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USAID's Growth with Equity in Mindanao Program

Evaluation of the Economic Impact of Infrastructure Projects



Submitted to:
United States Agency for
International Development/Philippines
Office of the Economic Development and Governance
Manila, Philippines

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Foreword

This study has two purposes: to evaluate the economic impact of Growth with Equity in Mindanao (GEM) infrastructure projects over the period 2002 – 2010; and to determine the impact, if any, of GEM infrastructure on peace and order in the barangays in which they are located.

The Institute for Socio-Economic Development Initiatives (ISFI) of Ateneo de Davao University, Mindanao was selected to conduct the study. ISFI designed and tested all the data collection instruments and protocols, collected all required data, analyzed the data and generated the results. ISFI surveyed thousands of households and businesses on Mindanao and held 244 Focus Group discussions involving more than 1,800 households to complete the study. ISFI-Ateneo carries out what may be the most rigorous and extensive household/business survey-based study ever conducted in Mindanao.

The study was undertaken at the request of United States Agency for International Development (USAID)/Philippines, which designed the assessment and was consulted frequently during its implementation.

The study results show that GEM infrastructure had positive impacts on the incomes of households in the barangays in which the infrastructure is located. Further, barangays where GEM infrastructure is located have lower levels of violence than barangays without GEM infrastructure.

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The following annexes are contained in a DVD that accompanies this report: the scope of work, the summary report, the main report, the project profiles, the databases, and statistical calculations.

1 Executive Summary

A peso invested in USAID/GEM's Regional Infrastructure Program (RIP) category of projects, returned 2.59 pesos in benefits, as assessed through stringent statistical analysis. Using the same measures, a peso invested in the Barangay Infrastructure Program (BIP) category of projects returned 2.00 pesos in benefits. Aside from the airports, the highest economic returns were generated by roads and bridges under both the GEM 2 and GEM 3 programs. Social, political, and geographical benefits were not included in the study.

1.1 Background and Objective

In November 2010, USAID instructed GEM to conduct an evaluation of the economic impacts of infrastructure projects constructed during GEM 2 and 3. USAID developed a Scope of Work (SOW) and GEM prepared a Request for Proposals (RFP) that was the basis for competitive bidding, which started about February 15, 2011. GEM held a bidders' conference on February 28, 2011 and bids were submitted on March 21. GEM held a pre-award interview with the apparent successful bidder to discuss the study requirements in further depth. The contract was awarded to the Institute for Socio-Economic Development Initiatives (ISFI) of Ate-Neo de Davao University. Field work was conducted by ISFI during June, July and August of 2011.

The study has two purposes:

The primary purpose is to "... assess the economic impact of infrastructure projects carried out under GEM, on families and communities within the project areas, as well as the collective economic impact of the projects on the Autonomous Region in Muslim Mindanao (ARMM), other conflict-affected areas in Mindanao (CAAM), and on Mindanao as a whole."¹

The secondary purpose is to assess the impact, if any, the GEM infrastructure had on peace and order conditions in the ARMM and CAAM.

1.2 Approach and Methods

The study is based on statistical analyses of data collected on a stratified random sample of infrastructure projects constructed under GEM 2 and GEM 3. Since about 1,100 infrastructure projects were constructed prior to the study under GEM 2 and GEM 3, 1,100 projects was taken as the universe. The sample was stratified by concentration of projects, type of projects, size of projects, and by those projects constructed in high-conflict and moderate-conflict areas of Mindanao. For the purposes of the study, there were no low-conflict areas in Mindanao.

To specify the types of projects by size of project, the following criteria were used:

Regional Impact Projects (RIPs) are larger projects such as ports, roads, and bridges. Typically, RIPs include substantially more beneficiaries than BIPs. Usually, beneficiaries include the populations of one or more municipalities, and sometimes, in the case of a port or airport, the population of an entire province.

Barangay Infrastructure Projects (BIPs) are relatively small “community level” infrastructure projects such as boat landings, road upgrades, water systems, trading or community centers, barangay bridges, footbridges, drainage canals, warehouses/solar dryers, and irrigation systems. Typically, the primary beneficiaries of BIPs are the residents of one or two barangays.

The Statement of Work (SOW) and Request for Proposal (RFP) specified the sample size by type of infrastructure project. For example, there were 13 road upgrades in the RIP category and the sample included 7 of the 13. Some categories of infrastructure were omitted on instructions from USAID. These included: irrigation systems, hand pumps, and

community centers. Later, at USAID’s instruction, 20 Barangays with no GEM infrastructure projects were sampled. GEM reduced the number of solar driers to be sampled by 20, to 64, to compensate for this added task. *Note that the study did not attempt to assess social or diplomatic benefits, associated with the infrastructure.*

The SOW placed the useful life of infrastructure projects at 20 years, and set the discount rate at 12%. A discount rate of 12% is used by the World Bank and the Asian Development Bank to judge the viability of projects and in many cases is also the rate used to judge if a project is commercially viable. A discount rate of 3% is often used by governments to judge the viability of projects for funding, because governments typically place a higher value on future benefits to society.

Each project sampled was assessed using the Net Present Value approach, utilizing economic, as opposed to financial values where possible, of the benefits and costs of the projects. The Net Present Value of a project is the benefits less the costs of the project over each year of the project’s life, adjusted to reflect that not all the benefits and costs occur in the current year. So, benefits and costs forecast to occur in the future are reduced in value to reflect the current value of future pesos. A discount rate of 12% thus places a heavy value on pesos held today, while a discount rate of 3% places a heavier value on pesos held in the future. Inflation is adjusted out of the analysis.

The projects were also tested using benefit-cost ratios. A benefit-cost ratio is the net present value of benefits divided by the net present value of costs. A benefit-cost ratio equal to 1.0 means that the benefits and costs for that project are equal at a given discount rate. A benefit-cost ratio above one means that the benefits of the project exceeded the

costs of the project by the amount greater than one at a given discount rate. A benefit-cost ratio that is below one means the costs of the project exceed the benefits at that discount rate.

A sensitivity analysis on the net present values and benefit-cost ratios was also performed to see how the results varied with a 10% increase in costs, a 10% decrease in benefits, and a change in the discount rate from 12% to 3%. These analyses were conducted to determine whether the economic results, as presented herein, are robust.

Household surveys covering transport projects, other projects, vehicle and vessel owner surveys, driver surveys, and passenger surveys were also conducted. Key Informant Interviews and Focus Group Discussions (FGD) were held at every sampled GEM infrastructure site. Data from these sources were collected to provide contexts for the quantitative results.

The final sample includes 233 projects disaggregated into 24 RIPs, and 209 BIPs. Taken together, these projects represent about 20% of the projects that had been constructed at the time of the study.

1.3 Findings

1.3.1 Economic Findings

Based on the study's surveys, in the barangays where the GEM infrastructure was located, *the overall level of income increased significantly between 2002 and 2010*. Among the control barangays, there was no statistically significant increase in income compared to the barangays with the GEM infrastructure projects.

The location of USAID-GEM infrastructure is statistically comparable across Mindanao. That is,

USAID-GEM projects located in the ARMM are as economically viable as projects outside the ARMM. This type of result was also found to be true in the areas of high-conflict versus those of moderate-conflict in Mindanao. Though high-conflict areas may discourage private investment because of the uncertainty induced by conflict, GEM infrastructure returned strong net economic benefits. Those benefits are as strong as the net benefits generated by infrastructure in moderate-conflict areas.

1.3.1.1 The RIP Category of Projects

On average, using a 12% discount rate, the *Regional Impact Projects (RIPs)* had a benefit/cost ratio of 2.59. This means that on average, a peso invested returned 2.59 pesos in benefits. On average, at a discount rate of 3%, the RIPs yielded a benefit-cost ratio of 4.61, meaning that every peso invested resulted in 4.61 pesos in benefits.

Within the RIP category of projects, the Airport in Tawi-Tawi had the highest benefit-cost ratio (see table 1). This result is no surprise given the importance of the airport to the region. Again, using stringent sensitivity testing, the high benefit-cost ratio was robust. RIP roads were subject to the same sensitivity testing and their high result was robust as well. All the RIP results were subject to sensitivity testing and the results remained strong.





Table 1: Benefit-Cost Ratios by Type of Project and by Discount Rate, RIPs

Type of Projects	Discount Rate =12%	Discount Rate = 3%
RIPs		
Boat Landings	2.40	4.40
Bridges	2.46	4.45
Roads	2.74	4.81
Airport	3.90	6.14
RIP Average	2.59	4.61

1.3.1.2 The BIP Category of Projects

For the BIP category of projects; the results were nearly as strong (see table 2). On average, using a 12% discount rate, *BIPs have a benefit-cost ratio of 2.0*, meaning that for every peso invested, the return was 2 pesos in benefits. On average, using a 3% discount rate, BIPs have a benefit-cost ratio of 3.42,

meaning that for every peso invested, the return was 3.42 pesos in benefits.

At a discount rate of 12%, trading centers offer the lowest benefit-cost-ratio. This reflects the fact that in GEM 2, trading centers were located in less economically beneficial areas and were often constructed based on non-economic factors. Under GEM 3, trading centers were located in more economically viable areas, and thus have higher benefit-cost ratios. Further, trading centers are used for social and political gatherings as well as for commercial activities. However, only market sales were taken into account in establishing benefit-cost ratios. Typically, market sales days occur only once or twice a week.

