluation is completed.

4. The two Impact Evaluations have provided important additional perspectives on the Evaluation Office's work on the impacts of Protected Areas, commenced through the evaluation of the impacts of three Protected Areas in East Africa in 2007. One reported finding of that body of work was the negative socio-economic impacts experienced by one sub-group in the locality neighboring one Protected Area. This raised the broader issue of the socio-economic impacts of Protected Area Systems, which form a major component of GEF-supported activities in the biodiversity Focal Area. The two statistically-based studies conducted in 2008 showed that: a) districts surrounding Protected Areas in Costa Rica and Thailand showed less poverty than carefully-controlled counterfactual districts (not adjacent to Protected Areas) with similar geographical and physical characteristics; b) without use of a counterfactual, the districts seemed to be poor; which could have led to the false conclusion that this was associated with the neighboring Protected Areas; and c) that income inequality increased near Protected Areas in Thailand (data on this factor were not available for Costa Rica), so that an aggregate income improvement may disguise pockets of worsening poverty. Furthermore, since Costa Rica and Thailand have relatively high income levels compared with most developing countries; and since both already have well-developed tourism industries, the specific national-level findings should not be assumed to apply to Protected Area systems in other countries.

5. In addition to the two quasi-experimental studies of Protected Area systems, one completed (World Bank-implemented) project, which had an experimental design, featuring participant and control groups of farmers, is under assessment on some of its key dimensions:

- Case Study: Regional Integrated Silvopastoral Approaches to Ecosystem Management Project. This focused on a completed GEF project in Nicaragua, Colombia and Costa Rica. The evaluation drew upon existing research information of a Doctoral researcher formerly associated with the GEF Evaluation Office. It involved limited follow-up field research to evaluate: strengths and weaknesses of the project's experimental design and its impacts at field level, including the adoption of improved silvopastoral practices, environmental

benefits, socio-economic benefits and sustainability of land use changes. Field work has finished and the evaluation will be completed in November 2008.

6. The major Impact Evaluation activity of 2008 has been the methodological development for and commencement of implementation of an evaluation of the impact of GEF activities concerning the reduction of Ozone Depleting Substances. This evaluation utilizes a Theory Based Approach and will include extensive statistical analysis of impacts of GEF activities, compared with those of the Multilateral Fund of the Montreal Protocol. It is under implementation through a detailed desk review of all relevant GEF activities (focusing particularly on Terminal Evaluations), of key scientific literature and of analysis of statistics available from the Montreal Protocol. On the basis of this preparatory work, detailed field work will be conducted in four countries (Russia, Ukraine, Uzbekistan and Kazakhstan). During the study preparation, discussions were held with STAP members and with the Evaluation Offices of GEF partners, as a result of which the evaluation is being conducted in collaboration with UNEP and UNIDO. The initial findings of this work will be incorporated into the OPS4 Final Report, and finalization to be included in the GEF Annual Report on Impact 2009.

7. The extensive development of Impact Evaluation approaches has been fed into the design of the methodology for the evaluation of results in OPS4. In addition to including the findings of the Protected Areas and Ozone evaluations in the OPS4 results analysis, the Theory Based Approach is being adapted so that it can enable an improved understanding and reporting of results throughout the GEF portfolio. Theories of Change are being developed for all the major areas of GEF activity and early testing has shown that they enable an improved understanding of the sustainability and catalytic effects of GEF support after formal project closure.

8. The two sections below report on the findings of the two completed quasi-experimental Impact Evaluations described above.

CASE STUDY OF THE SOCIAL IMPACTS OF PROTECTED AREAS: NORTH AND NORTH-EAST THAILAND

9. This Impact Evaluation approach develops and applies a new comparison-group based method for evaluating the socio-economic effects of protected areas on local communities across a protected area system. The project was designed to extend and complement program evaluation methods previously developed by the GEF Evaluation Office.

10. Protected areas, including those supported by the GEF, now cover a significant fraction of the global land area. However, little is known about their net effects on local incomes or poverty rates. Community-level economic development could be reduced by restrictions on land use or resource extraction activities but could also be supplemented by a new tourism sector or increased environmental benefits. Empirical work on the

actual impacts of protected areas has been limited to date by: a) the lack of data on poverty outcomes at the appropriate spatial scale and b) the non-random selection of protected area locations, which complicates the construction of a useful comparison group.