Table 2: Benefit-Cost Ratios by Type of Project and by Discount Rate, BIPs

Type of Project	Discount Rate = 12%	Discount Rate = 3%
BIPs		
Boat Landings	1.90	3.42
Bridges	2.11	3.85
Grain Solar Dryers	2.18	3.34
Roads	3.17	5.61
Trading Centers	1.00	1.55
Warehouse and Grain Solar Dryers	1.70	2.58
BIP Average	2.00	3.42

The highest benefit-cost ratio among BIPs is associated with roads. This result was subject to a great deal of sensitivity testing, including limiting the useful life to 7 years with a salvage value and sharply increasing the maintenance costs. Despite these constraints, the benefit-cost ratio for roads remained high as in the preceding table. All BIPs were sub-



ject to the same degree of sensitivity testing as were the RIPs, and the results remained robust.

For both categories of projects, benefits considered for transport projects include vehicle operating cost savings (for improved roads and bridges), passenger time savings, passenger fare savings, and handling fees. For the airport, increased terminal fees and tax collections are the primary components of the benefits. For vessels, additional benefits include reduced cargo handling fees, terminal use fees, passenger taxes, and docking fees.

Benefits for the grain solar driers and the solar driers with warehouses include the increased value of dried palay; a decrease in post-harvest losses of palay; and user fees. The benefits do not include the recreational use of solar driers as basketball courts, as this is a social benefit and not included in the study.

1.3.2 Peace and Order Findings

In the barangays where the GEM infrastructure was located, the overall degree of violence declined significantly between 2002 and 2010. Among the control barangays, there was no decline in violence that was statistically significant, compared to the barangays with the GEM infrastructure projects. Measures of violence included rido, or clan violence, military encounters, insurgent bombings, kidnapping, murder, burglaries and domestic violence. Among these measures, only kidnapping showed a significant decline among the control barangays.

1.3.3 Qualitative Findings

The study team held 224 Focus Group Discussions, comprising approximately 1,800 people. In the ARMM, 86% of the participants recognized USAID's role as "very important" for their livelihood and communities. They considered USAID/GEM an important development partner in improving access, triggering more trade and commercial activities, and easing the degree of conflict. In some regions, 95% of the participants said that USAID was important to improving their livelihoods and the well-being of their communities. In other regions, 86% of the respondents said that they valued USAID/GEM infrastructure because farmers were able to increase their incomes due to easier market access. Participants emphasized that they valued footbridges because students could travel safely to school. These participants viewed the infrastructure as "heaven sent" by making it faster, easier and cheaper to get farm products to market. In virtually all groups, people said that the the infrastructure improved the quality of their lives and incomes.

1.4 Conclusions

1. In the barangays with USAID-GEM infrastructure, incomes increased significantly. There was no corresponding significant increase in incomes in the “without” project barangays.
2. Almost all people said that GEM infrastructure improved their quality of life and incomes.
3. Almost all people, during the focus group discussions, expressed a desire for more and better roads.
4. Farm-to-market roads of the types that can be built under the BIP category of projects are highly valued by rural residents and thus in great demand.
5. Aside from the airport, roads have the highest benefit-cost ratios.
6. Building more roads and bridges makes economic sense and is supported by the fieldwork and statistical analysis.
7. RIPs have higher average benefit-cost ratios than do the BIPs. Based on the criteria of this study, building more RIPs makes greater economic sense than building more BIPs. However, this does not take into account social, and geographical benefits or political objectives.
8. Building infrastructure in a barangay is related to reductions in violence in that barangay.
9. Building infrastructure in the ARMM or other high-conflict areas of Mindanao returns the same benefit-cost-ratios as infrastructure constructed in areas of moderate conflict.

2 Context

Mindanao contains about 35% of the entire land mass of the Philippines and is home to approximately 25% of the estimated 90 million people who live in the country. The island region has long been plagued by insurrection and armed conflict.

2.1 Mindanao – An Overview

From one perspective, Mindanao's situation today is the result of an historical coincidence, in that Mindanao was the northeastern-most point reached by Islam as it spread gradually from its starting point in Arabia to various corners of the world. In fact, Islam had only recently established itself in Mindanao and the Sulu archipelago when the Spanish reached the Philippines by coming west across the Pacific in the early 16th century. The fact that most of the people in Mindanao and the Sulu archipelago were Muslims was one of the reasons why Spain was never able to completely subdue Mindanao and the Sulu archipelago, Christianize its peoples, and integrate them fully into its Philippines colony.

When the U.S. took the Philippines from Spain at the turn of the 20th century, it managed to more fully integrate Mindanao and the Sulu archipelago. By and large, U.S. colonial policy toward the peoples of Mindanao recognized and was respectful



of the cultural differences among its peoples, and between the people of the rest of the Philippines (the Christianized Philippines). The U.S. success in incorporating Mindanao and the Sulu archipelago into the country brought with it what was, from the Muslim peoples' perspective, a negative consequence, in that with its integration into the rest of the Philippines, emigration to Mindanao from the Visayan Islands and Luzon became easier. Emigration to Mindanao from the rest of the Philippines became so substantial that, while at the turn of the 20th century upwards of 90% of the people of Mindanao and the Sulu archipelago were Muslims, by the turn of the 21st century, only about 18% of the region's inhabitants were Muslims.

This radical shift in the ethnic and religious composition of Mindanao, and therefore of political power in the region, not surprisingly, was accompanied by tensions between the earlier inhabitants and the new settlers. The constraints eventually resulted in a desire on the part of substantial portions of the Muslim communities in Mindanao for independence or greater autonomy from the Philippines. This desire eventually resulted in a violent and bloody struggle that effectively precluded any significant economic progress for large areas of the region.

2.2 An Incomplete Peace Process

For almost four decades, Muslim separatist groups in the southern Philippines island of Mindanao have been battling the Armed Forces of the Philippines (AFP) with the goal of attaining independence, or at least substantial autonomy. In September 1996 however, after several years of negotiations, the Government of the Philippines (GOP) and the Moro National Liberation Front (MNLF), the largest of the Muslim separatist groups, signed a Peace Agreement.

There was widespread hope that this agreement would usher in an era of peace in Mindanao, and that peace would make possible substantial and rapid economic progress in the Muslim areas of the island, which have long been among the poorest parts of the Philippines. This economic progress, it was hoped, would help to institutionalize a durable peace by lessening the motivation of some of Mindanao's Muslim population to take up arms against the Government.

These hopes have been only partially realized. The MNLF's estimated 45,000 soldiers stood down with the signing of the Peace Agreement, and, for the most part, the leadership of the MNLF has cooperated with efforts of the GOP and various donors to build a sustainable peacetime economy in the Muslim areas of Mindanao. The armed clashes between MNLF forces and the AFP that have occurred since the Peace Agreement was signed have, to a major extent, been triggered by the "split" in the MNLF between elements loyal to its founder and long-time Chairman, Professor Nur Misuari, and a rival leadership group within the MNLF which ousted Professor Misuari from his Chairmanship position.



The estimated 12,000 troops of the Moro Islamic Liberation Front (MILF), a group that splintered from the MNLF in the 1980s, were not a party to the 1996 Peace Agreement. While talks are being held with the MILF (and while a "cease-fire" agree-

ment has been reached, and talks continue), a final Peace Agreement between that group and the GOP has yet to be attained.. Armed clashes between MILF units and the AFP occur occasionally.

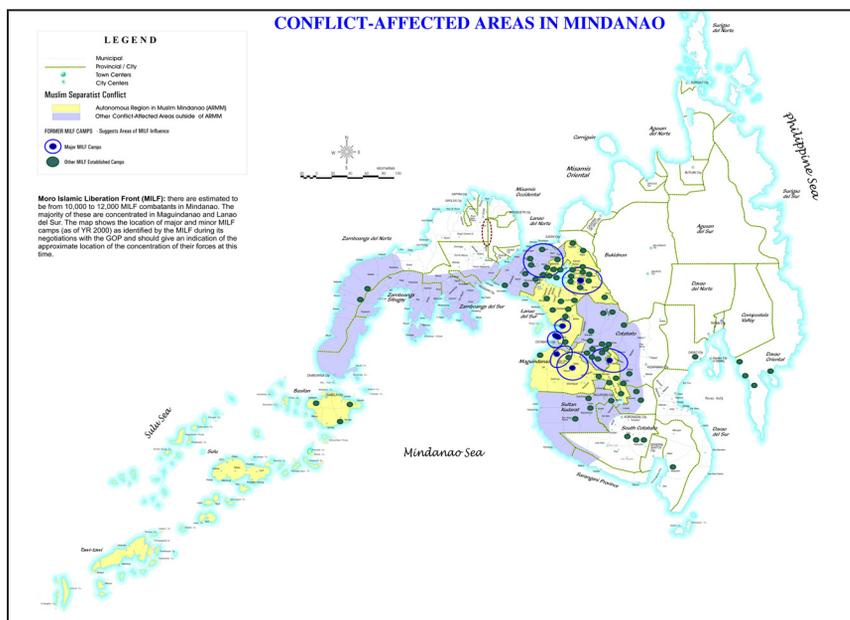
Recently, the Abu Sayyaf Group (ASG), though small in number, has perpetrated some highly-publicized kidnappings of both foreigners and Filipinos. Despite continuing pursuit and pressure from the sizable AFP contingents sent to eliminate them, the ASG continues to terrorize some areas of Mindanao and the Sulu archipelago. The disruption caused by the ASG has been so severe that small contingents of U.S. military forces have been providing assistance to the AFP in its efforts to hunt down the group.

The continuing unrest, armed clashes, kidnappings, and incidents of terrorism in Western and Central Mindanao and the Sulu Archipelago severely limit prospects for significant economic progress in those areas. While Southern and Eastern Mindanao have largely been spared the violence that has become common in parts of Western and Central Mindanao, and the Sulu Archipelago, their proximity to the areas of violence has meant that economic progress there has also been limited—as fear of the spread of the violence has meant that few businesses are investing in new businesses or expanding existing businesses in those parts of the island as well.

Effectively, Mindanao is caught in a vicious cycle. Violence and fears of violence are hindering economic growth and the emergence of economic opportunity. The absence of economic opportunity, in turn, helps maintain a situation where some individuals are ready to turn to violence and rebellion with the hope that, through these routes, they will be able to improve their economic prospects.

To address the situation in Mindanao effectively, the GOP has been pursuing a two-pronged approach. Using military and other security resources, it is trying to contain and eliminate the violence. To try to assure that widespread violence does not re-surface in the future, it is attempting to expand economic opportunity for all the people of Mindanao.

GEM operates largely in conflict-affected areas of the regions as depicted on the map below:



2.3 USAID's Role on Mindanao

In support of the GOP efforts, USAID has been mounting major assistance efforts in Mindanao for over a decade. For the first few years, the assistance was focused on the SOCSARGEN (South Cotabato and Sarangani Provinces, and General Santos City) area. In 1995, however, USAID expanded its assistance efforts to cover all of Mindanao and the Sulu Archipelago. After the signing of the Peace Agreement between the MNLF and the GOP in 1996, USAID intensified assistance efforts in the conflict-affected areas of Mindanao.

At this point, USAID is implementing a sizable assistance effort that includes projects and activities in a wide range of areas, including: infrastructure development, agricultural development, education improvement, democracy promotion, governance improvement, health services, environmental management improvement, expansion of microfinance services, and the reintegration of former combatants. The activities are carried out across Mindanao, but are concentrated in the five provinces that make up the Autonomous Region in Muslim Mindanao and in other conflict-affected areas of Mindanao that are in close proximity to the ARMM.

3 Projects included in the Evaluation

Because of the sheer size of the island region, and its history of conflict, it would be presumptuous to assume that any single program, including USAID's Growth with Equity in Mindanao Program, could dramatically alter the macro economy of Mindanao.

Further, GEM is but one of several USAID initiatives, and USAID is one of several donors funding programs in the region. It would therefore be almost impossible to distinguish the discreet economic impact of GEM on the region's economy from the impacts made by the totality of all donor initiatives and those initiatives launched by the Government of the Philippines. The difficulty of isolating GEM's economic impact is further compounded by the fact that GEM's infrastructure projects are typically undertaken in collaboration with regional, provincial, municipal and other local government agencies and, occasionally, in conjunction with other donors.

Despite these caveats, the methods utilized by the study most likely yielded conservative estimates of benefits, because assessments were based on individual projects as part of a sample of projects. Originally, part of the study was intended to capture synergies between individual projects and other projects in close proximity. Because of the number of confounding variables, that aspect of the project was too complex to complete with sufficient confidence. Instead, a "with project" and "without project" set of comparisons was made. The final part of the study estimated the impacts of the projects on the Autonomous Region in Muslim Mindanao and other Conflict-Affected Areas of Mindanao, as well as on Mindanao as a whole.

GEM divides its infrastructure projects into two categories:

Regional Impact Projects are larger projects such as ports, roads, and bridges. Typically, RIPs include more beneficiaries than BIPs. Usually, beneficiaries include the populations of one or more municipalities, and sometimes, as in the case of a port or airport, the population of an entire province. RIPs are expected to have a wider economic impact than BIPs, and, because of their visibility, are also expected to have a greater impact on people’s awareness of the Philippine and U.S. Governments’ concerns for the region. The projects are usually undertaken in partnership with provincial or municipal governments, and sometimes with the ARMM Regional Government or with national government agencies. The construction cost of a RIPs is more than \$50,000 and can reach as high as \$4 million. Most RIPs, however, have a construction cost of between \$250,000 and \$1,000,000. To date, 46 RIPs have been constructed.



Barangay Infrastructure Projects are relatively small “community level” infrastructure projects such as boat landings, road upgrades, water systems, trading or community centers, barangay bridges, footbridges, drainage canals, warehouses/solar dryers, and irrigation systems. Typically, the primary beneficiaries of BIPs are the residents of one or two barangays. The BIPs are intended to help spark or sustain economic growth in the recipient barangays and also to demonstrate the determination of the GOP and USAID to be responsive to the needs and concerns of historically underserved minorities in Mindanao (such as Muslim communities). The projects are usually undertaken in partnership with municipal and barangay governments, but sometimes in partnership with cooperatives. The construction cost of BIPs generally range from about \$10,000 to up to \$50,000, with an average construction cost of approximately \$33,000. To date, about 1,150 BIPs have been constructed throughout the conflict-affected areas of Mindanao.

As indicated above, during the five-year duration of GEM-2, and the first three years of GEM-3 implementation, about 1,150 infrastructure projects have been constructed.

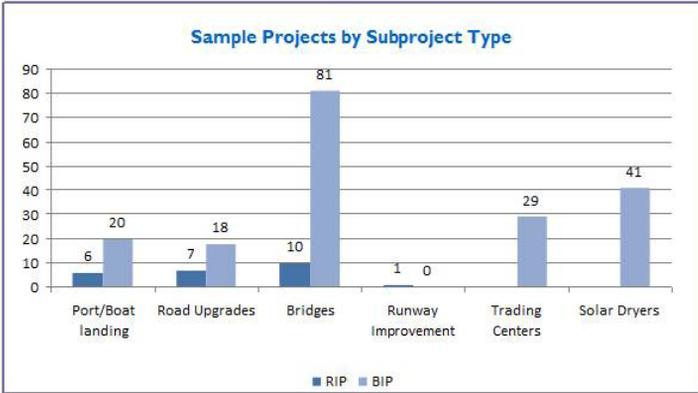
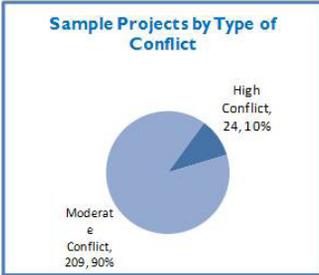
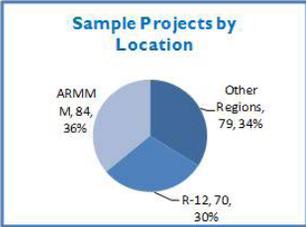
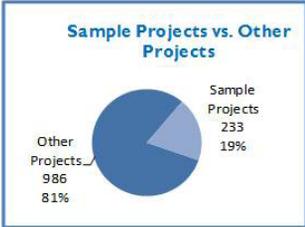
Table I below shows the numbers and types of RIPs and BIPs that have been constructed, presents the types of projects sampled, and the sample size for each type.

Table 3: Summary of infrastructure projects constructed during GEM-2 and GEM-3 as of 31 October 2010.*

Project Type	No. of Projects	Sample size
Regional Impact Projects (RIPs)		
Ports/Boat Landings**	11	6
Road upgrades*	13	7
Bridges*	17	10
Airport runway improvements*	2	1***
Commercial center	1	
Water supply systems	2	
Total	46	24
Barangay Infrastructure Projects (BIPs)		
Boat landings*	81	20
Trading centers*	93	29
Road upgrades*	61	18
Irrigation systems	10	
Barangay bridges/footbridges*	263	81
Post harvest facilities		
Solar Dryers*	280	41
Warehouses	3	
Combination dryer/warehouse*	66	20
Production facilities	2	
Water supply systems	48	
Footbridges*	75	23
Drainage canals	99	
Community centers	54	
Hand pumps	10	
Other (sheds, slope protection, etc.)	85	
Total	1,155	233

*Infrastructure categories highlighted in bold were sampled and the sample size is given for each category. **For purposes of this assessment, RIP ports and RIP boat landings were combined into a single category. Two of the largest RIP boat landings were sampled. ***The airport in the sample is located in Tawi-Tawi.

As illustrated on the previous page, this evaluation covered 233 projects, equivalent to 19% of the total GEM infrastructure population: there were 24 RIPs and 209 BIPs. More than a third (88 or 36%) of the sampled projects are located in ARMM while Region 12 subsumed 70 projects or 30% of the total. The other four regions comprise the remaining 34%, with 37 from Region 9, 24 from Region 10, 3 from Region 11 and 15 from Region 13, as depicted below.



4

Purpose and Method

The thousand-plus infrastructure projects constructed in Mindanao's conflict-affected areas during GEM 2 and GEM 3 have been the most visible and perhaps the most widely-appreciated efforts undertaken by USAID-GEM.