11. The approach presented here analyzes a protected area system across a national or sub-national area with respect to socio-economic and environmental impacts at the community level. This method is applied in the context of Thailand's national protected area system, using data at the sub-district level from the North and Northeast regions of Thailand. To measure socio-economic outcomes, the method uses data from new poverty mapping techniques that estimate community-level incomes and poverty rates. To assess impacts, the approach relies on evaluating differences between communities with protected land and comparison communities in the same province or district, with similar likelihood of protection and similar pre-protection development potential. The comparison group was constructed on the basis of an analysis of the history of protected area designation in Thailand, in order to account for the key factors that determined protection and might also influence outcomes.

12. The method presented here can be of more general use beyond Thailand. It could productively be used to evaluate protected areas in other countries or to evaluate impacts of other large scale environmental projects supported by the GEF. Ideally, this methodology can complement existing studies, including case comparisons or household survey work, by providing a broader overview of impacts across a larger number of sites.

13. The results of this study indicate that protected forest areas in North and Northeast Thailand have prevented forest clearing that otherwise would have occurred and thus have imposed a constraint on land available for agricultural use. Sub-districts with more land in protected areas had significantly more forest cover by the year 2000 than appropriate comparison sub-districts (9-25 percentage points for national parks, 11-32 percentage points for wildlife sanctuaries).

14. Despite reducing land available for agricultural production, this study finds that national parks and wildlife sanctuaries did not harm average consumption levels or increase poverty rates. Looking only at correlations, sub-districts with more land in protected areas were indeed substantially poorer than the province averages. After controlling for geographic characteristics and pre-protection development potential, however, the analysis indicates that this poverty is not the result of the protected areas. Sub-districts with more land in wildlife sanctuaries did not have significantly different consumption levels or poverty headcounts than appropriate comparison sub-districts. Sub-districts with more land in national parks had significantly higher consumption levels (2-7 percent) and lower poverty rates (4-12 percent) than comparison sub-districts. However, inequality measures are higher on average for communities near the national

parks, indicating that a disproportionate share of these gains went to higher income households.

15. The results suggest that, on average, at the community level, the gains from protection have been high enough to offset the costs of land use constraints. The most probable mechanism for the positive economic effect of national parks is increased income from tourist visits in and near the parks. The Thai government has actively promoted national parks as tourist destinations and official statistics indicate over 10 million tourist visits to national parks in 2000. Consumption levels are positively associated with popularity of parks as measured by tourist visits; a higher flow of tourists is a likely explanation for the stronger positive effects for national parks compared with wildlife sanctuaries, where tourism opportunities are limited. Summary tables of key results are presented in the Annex of this report.

CASE STUDY ON THE SOCIAL IMPACTS OF PROTECTED AREAS: COSTA RICA

16. The study applies a quasi-experimental approach to evaluate the socio-economic impacts of Costa Rica's protected area network, in which the GEF has invested for many years.

17. The study uses a quasi-experimental approach to provide estimates of the aggregate social impacts of protected areas. It seeks to answer the question "what is the effect of this protected area on economic outcomes within neighboring communities?" To tackle this question, one must isolate the effects of other variables on the economic outcomes in local communities affected by protected areas. This in turn requires the establishment of a counterfactual: "what would have happened if this protected area had not been established?" Matching methods, the particular quasi-experimental approach that is used in this study, provide one way to find suitable comparisons for communities affected by protection, thus establishing the counterfactual.

18. The study applies the quasi-experimental approach to measure the impacts of Costa Rican protected areas established before 1980 on changes in socioeconomic outcomes between 1973 and 2000. It uses matching methods to identify suitable counterfactuals for protected census segments in order to control for the overt bias from nonrandom placement of protection. It matches each segment affected by protection with similar unprotected segments based on relevant pre-protection variables that affect the likelihood of protection as well as changes in socioeconomic outcomes. It also estimates the spatial spillover effects of protection on unprotected segments located near protected areas and assesses the sensitivity of the results to various changes in the sample or matching specification.