4.1 Objectives

As mentioned previously, projects were built in pursuit of two interrelated objectives:

1. *Strengthening peace in Mindanao* - by demonstrating to residents of conflict-affected areas, that the Governments of the Republic of the Philippines (GOP) and the United States are prepared to make investments that expand opportunities and improve quality of life in those areas. USAID hoped and expected that the projects would help counter the widespread impression of people in the conflict areas that the GOP often ignored their concerns. This perception had been one of the underlying causes of the conflict between the Muslim community and the government.

2. *Facilitating an expansion of economic activity in the conflict-affected areas.* USAID is aware that continued improvement of the peace and order situation in Mindanao is a *sine qua non* for significant and sustained expansion of job-creating private investment in Mindanao. Consequently, only limited expansion of economic activity is likely to take place in the more severely conflict-affected parts of Mindanao. Thus, many of the efforts undertaken by USAID in Mindanao are aimed at laying the groundwork that will make it more likely that the significant private investment needed for expansion of economic opportunity will occur when and where the peace and order situation allows. This "groundwork" includes, infrastructure development, workforce prepara-

tion, and governance improvement activities being undertaken by USAID under its GEM Program, as well as other programs in microfinance, education and health.

USAID-GEM has pursued two objectives (peace and economic growth) in implementing its infrastructure development activities. Thus, while the promotion of expansion of economic activity was an important consideration in the selection of most projects, it was not necessarily always the most important criterion for selection. In some cases, the potential impact of a proposed project on creating a more peaceful environment was the more important of the two objectives. Projects in which peace promotion was the more important objective included, for example, the construction of the Campo Uno-Tuburan Road in Basilan, which facilitated access to a previously isolated part of Basilan that had become a stronghold of insurgents. The construction of the Siocon Port in Zamboanga del Norte, was built at GOP's request, with the intent of "sending a message" to terrorist/insurgent groups that the government would not be intimidated by increased activity in the area, and provides another salient example. Finally, the construction of the Sitio Sarmiento Bridge in Maguindanao, which provided access to the then newly-conquered former MILF headquarters - Camp Abubakar - was intended to demonstrate the conciliatory attitude of the GOP to the people of that area.

While bearing the above in mind, the primary objective of this study was to assess the economic impact of infrastructure projects carried out under GEM, on families and communities within the project areas, as well as the collective economic impact of the projects on the ARMM and other CAAM, and on Mindanao as a whole.

4.2 Approach

The study included a pool of projects that is substantially representative of the universe of infrastructure projects carried out by USAID-GEM over the past several years. The sample was weighted to assure greater attention to those categories of projects where relatively more resources were expended.

4.2.1 RIPs

- Four principal categories of RIPs were included in the sample: ports, road upgrades, bridges and airports. Ports are included in the same category as boat landings, and are referred to as "boat landings."
- Projects selected were reflective of the geographical distribution of GEM infrastructure. USAID-GEM has constructed projects throughout the conflict-affected areas of Mindanao, with RIPs located in 28 municipalities across 13 provinces. Some provinces have received more RIPs than others. These differences were reflected in the selection of projects that were assessed.

The study team selected a 50% sample of representative projects from each of the four principal categories of RIPs for detailed analysis. The projects selected reflected the geographic distribution of those types of infrastructure constructed by GEM, and were stratified by the degree of conflict that characterized the area in which they are located.

The economic impact assessment was based on a representative, stratified sample of the different types of RIPs. Each RIP project sampled was analyzed over its useful life of 20 years. Again, a net present value approach to analyze the benefits and costs of the project was utilized. GEM staff provided the initial cost values for each project in the sample. The discount rate was set at 12%, and

sensitivity analyses, using 3% as the alternative discount rate, were also conducted.

4.2.2 BIPs

- Seven principal categories of infrastructure projects were included in the sample: barangay bridges, footbridges, trading centers, road improvements, boat landings, solar dryers, and combination solar dryer/warehouses.
- Projects selected reflected the geographic distribution of GEM infrastructure. USAID-GEM has constructed projects throughout the conflict-affected areas of Mindanao, with BIPs located in 175 municipalities across 18 provinces. Some municipalities/provinces have received substantially more BIPs than others. These differences are reflected in the selection of projects that were assessed.

The projects selected reflected the geographic distribution of the types of projects, and were stratified by the degree of conflict that characterizes the area in which they are located. While all USAID-GEM infrastructure projects are located in “conflict-affected” areas, some areas have historically been more conflict-affected than others. USAID characterizes all conflict-affected areas of Mindanao as being either “moderately conflict-affected” or “heavily conflict-affected.” A reasonable sample of projects from each of the two types of conflict areas was included in this study.

All of the host communities for the selected BIPs were visited and attempts were made to identify impacts that the construction of the projects, and the presence of the new facilities has had on trade, commerce, and employment in the host communities and nearby areas.

In many cases, there was no documentation avail-

able that would reflect the “before” situation with respect to the new infrastructure facility. Thus, “baseline” information was collected by reviewing whatever relevant documentation was available. This was supplemented by information obtained through systematic, structured interviews with community residents, barangay officials, business owners, users of the infrastructure facilities, and other knowledgeable community residents.

Each BIP project sampled was analyzed over its useful life of 20 years. All BIPs were built with the understanding that the municipalities, or in the case of most warehouses and solar dryers, the beneficiary cooperatives, would maintain the infrastructure. The net present value approach was used to analyze the benefits and costs of each project. GEM staff provided the initial cost values for each project in the sample. The external study team estimated the cost of maintenance programs provided by the communities. Most important, the study team estimated the benefits per year over the useful life of the project of 20 years. A 12% discount rate was used and as were sensitivity analyses of the discount rate, using 3% as the alternative.

5 Data Analysis

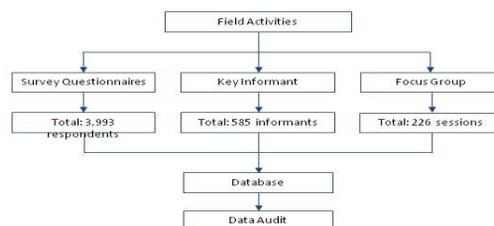
Household surveys for transport projects, for other projects, as well as vehicle and vessel owner surveys, driver surveys, passenger surveys, focus group discussion (FGD) forms and forms for key informant interviews (KFI), were designed for use within the study and were tested for reliability and validity prior to use. Key informant interviews and focus group discussions were held at every sampled GEM infrastructure site, and sample surveys were also conducted, as illustrated in the block diagram in section 5.2.²

5.1 Sources of Primary Data

Questionnaires were pre-tested and revised before the actual field activities.

5.2 Data Processing and Auditing

Results of the interviews and the FGD sessions were encoded into a database and queried using Microsoft Access. Periodic data cleaning and data auditing were also conducted to ensure reliability of the results.



5.3 Data Analysis

Descriptive statistics (proportions and means) were used in the analysis. Frequencies and cross-tabulation deepened the classification and identified the degree of association of two or more economic variables.

Other statistical tests used in the evaluation included t-tests for the independent observations. An analysis of variance (ANOVA) was used to test the effects of the sub-projects. If the results of the ANOVA were significant, the Duncan Multiple Rate test was used to isolate the significant means among treatment means.

21 ² In total, more than 6,000 respondents participated in the study.

5.4 Evaluating the Economic Impact of the Projects

Per the formula presented below, net present value (NPV) was used to estimate the economic impact of the infrastructure projects. *NPV is the present value of future economic benefits minus the costs associated with the implementation and maintenance of a project or investment.* It makes use of a discount rate in obtaining the present value of the stream of benefits and costs. *Public projects such as roads, bridges, and ports are evaluated based on their impact on the community as a whole, and not only on the benefits accrued to selected individuals or groups. Note that social, political, or geographic benefits of a project were not estimated for this study.*

5.5 Estimating the NPV

Project costs refer to the investments by USAID and the counterpart funds contributed by LGUs and other partners. Maintenance and operational costs were derived from the project profiles and survey results. Benefits were identified from the surveys, particularly those conducted in households and groups that used the projects, or identified through those sectors that have directly or indirectly benefited by the project. Traffic counts were conducted on roads and bridges and ports to help compute vehicle operating cost savings.

The initial discount rate was fixed at the international standard of 12%. However, the evaluation also presents the results of a 3% discount rate, which is often used for government-funded projects.

All projects were assumed to have a beneficial life of up to 20 years. Operational and maintenance costs were assumed at 1% per year of the project cost. Depreciation was assumed to be 3% per year of the project's cost. During the sensitivity analysis, these assumptions were subject to rigorous testing.

5.6 Determining the Costs and Benefits of a Project

Costs were taken primarily as the investment costs as reflected in the USAID-GEM project profiles. For the airport runway improvement project, investment costs also included the value of land improvements. Benefits were derived differently for each project as follows:

- Airport runway improvement – terminal fees, taxi fees and other taxes;
- Solar dryers – user fees from the use of the facilities, reduction in post-harvest losses, change in price of the dried palay (if no fees were charged, user's willingness to pay was used);
- Warehouses – user fees and reduction in post-harvest losses;
- Trading centers – user fees, other fees, and reduction of post-harvest losses;
- Bridges – travel time savings for passengers and vehicle operating cost savings;
- Boat landing and ports – travel time savings for passengers, cargo handling fees; terminal fees, passenger tax fee and docking fees;
- Roads – vehicle operating cost savings, and passenger travel time savings.

5.7 Determining the Combined Impact per Project Type

Impact aggregation was calculated to evaluate the overall or collective impact of the projects in Mindanao. The first step of this process was calculating the mean NPV of projects belonging to the “project type” and multiplying that by total number of projects in the population. The second step was to add the NPV of RIPs in the population to the NPV of BIPs.

6

Study Results

This section presents a summary of the economic impacts of GEM infrastructure in Mindanao as a whole. The detailed analyses that support these results are presented in the appendices.

6.1 Economic Impacts were robust for almost 90% of the projects

USAID-GEM projects were constructed for two primary reasons: to demonstrate the commitment of the U.S. Government and the GOP, to the development of Mindanao; and to provide a basis for local economic growth.

Almost all projects evaluated (208 of the 233) proved to be economically viable. This is a considerably high percentage, especially at the conservative 12% discount rate used for the analyses. The results are particularly noteworthy given that the projects are constructed not only to spur economic growth, but also often for social purposes. Thus, some of the facilities are being operated with limited user fees, and in some cases, are made available to beneficiaries at no cost.

6.2 100% of the RIPs have positive NPVs

All of the 24 RIPs yielded positive NPVs. The average NPV across all RIP projects is PhP 55,328,578 at a 12% discount rate. The Economic Internal Rate of Return (EIRR) is 34.82, showing that the projects are all returning good economic values (almost 3 times the commercial rate). The Benefit-Cost ratio (BCR) for RIPs confirm that for every peso of investment, RIP projects yield on average PhP2.59 in benefits.

While the Sanga-Sanga Airport in Bongao, Tawi-Tawi posts the highest NPV, road projects have the highest average NPV compared to port/boat landings and bridges. Roads have an average EIRR of 36.61 and a BCR of 2.74.

6.3 88% of the BIPs Have Positive NPVs

Of the total of 209 BIP projects sampled, 184 (88%) yielded positive NPV. The net benefit of BIPs is PhP 2,238,986 at a 12% discount rate, with an EIRR of 27.78. For every peso invested, there is an economic benefit of PhP 2.00 (BCR).

6.4 Results if 3% social discount rate is used

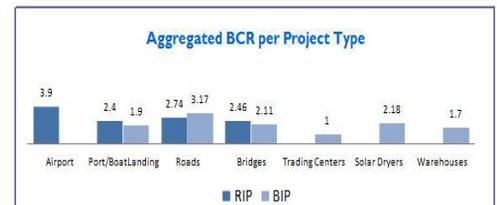
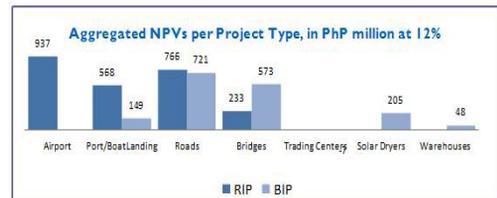
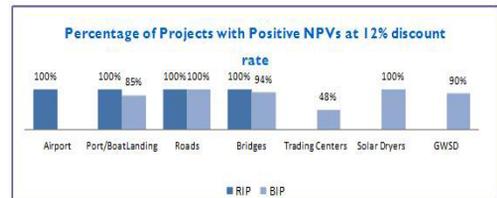
Not all projects were constructed with the primary purpose of expanding economic activity. Some were constructed primarily for social and/for political reasons associated with strengthening a commitment to peace. As part of the sensitivity analysis, it was worth exploring how many of the sample projects return positive NPV if the social discount rate of 3% is used, as is often the case with government-financed projects. When 3% is used, an additional 15 projects yield positive NPV and increase the percentage of positive NPV from 88% to 95% of the 233 projects sampled.

The 12% discount rate is considered a “commercial rate,” and is used by the World Bank and the Asian Development Bank. Considering that most of the projects were constructed to meet a livelihood improvement objective, the social discount rate should also be considered when assessing economic impact.

6.5 Impact Aggregation

When taken together per project type, the projects return high net economic benefits. These projects

are found in areas not traditionally served by the government (local or national), and several are constructed in barangays considered to be high-conflict areas. The combined NPV of GEM’s 43 RIP projects is PhP 2.379 billion, while the combined NPV of 847 BIP projects is PhP1.896 billion. Aggregated RIP projects also post higher EIRR and a higher BCR compared to aggregated BIP projects (34.82% vs. 27.78%, and 2.59 vs. 2.00 respectively,) as illustrated below.



6.6 Conclusions from the NPV Results:

- The combined NPV of GEM's 43 RIP projects is PhP 2.379 billion, while the combined NPV of 847 BIP projects is PhP 1.896 billion. *USAID-GEM infrastructure brings PhP 4.275 billion in net benefits to Mindanao's Gross Domestic Product.*
- In general, RIP projects have a stronger economic impact than BIP projects, though both are associated with strong economic results. The difference is attributed to the strategic location of the RIP areas, and the number of people directly and indirectly affected by the facilities.
- Road projects have the highest economic return among BIP projects, with a BCR of 3.17 while the trading centers have the lowest BCR of 1.
- Aside from the airports, road upgrades show the highest NPV because of the dramatic vehicle operating cost savings.
- Bridges also show strong BCRs because of vehicle operating cost savings. The study team used a standard length of 100 meters for the bridges, though many were much longer. As a result, the BCRs and other economic results for bridges are, in some cases, understated.
- Strategically located projects have relatively higher NPVs than other projects. The Sitio Opong Road Upgrading Project for example, yielded an NPV of Php 97.3 billion, and the Tuburan-Guiawon Road yielded an EIRR of 76% and a BCR of 5.98.

7

Economic Impact on the ARMM

Though results for projects in the ARMM varied slightly in some cases, from projects located outside of the ARMM, in general they are statistically indistinguishable.

7.1 Sampled Projects in ARMM

There are 84 sample projects located in the ARMM, representing 36% of all sampled projects: this number includes 19 RIPs and 65 BIPs.

Key findings in ARMM include:

7.2 All RIP projects Yielded Positive NPVs

All of the 19 RIP projects in ARMM, yielded NPVs that are comparable and statistically indistinguishable, from the Mindanao average, as are their EIRRs and BCRs.

7.3 BIP projects in ARMM return same results as non-ARMM projects

There are 65 BIP projects in ARMM, representing 31% of the total BIP projects sampled. The average NPV of BIP projects in ARMM is PHP 1.5 million, slightly higher than the average NPV of BIP projects in non-ARMM areas that yielded an average of PHP 0.9 million. The difference is not statistically significant.

7.4 Results by category of RIPs

7.4.1 Ports/Boat Landings



All of the port/boat landing projects included are located in the ARMM. The Lamitan boat landing is the most viable, with an NPV of Php 76 million and an EIRR over three times its 12% discount rate.

While the project attracts vessels and offers better, more direct routes (increasing travel-time savings and traffic), intermittent peace and security threats have forestalled the entry of large investors into the area. Other benefits realized by the ports/boat landings include increases in employment, trading activities and local revenues.

7.4.2 Road Upgrades



All five RIP road upgrades in the ARMM yielded positive NPVs. The project with the highest NPV is the Shariff Aguak-Sapakan road upgrade in Maguindanao, with an NPV of Php 120

million, an EIRR of 58% and a BCR of 4.32. Benefits realized by these road upgrades include savings in transport costs, savings in vehicle operating costs, and increases in the net value of farm produce due to quicker farm-to-market travel. The road upgrades are also recognized for promoting peace and social development in the conflict-affected areas. Of all RIPs aside from the airports, roads are the most valued.

7.4.3 Bridges



Seven of the 10 RIP bridge projects sampled are located in the ARMM and all yield positive NPVs. The highest economic impact is associated with the Sitio Sarmiento Bridge in

Maguindanao, with an NPV of Php40 million and an EIRR of 27%. The economic indicators are comparable between ARMM and non-ARMM bridges. Other benefits realized by the RIP bridge projects are the reduced transport cost for farm inputs and agriculture produce to and from storage areas and markets. Bridges also facilitate the movement of people, even during heavy rain and flood periods. RIP bridge projects accommodate heavily-loaded trucks.

7.5 Results by category of BIP:

Of the 64 BIP projects in the ARMM, 77% yielded positive NPVs at a 12% discount rate. Almost all (96%) of the BIP projects in Basilan have positive NPVs, while Maguindanao has the highest average NPV at Php 2.3 million, and the highest BCR ratio with a return of Php 2 in benefits for every peso invested, which is the same for Mindanao as a whole. Only Tawi-Tawi has a negative NPV for BIP projects. However, many of the projects constructed in Tawi-Tawi may have been built for social, political or geographic “coverage” reasons.

7.5.1 Boat Landings



There are 10 BIP boat landing projects in the sample that are in the ARMM, representing 50% of the BIP boat landing facilities included in the sample population. All 10 boat

landings yielded positive NPV. The average NPV of boat landings in ARMM is higher, at PhP 2.1 million, compared to non-ARMM with PhP 1.5 million. Among the boat landing BIP projects in the ARMM, the Datu Piang project in Maguindanao has the highest NPV, at PhP 6 million and the highest BCR at 4.28.