19. The study finds no evidence that protected areas in Costa Rica have had harmful impacts on the aggregate livelihoods of local communities – on the contrary, it finds that protection has had *positive* effects on socioeconomic outcomes. The establishment of protected areas is associated with a lower poverty index in local communities affected by

protection. It finds also that protection led to better outcomes in terms of condition of housing and access to water supply, but found no significant differences in such other (slightly higher income level) indicators as measures of access to electricity or telephones.

20. Furthermore, the study found that conventional statistical evaluation techniques (such as a difference in means test, or Ordinary Least Squares regression) produced biased estimates when applied to its sample. In contrast to the results indicated above, those conventional methods erroneously implied that protection had negative impacts on the livelihoods of local communities. These findings suggest that conventional methods that fail to control for confounding factors or outcome baselines can lead to inaccurate estimates. The study demonstrates the specific value delivered by applying an impact evaluation approach, which carefully identifies suitable counterfactuals for measuring the social impacts of protected areas. Summary tables of key results are presented in the Annex of this report.

Conclusions on Impact Evaluation Work in 2008

21. The Evaluation Office has made substantial progress in developing and implementing a variety of approaches to assessing impacts of the GEF's interventions. In addition to the evaluation of the impacts of the programme to assist in the elimination of Ozone Depleting Substances in Countries with Economies In Transition (CEITS), which is under way and will be incorporated into OPS4, two quasi-experimental evaluations have been completed, addressing an important issue to GEF policy and practice, namely the socio-economic impacts of Protected Area projects in two countries. The conclusions from these two analyses show that the most effective evaluative perspective is gained by combining methodological approaches to ensure that both macro and local level impacts are accurately assessed. The Impact Evaluation work of the Evaluation Office has contributed to and benefited from substantive engagement in key international forums, which are leading the further development and implementation of approaches in the field.

ANNEX: KEY SUMMARY TABLES OF SOCIAL IMPACTS OF PROTECTED AREAS IN THAILAND AND COSTA RICA

Table 1: Consumption / Poverty Headcount Ratio and Protected Areas: Thailand

Dependent variable:	**log mean consumption**				
	(1) No controls	(2) Province F.E. only	(3) Slope/Elev controls	(4) Geog. controls	(5) Full controls
National Park (pct)	-0.191***	-0.170***	0.061	0.133***	0.133***
	(0.044)	(0.045)	(0.040)	(0.037)	(0.037)
Wildlife Sanctuary (pct)	-0.278***	-0.217***	-0.000	0.098*	0.106*
	(0.069)	(0.075)	(0.055)	(0.055)	(0.055)
northeast dummy	yes	yes	yes	yes	yes
province fixed effects	no	yes	yes	yes	yes
slope and elevation controls	no	no	yes	yes	yes
geographic controls	no	no	no	yes	yes
historical forest cover	no	no	no	no	yes
Adjusted R2	0.143	0.417	0.466	0.570	0.574
N	4113	4113	4113	4113	4113

Dependent variable:	**log poverty headcount ratio**				
	(6) No controls	(7) Province F.E. only	(8) Slope/Elev controls	(9) Geog. controls	(10) Full controls
National Park (pct)	0.576***	0.458***	-0.110	-0.251***	-0.251***
	(0.125)	(0.099)	(0.067)	(0.061)	(0.062)
Wildlife Sanctuary (pct)	1.006***	0.595***	0.057	-0.124	-0.142
	(0.232)	(0.168)	(0.129)	(0.129)	(0.128)
northeast dummy	yes	yes	yes	yes	yes
province fixed effects	no	yes	yes	yes	yes
slope and elevation controls	no	no	yes	yes	yes
geographic controls	no	no	no	yes	yes
historical forest cover	no	no	no	no	yes
Adjusted R2	0.265	0.616	0.655	0.709	0.711
N	4113	4113	4113	4113	4113

*** p < .01 ** p< .05 * p< .10. Standard errors are robust, clustered at the district level
Slope and elevation controls = (log of) average slope, average elevation. Geographic controls = (log of) distance to major city, distance to rail line, distance to mineral deposits, distance to any roads (1962), distance to major roads (1962), max elevation, max slope, distance to national boundary, distance to navigable river; average temperature, average rainfall, ecoregion 2, ecoregion 3, near watershed. Historical forest cover = forest cover in 1973.