7.5.2 Trading Centers



The sample contained 10 BIP trading centers located in ARMM, representing 34% of the total BIP trading centers included in the sample population. Maguindanao is home

to half of the trading centers constructed in the ARMM. The results show that the trading centers, whether in ARMM or elsewhere, are not necessarily as economically viable as other projects. The NPV are negative and except for those in Basilan, the BCR are below 1. The facilities are not fully exploited or fully utilized. Some of the trading centers are used only during market days (once or twice a week), and idle on other days. Some trading centers cannot accommodate all vendors because of limited space. During the study, a trading center in Tupi was closed for renovation, while one in Bagumbayan was closed due to a heavy infestation

of insects. Though less economically viable than other BIPs, trading centers are often built for social, political and geographic coverage reasons. Further, they are sometimes utilized by the community for non-commercial functions.

7.5.3 Road Upgrades



There are 18 BIP road upgrades in the sample, of which seven are located in ARMM. All road projects yielded positive NPVs and the average NPV was PhP

5.0 million. This is lower than the average NPV in non-ARMM areas, which is PhP 16.1 million. The BCR of road upgrades in ARMM is also lower at 2.11 compared to the 3.74 in non-ARMM areas.

7.5.4 Barangay Bridges



There are 20 BIP barangay bridges in the ARMM, representing 25% of the total BIP bridges included in the sample population. Of

the 20 projects, 18 yielded positive NPVs. The average NPV in ARMM (PhP 2.19 million) is slightly higher than those located in non-ARMM areas (PhP 2.18 million). The nine bridges in Maguindanao register the highest BCR with 2.57. Apart from connecting Puroks to the town centers, the benefits of bridge projects include accident prevention and reduced cases of dengue, fever and other water borned diseases because of controlled flooding.

7.5.5 Solar Dryers



The sample contained 11 dryers in the ARMM, representing 27% of the total BIP solar dryer projects. The average NPV in the ARMM is PhP 0.9 million while in non-ARMM areas it is PhP 0.6 million. ARMM solar dryer's projects also register the higher BCR with 2.25 while non-ARMM dryers yield 1.93. Nine solar dryers in Maguindanao post the highest average NPVs and the highest EIRRs (39%).

7.5.6 Combination Grains Solar Dryer and Warehouses (GSDWs)



There were 7 sampled BIP GSDWs located in the ARMM, representing 35% of the total BIP GSDWs included in the sample. All of the GSDW projects located in ARMM yield positive NPV (the average is PhP 0.9 million) and a BCR of 1.85, slightly better than those in non-ARMM areas. There are projects that are not fully utilized commercially, but serve social purposes, such as functioning as a temporary evacuation centers for families fleeing areas of conflict.

7.6 Conclusions about Project Location in the ARMM

Nineteen out of the 24 sampled RIPs are in the ARMM. The NPVs of projects in the ARMM and non-ARMM are statistically comparable. There are 65 sampled BIP projects in ARMM, representing 31% of the total BIP projects sampled in this evaluation. The average NPVs of BIP projects in the ARMM are statistically comparable to those in the other areas of Mindanao.

USAID-GEM projects located in the ARMM, are as economically viable as projects outside the ARMM.

8

Comparison: High-and Moderate-Conflict Areas

There are 5 RIP projects in the sample that are located in high-conflict areas. Nineteen of the sampled RIPs are in moderate-conflict areas. Computations show that RIP projects in moderate-conflict areas yield higher NPV results (Php 60.1 million), EIRR (35.13%) and BCR (2.60) than RIP projects in high-conflict areas (Php 37.1 million, 33.66% and 2.52, respectively). However, the differences in results are not statistically significant.

8.1 Categories of RIPs:

8.1.1 Bridges

Within the sample, there are 2 RIP bridges in high-conflict areas and 8 in moderate-conflict areas, all yielding positive NPV. Results show that RIP projects in moderate-conflict areas show higher NPVs. Bridges in high-conflict areas, have higher EIRRs and BCRs compared to moderate-conflict areas.





8.1.2 Road Upgrades

High-conflict areas are home to 3 of the RIP road upgrades in the sample, while moderate-conflict areas have 4 projects. The economic indicators in moderate-conflict areas are comparable to the indicators in high-conflict areas. For example, road projects in Maguindanao (an area of high conflict) yield an average NPV of PhP 120 million compared to a moderate-conflict road project that yields an NPV of PhP 13.8 million. The high-conflict road project has a higher EIRR and BCR.

8.1.3 Boat Landings

All RIP boat landings in the sample are located in moderate-conflict areas and show an average NPV of PhP 59.8 million, an EIRR of 31.91% and a BCR of 2.40.



8.1.4 Airport Runway Improvements

There is only one RIP airport project within the sample and it is located in a moderate-conflict area. The Sanga-Sanga Airport runway has an NPV of PhP 446 million, an EIRR of 66.29% and a BCR of 3.90.



8.2 Comparing BIP Projects in High-Conflict and Moderate-Conflict Areas

Of the 209 BIP projects in the sample, 25 are located in high-conflict areas and 184 in moderate-conflict areas. Projects in high-conflict areas yield slightly lower average NPV (PhP 2.17 million against PhP 2.24). But high-conflict projects have higher EIRR (31.53% against 27.28%) and BCRs (2.29 against 1.96) compared to projects in moderate-conflict areas. High-conflict and moderate-conflict areas yield 88% positive NPVs. They are statistically comparable.

8.3 BIP by category:

8.3.1 Boat Landings



The sample includes 20 BIP boat landings, with 19 located in moderate-conflict areas. Maguindanao boat landings post the highest NPV at PhP 3.3

million, while Sulu yields PhP 2.9 million. BIP boat landing projects in moderate areas located in non-ARMM yield an average of PhP 1.4 million in NPV.

8.3.2 Trading Centers



In the sample, there are 4 trading centers in high-conflict areas and 25 in moderate-conflict areas. Only one project in a high-conflict area and 13 in moderate-conflict

areas yield positive NPVs, slightly lower than half of the total trading center population. Trading centers are not fully exploited for their economic benefits, though they are appreciated because they provide the traders/sellers and buyers/residents with a convenient place to conduct business and are used for some social and political activities of the barangays.

8.3.3 Road Upgrades



On average, road upgrades located in high-conflict areas demonstrate higher EIRRs and BCRs compared to moderate-conflict areas. Looking closely at the results, the NPVs are higher for the non-ARMM road projects, both in high-conflict (PhP 10.3 million) and moderate-conflict (PhP 17.4 million) areas. Roads provide a consistently strong return on investment throughout Mindanao.

8.3.4 Barangay Bridges



High-conflict areas house nine of the sampled barangay bridges, while 72 bridges are in the areas of moderate-conflict. The economic indicators show that average NPV, EIRR and BCR are higher in high-conflict areas compared to low conflict areas: PhP 2.9 million compared to PhP 2.1 million for NPVs, 33.95% compared to 26.75% for EIRRs and 2.59 compared to 2.05 for BCRs. Still, the bridges are statistically comparable regardless of location.



8.3.5 Solar Dryers

There are 5 solar dryers in high-conflict areas and 36 in moderate-conflict areas within the sample. Economic indicators show negligible differences on NPV, EIRR and BCR.

8.3.6 Warehouses

High-conflict areas house 3 of the sampled warehouses and moderate-conflict areas include 17 warehouses. While all projects register positive NPVs, high-conflict areas yield higher results on average NPVs, EIRRs and BCRs. The groups are, however, statistically comparable.

8.4 Conclusions about Locations of Projects in High-Conflict areas

GEM infrastructure projects located in high-conflict areas yield the same net economic benefits as infrastructure projects in moderate-conflict areas. This may indicate GEM-infrastructure in high-conflict areas helps to pull those areas out of economic doldrums caused by conflict, to level of development comparable to the rest of Mindanao.

9 Sensitivity Analyses

To assess the robustness of the statistical results, the latter were subjected to stringent sensitivity analyses. The analyses permit “testing” results against additional assumptions.

9.1 How are results affected if costs are increased by 10%?

Using the 12% discount rate, only two projects were sensitive to a 10% increase in project cost, in the sense that their NPVs become negative. Thus, the base scenario (original cost) of 25 BIPs which have negative NPVs, rises to 27 BIPs. These two “sensitive” projects, the Anislagan Box Culvert and Diplo Grains Solar Dryer, are located outside of the ARMM.

At a 3% discount rate, one more project remains sensitive; the Lanawan Grains Warehouse and Solar Dryer, which yields a negative NPV.

9.2 How are results affected if benefits are reduced by 10%?

At the 12% discount rate, only three projects are sensitive to a 10% decrease in benefits. Thus, the 25 projects with negative NPVs in the base scenario, increases to 28 projects. The “sensitive” projects include a barangay bridge and two grains solar dryers, all located in non-ARMM areas.

At the 3% discount rate, only one project is “sensitive” and its NPV becomes negative.

9.3 How are results affected if a 3% social discount rate is used?

Not all projects were constructed with the primary objective of expanding economic activity. Some were constructed to sustain peace in specific areas. As part of the sensitivity analysis, it is worth exploring how many of the sample projects return positive NPVs if a social discount rate of 3% is used. When 3% is used, an additional 15 projects yield positive NPV, increasing the percentage of the positive NPVs from 88% to 95% of the 233 projects sampled. The NPVs, EIRRs and BCRs are all much higher when the 3% discount rate is used.

The 12% discount rate is considered a commercial rate, and is also the rate used by the World Bank and the Asian Development Bank. Considering that most of the projects were constructed to respond to the needs of the community in improving their livelihoods, the social discount rate should also be considered when assessing the overall value of projects.



9.4 Conclusion Regarding the Sensitivity Tests

Changing the discount rate from 12% to 3%, changing costs by 10% or changing benefits by 10% makes little difference in the overall net benefits that USAID-GEM infrastructure projects bring to Mindanao; results remain robust under all conditions tested.



10 Other Additional Benefits

More than 6,000 interviews, surveys, and focus group discussions conducted during this evaluation, provided additional insights into some of the non-economic benefits associated with GEM infrastructure. This section summarizes the salient results of those data collection activities.

10.1 Benefits from Transport Projects

Those surveyed were provided opportunities to express their opinions, in addition to answering specific questions. Some of the survey questions addressed the identification of possible project benefits aside from economic returns.

About 85% of the 1,449 sampled households report that they benefited from the USAID-GEM infrastructure projects. By area, 78% of the households in the ARMM included in the survey reported they benefited from the infrastructure projects, while in the non-ARMM areas, the percentage was 89%.

From the sample households, key findings include:

- “Safer travel” was cited by 38% of correspondents as the top benefit of transport projects, followed by “more trips to the market” by approximately 20%, “higher incomes” by 20%, and more “frequent travel around the barangay/municipality by 15%.
- The least-mentioned benefit is “lower cost of farm inputs” with only 1.2%, of respondents citing the topic.

There are insignificant differences between ARMM and non-ARMM area regarding the types of benefits cited.

10.2 Benefits from Grains Warehouse and Solar Drier Projects

There were 848 households interviewed about the GWSD projects: 80.4% claim to have benefited from solar dryers, while 80.4% said they benefited from solar dryers/warehouses, and 74.7% from trading centers. Only 44.5% claimed to have benefited from the warehouses alone.

Key findings include:

- “Higher income/profit” tops the list of benefits from GWSD projects with 88% of the households so responding. This is followed by “lower post-harvest losses,” identified by 55.8%, and improved quality of products cited by 20.6% of the households.
- The least felt/observed benefit, from the perspective of the surveyed households, is higher prices for crops, with only 3.4% of the respondents saying they received higher prices.

10.3 Increases in Household Income

For household respondents near transport infrastructure, more than half (801 or 1,449 or 55.28%) of the households reported that they experienced increased incomes after infrastructure construction in their barangays. The same proportion of households reporting increases in income was present in ARMM and non-ARMM areas.

For household respondents near GWSD projects, households reported increased incomes in areas where the trading centers (56.5%) and warehouse (55.6%) projects are located.

Incomes increased in the barangays where GEM infrastructure is located, and that increase is statistically significant. In the “without” project barangays, incomes did not increase significantly. This is a very important result of the study.

10.4 Utilization of Projects

Specific to barangays with transport projects, a shift to larger vehicles (to accommodate more passengers or more cargo) is reported by 85% of the households. This shift includes a 36% movement from motorcycles to motorized tricycles, 24% from motorized tricycles to jeeps and 12% from jeeps to buses. For port projects, about 7% of respondents reported a shift from bancas to larger vessels, and another 5% from smaller to larger vessels.

For road projects, only 31% of the households surveyed reported cheaper fares as an important benefit. In fact, 56.3% of household respondents reported no decrease in fares, because isolated rural roads do not attract enough vehicles to promote the competition needed to lower fares. Still, over a third reported lower fares, suggesting the possible presence of competition in some areas.

10.5 Increase in Commercial Activities

There were 455 business owners interviewed in the project areas, all whom were single proprietors. *All claim to have experienced increases in the value of capital assets, regardless of location.* Owners of businesses located in the ARMM reported an average increase in capital assets of 38%, while businesses located in non-ARMM areas report an increase in asset value of 7.4%.

Pre and post GEM comparisons of monthly incomes and revenues indicate significant increases associated with GEM infrastructure. For businesses located in the ARMM, the average increase reported is 14.6%, from PhP 36,132 before GEM to PhP 41,392 after project construction. For businesses located in non-ARMM areas, the reported increase is higher at 28%, from PhP 24,068 to PhP 30,832. The increases are statistically comparable.

10.6 User Fees

Organizations managing the GEM infrastructure projects (cooperatives or LGUs) often charge minimal or no fees for the use of facilities. For example, farmers pay as little as PhP 5 for use of the solar dryers (in some projects, use is free of charge). Traders/vendors also pay PhP 5 to 10 per stall for the trading centers. There are no fees charged to users of roads, bridges and port projects.

10.7 Changes in Incomes and Poverty Rates

Respondents report increases in household income of 33.44%, from an average of PhP 6,380 before GEM to PhP 8,515 in 2010. The increase is higher in non-ARMM areas (from PhP 6,308 to PhP 8,540 or 35.4%) compared to ARMM areas (from PhP 6,496 to PhP 8,475 or 30.5%).



Comparing these results to the annual per capita incomes of 2003 and 2009 (reported by the National Statistical Coordination Board), the percentage of the sample population below the poverty line

has increased from 45.68% before GEM to 54.87% in 2010. This translates to 9.19% percentage points after the GEM infrastructure projects are implemented. By area, the increase is higher in non-ARMM areas (from 48.88% to 57.45%) compared to ARMM areas (39.75% to 50.9%).

GEM is not an anti-poverty program, and cannot halt the apparent continued slide of much of Mindanao's population into poverty particularly since most of its infrastructure projects are designed to impact relatively small, remote, rural areas. National Statistics indicated that poverty is increasing nationwide. It is likely that the income increases associated with USAID/GEM infrastructure were not sufficient to affect the overall increase in poverty in the region.

10.8 Benefits to the Agricultural Sector

Due to the high non-response rate to questions in this category, the study elicited no clear pattern. It appears that farm production either increased slightly or remained the same during GEM implementation. The common sentiment observed is that production has remained the same from 2002 to 2010.

While there has been an increase in the production of all types of palay, the increases are too small (1.09% for irrigated rice, 2.82% for rainfed rice and 19.81% for upland rice) to attribute to GEM. Corn production has decreased by 2.6% as have livestock and poultry production.²

38 ² *Though GEM did construct a small number of irrigation projects, that may have increased farm production, such were omitted from the sample at the instruction of USAID.*

10.9 Increases in Cultivated Land Area

Results of the survey reveal that as a whole, the implementation of GEM infrastructure projects did not affect farm land area under cultivation. The primary reason is that so few households included in the sample or within the influence areas own land. Also, a large percentage of the respondents elected not to answer this question because they are not engaged in farming. In RIP barangays, an increase in farm area is reported by 4.14% of the households. In BIP barangays, an increase in farm area is reported by 5.2% of the households.

10.10 Conclusions:

- ◆ Incomes increased in the barangays where GEM infrastructure is located, and that increase is statistically significant. In the “without” project barangays incomes did not increase significantly.
- ◆ USAID-GEM infrastructure transport projects resulted in safer travel. Also, transport infrastructure led to the use of larger vehicles.
- ◆ The direct impact of GEM infrastructure on areas planted or overall farm production was small.
- ◆ Though USAID-GEM infrastructure is associated with increases in household income, poverty rose in Mindanao as a whole. This infrastructure did not dampen poverty significantly for the region as a whole.

11 Peace and Security Outcomes

During the design of this evaluation, GEM staff studied the results of two prior studies, conducted by Social Weather Stations and by the European Union that examined increases or decreases in conflict in various areas of Mindanao. Both studies collected data at the municipal level so disaggregation to barangays was not possible. USAID may have funded the first study to collect and analyze conflict reduction data at the barangay level.

11.1 Incidences of Conflict, in Project and Control Barangays

In USAID-GEM infrastructure project barangays (ARMM and non-ARMM), there was a significant reduction in most types of violence after the infrastructure was constructed. For example:

- Rido/clan wars declined by almost 56%;
- There was a 68.78% reduction in encounters between the military and rebel groups;
- There was a 62.35% decrease in murders in project barangays;
- There was a 62% decrease in cases of domestic violence in project barangays.

Conversely, project barangays in non-ARMM areas experienced increases in the number of kidnappings between 2002 and 2010. Overall, in project barangays, there was a reduction in kidnapping cases of 15.19%. Control barangays experienced a 16.67% reduction in kidnapping. There was no significant difference in kidnapping rates between the control barangays and the barangays with GEM infrastructure.

The reduction of conflict in GEM infrastructure project barangays was statistically significant, except for the kidnapping category.

Statistical tests also showed that except for murder, other categories of conflict (rido, encounters, bombings, kidnapping, robberies and domestic violence) the reduction in violence was not statistically significant in the control barangays. *This supports the conclusion that GEM infrastructure is consistently associated with decreases in most types of violence.*

11.2 Respondents' Perceptions of Peace and Security Effects of GEM Infrastructure Projects

The majority of the respondents (61%) concluded that life has gotten better since the construction of GEM infrastructure. Further, facilities are not limited only to economic uses: warehouses for example have temporarily sheltered evacuees, trading centers have served as community meeting places, and solar driers often function as sports facilities. Respondents *do* interpret USAID's infrastructure projects as manifestations of the US and Philippine Governments' concern for poverty-stricken, conflict-affected communities. Respondents say that the projects symbolize hope for the community, serving as rallying points for them to work together and make the most of their resources.