Table 2: Additional Socio-economic Outcomes and Protected Areas: Thailand

Dependent variable:	**log poverty gap**		**log squared poverty gap**	
	(1) Province F.E. only	(2) Full controls	(3) Province F.E. only	(4) Full controls
National Park (pct)	0.359***	-0.245***	0.246***	-0.185***
	(0.093)	(0.061)	(0.078)	(0.053)
Wildlife Sanctuary (pct)	0.528***	-0.112	0.390**	-0.073
	(0.167)	(0.125)	(0.150)	(0.117)
northeast dummy	yes	yes	yes	yes
province fixed effects	yes	yes	yes	yes
slope and elevation controls	no	yes	no	yes
geographic controls	no	yes	no	yes
historical forest cover	no	yes	no	yes
Adjusted R2	0.609	0.684	0.586	0.644
N	4113	4113	4113	4113

Dependent variable:	**log gini coefficient**		**population density**	
	(5) Province F.E. only	(6) Full controls	(7) Province F.E. only	(8) Full controls
National Park (pct)	0.007	0.060*	-170.556***	15.953
	(0.022)	(0.033)	(33.007)	(15.045)
Wildlife Sanctuary (pct)	-0.023	0.040	-139.317***	33.692**
	(0.046)	(0.051)	(30.673)	(15.786)
northeast dummy	yes	yes	yes	yes
province fixed effects	yes	yes	yes	yes
slope and elevation controls	no	yes	no	yes
geographic controls	no	yes	no	yes
historical forest cover	no	yes	no	yes
Adjusted R2	0.455	0.477	0.140	0.346
N	4113	4113	4113	4113

*** p < .01 ** p< .05 * p< .10. Standard errors are robust, clustered at the district level
Slope and elevation controls = (log of) average slope, average elevation. Geographic controls = (log of) distance to major city, distance to rail line, distance to mineral deposits, distance to any roads (1962), distance to major roads (1962), max elevation, max slope, distance to national boundary, distance to navigable river; average temperature, average rainfall, ecoregion 2, ecoregion 3, near watershed. Historical forest cover = forest cover in 1973.

Table 3: Forest Cover and Protected Areas: Thailand

Dependent variable:	forest cover, 2000 (percent)				
	(1) No controls	(2) Province F.E. only	(3) Slope/Elev controls	(4) Geog. controls	(5) Full controls
National Park (pct)	0.805***	0.667***	0.197***	0.171***	0.171***
	(0.047)	(0.043)	(0.047)	(0.048)	(0.042)
Wildlife Sanctuary (pct)	0.857***	0.681***	0.262***	0.233***	0.215***
	(0.054)	(0.099)	(0.062)	(0.062)	(0.052)
northeast dummy	yes	yes	yes	yes	yes
province fixed effects	no	yes	yes	yes	yes
slope and elevation controls	no	no	yes	yes	yes
geographic controls	no	no	no	yes	yes
historical forest cover	no	no	no	no	yes
adjusted R^2	0.452	0.636	0.835	0.845	0.866
N	4113	4113	4113	4113	4113

Dependent variable:	forest cover, by year (percent)				
	(6) OLS (2000)	(7) Sub-district FE	(8) First Diffs	(9) Random Effects	(10) Sub-district FE w/ C.S.
National Park (pct)	0.101**	0.115***	0.082	0.121***	0.122***
	(0.050)	(0.039)	(0.063)	(0.038)	(0.043)
Wildlife Sanctuary (pct)	0.114	0.143***	0.174**	0.130**	0.142***
	(0.094)	(0.051)	(0.066)	(0.052)	(0.052)
province fixed effects	yes	--	--	--	--
geographic controls	yes	no	no	yes	no
sub-district fixed effects	no	yes	no	yes	yes
period fixed effects	no	yes	yes	yes	yes
adjusted R^2	0.768	0.351	0.132	--	0.316
N	1386	5473	4089	5473	3677

*** p < .01 ** p< .05 * p< .10. All standard errors are robust, clustered at the district level
Columns 1-5 show OLS regressions on the full sample. Slope and elevation controls = (log of) average slope, average elevation. Geographic controls = (log of) distance to major city, distance to rail line, distance to mineral deposits, distance to any roads (1962), distance to major roads (1962), max elevation, max slope, distance to national boundary, distance to navigable river; average temperature, average rainfall, ecoregion 2, ecoregion 3, near watershed. Historical forest cover = forest cover in 1973.
Columns 6-7 use the panel approach and limit observations to those with more than 10% of forest cover in 1973, less than 20% cloud cover and less than 20% land area in water. Column 6 repeats the OLS cross-section specification in Column 5 on this sub-sample; Column 7 includes sub-district and period fixed effects; Column 8 regresses changes in forest cover on changes in percent protected; Column 9 uses random effects estimation including the same additional fixed covariates as Column 5; and Column 10 repeats the specification of column 7 for the sample with common support (propensity score between .01 and 0.7).

Table 4: Effects of Protected Areas on Socio-economic Outcomes: Costa Rica

	1	2	3	4	5	6
Outcome	**Poverty index**	**Percent of houses in bad condition**	**Percent of houses in slums**	**Percent of households without telephone**	**Percent of households without electricity**	**Percent of households without water supply**
Matching Estimates (Effect of protection on change in outcome 1973-2000)						
Covariate Matching – Mahalanobis	-3.251*** (0.973)	-6.429*** (2.189)	-2.142** (1.064)	-1.032 (2.051)	-1.731 (3.697)	-5.856*** (1.652)
Covariate Matching – Mahalanobis with calipers [N outside calipers]	-1.941*** (0.543) [65]	-4.714** (1.489) [72]	-1.976** (0.795) [63]	-1.782 (1.709) [57]	2.155 (2.772) [60]	-4.201*** (1.212) [63]
Replicating Conventional Methods (Effect of protection on change in outcome 1973-2000)						
Ordinary Least Squares^	2.068*** (0.403)	2.364*** (0.818)	0.621* (0.347)	11.243*** (1.462)	7.354*** (2.347)	-2.622** (1.022)
Replicating Conventional Methods (Effect of protection on post-protection outcome measured in 2000)						
Difference in Means†	9.170***	6.114***	0.695**	29.085***	19.270***	4.352***
N treated (N available controls)	399 (15988)	399 (15988)	399 (15988)	399 (15988)	399 (15988)	399 (15988)

^ An Ordinary Least Squares model regresses the outcome on protection while controlling for key covariates.
† A t-test is applied to evaluate the difference in means of post-protection outcomes between treated and control segments.
‡ Standard errors in parenthesis under estimate.
? Calipers restrict matches to units within 1 standard deviation of each covariate.
*** significant at 1%; ** significant at 5%; * significant at 10%

Table 5: Estimates of the Spillover Effect of Protected Areas on Socioeconomic Outcomes in Neighboring Unprotected Segments: Costa Rica

	1	2	3	4	5	6
Outcome	**Poverty index**	**Percent of houses in bad condition**	**Percent of houses in slums**	**Percent of households without telephone**	**Percent of households without electricity**	**Percent of households without water supply**
Matching Estimates (Effect of protection on change in outcome 1973-2000)						
Covariate Matching – Mahalanobis	0.134 (0.258)	-1.241* (0.673)	-0.282 (0.257)	-0.621 (1.165)	10.071*** (1.903)	-0.725* (0.416)
Covariate Matching – Mahalanobis with calipers [N outside calipers]	0.147 (0.252) [5]	-1.373** (0.665) [8]	-0.223 (0.252) [7]	-0.654 (1.161) [10]	10.101*** (1.894) [5]	-0.589 (0.390) [5]
N treated (N available controls)	786 (11782)	786 (11782)	786 (11782)	786 (11782)	786 (11782)	786 (11782)

‡ Standard errors in parenthesis under estimate.
? Calipers restrict matches to units within 1 standard deviation of each covariate.
*** significant at 1%; ** significant at 5%; * significant at 10%