A sizeable number of respondents are strongly convinced of the positive influence of USAID infrastructure projects on the peace and security of their communities. They say that if USAID was not in their communities, the incidence of violence would have been higher. In addition, for communities that are experiencing violence, many say that the level of violence would surely have been higher had the infrastructure projects not been present.

11.3 Conclusion

Based on the study's surveys, in the barangays where the infrastructure was located the overall degree of violence declined significantly between 2002 and 2010. In the control barangays, there was no decline in violence that was statistically significant, compared to the barangays with the infrastructure projects. Measures of violence included rido, or clan violence, military encounters, insurgent bombings, kidnapping, murder, burglaries and domestic violence.

Among all these measures, only murder rates showed a significant decline among the control barangays.

12 Other Qualitative Results

The study included 224 Focus Group Discussions that involved approximately 1,800 people. In the ARMM, 86% of the participants recognized USAID's role as "very important" for their livelihood and communities. They considered USAID an important development partner in improving access to markets and services, triggering more trade and commercial activities, and lessening the degree of conflict. In some regions, 95% of the respondents said that USAID's infrastructure was important to improving livelihoods and to the well-being of the communities. In other regions, 86% of the respondents said they valued infrastructure because farmers were able to increase their incomes due to easier market access. Participants emphasized that they valued footbridges because they enabled students to go to school safely. These participants viewed the infrastructure as "heaven sent" by making it faster, easier and cheaper to get farm products to market. In virtually all groups, people said that the infrastructure improved their quality of life and incomes.

Samples of the results of the Focus Group Discussions from three different regions are presented below:

12.1 ARMM: Impacts of the USAID-GEM Infrastructure Projects

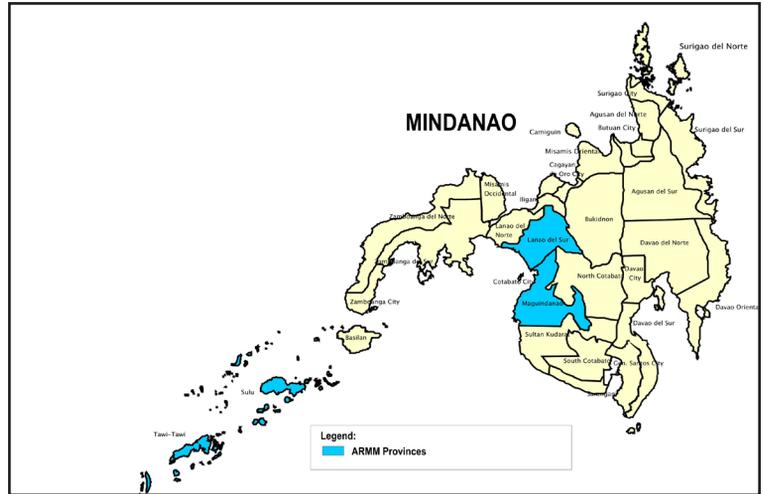
An overwhelming number of the informants answered "yes" (197 or 92%) when asked if the construction of an infrastructure project in their area had improved their livelihood or incomes. For those informants who lived in an area provided with road projects, the main benefit expressed was easier access. Access for the informants meant that they were able to send their produce to the market; and they were able to take advantage of the services/resources available at the community/town center; and that members of cooperatives were able to pay their loans as they could travel to the appropriate destinations. Access also referred to mobilization; in cases of emergency, they were able to send their sick/dying to hospital. Access also meant that more types of vehicles could gain entry/exit to their barangays at any given time. Other benefits gained from the road projects included cheaper transport costs and time savings.

Regarding trading centers, the informants stated that their LGUs earned increases in revenues. In some areas, the projects also served as venues for community activities such as Kandoli or Kasalan,

and sports activities. Some informants said that the trading centers appeared to have been related to the establishment of more businesses near the projects. More people reported going to the “tabo” (market day), as buying/selling transactions had become more orderly and comfortable.

The bridge projects were valued for “safety.” In most cases, informants shared their relief at being able to cross rivers and creeks more safely, compared to the dangers posed by bamboo and wooden bridges that were previously their only options. The bridges also meant easier access, for people to get to their destinations on the other side, including children going to schools and farmers delivering their harvested produce to buyers/markets. Informants stressed the bridges, enabled farmers to avoid double-handling costs. Now, products are brought from the farm to the market using only one type of transport, unlike the case prior to bridge construction, when farmers were forced to load and unload the products twice as they had to cross the river using boats. Also, respondents noted fewer incidences of overflow and flooding. Before the bridges were constructed, people often had to wait for the water in the rivers or creeks to subside before they could cross. Because this could take hours, students often elected to skip classes on rainy days. Farmers suffered spoilage if the products were not delivered immediately. Some of the informants noticed an increase in business activities because of the bridge projects.

Farmer-members of cooperatives and associations considered the solar dryers and/or grains warehouses to be a blessing. Farmers experienced an increase



in incomes as a result of their rice and corn (and sometimes coconut) being properly dried. The informants also said that farmer-members had fewer post-harvest losses as the grains and other products were dried using appropriate facilities, compared to sacks and plastic mats left on the roadside as had previously been the case. Informants also stated that the benefits of the dryers/warehouses were not confined to members of the cooperatives or associations, as they also accommodated the grains of farmers from adjacent barangays. The projects also meant lesser costs for the farmers, as they had a facility near to their farms/residences. Before the project, some of the farmers had to bring their grains to adjacent barangays, entailing additional transport costs.

Boat landing projects seemed to have created more businesses according to the informants, and also made it safer to embark/disembark from boats. For those that operated/owned the boats, the landings made docking more convenient.

If the USAID projects had not been constructed, the informants believed that there would have been

more accidents and deaths, with people (especially children) falling over the poorly-constructed bridges/footbridges or vehicles skidding on muddy roads. The flooding would have caused more damage to properties and crops. Market days would have been more chaotic and dangerous, while loading/unloading of cargoes to/from small boats would have taken longer due to restricted space or poor facilities. Farmers would have also lost income due to inappropriate drying, as they would be forced to sell their products for less, since soil and sand contamination reduces value.

12.2 Region 10: Northern Mindanao-Impacts of the GEM Infrastructure Projects

Sixty-nine informants (or 91%) observed positive impacts resulting from the construction of USAID infrastructure. The benefits observed were dependent on the type of project provided to the community. For road projects, access was the critical benefit, as the projects connected people to their destinations, whether markets, schools, hospitals or seats of government. The informants also noticed the lowering of transport and labor costs due to better roads, and remarked that roads were now safer to navigate even during rainy days. For bridge projects, farmers were able to save on handling costs and there was less damage from flooding. Students were able to cross the rivers/creeks, without parents worrying about their safety. Solar dryers and/or warehouse projects provided farmers dedicated facilities for the first time. Farmers were able to reduce post-harvest losses, as contamination from soil and sand was eliminated. The grains were of higher quality and attracted better prices. The comfort, order and convenience of the trading centers seemed to have encouraged more people to transact business. The LGUs earned revenue from the user fees collected from the trading centers. The centers also served as alternate venues for community activities.

12.3 Region 12: SOCSARGEN-Impacts of the GEM Infrastructure Projects

Only one person from among the 144 informants in Region 12 said that the infrastructure project had no impact on his community. The other 143 informants (99%) believed that the presence of the projects in their communities had, in one way or another, brought positive outcomes.

Farmers noted the largest improvement in their daily activities, citing being able to bring produce to market, even during rainy days. The farmers were also able to reduce post-harvest losses, since soil and sand were prevented from contaminating the grains while drying. The farmers were able to improve the quality of their products and thus, were also able to demand higher prices.

For parents, having a bridge in their area meant that their children could safely cross rivers/creeks and thus could attend school during rainy days. Comfort and order were introduced by projects such as trading centers and boat landings. People were encouraged to sell and buy products on market days because of the dedicated and convenient space offered by the trading centers. Trading centers were also utilized for other community activities. Boat landings allowed more and bigger boats to dock safely, and made the loading/unloading more efficient. With the user fees from the trading centers and boat landing facilities, LGUs also benefited from increased revenue.

Without the infrastructure projects, informants agreed that their overall quality of life would not have improved to the extent it has.

13 Conclusions

This study evaluated the economic impact of USAID-GEM Infrastructure projects. The primary statistical measures used for evaluating the economic performance of the projects were the Net Present Value and the Benefit-Cost Ratio of each sampled project. The discount rate used in the computation of the NPV and the BCR of the projects was 12%. The study, however, also computed the NPV and the BCR of the projects using a discount rate of 3%. This rate was used to underline the fact that the USAID infrastructure projects are not built solely for financial returns on investment, but also in consideration of social needs.

In addition, the Economic Internal Rate of Returns of the projects were computed to determine the rate of discount when the BCR is equal to 1, and for those interested, to compare the computed EIRR of a project to the minimum discount rate used by the Government of the Philippines for evaluating public projects, which is 15% due to governmental budget constraints. Many governments use 3% as the discount rate for funding projects under normal circumstances.

The study computed the NPVs, EIRRs and BCRs of 233 projects. This figure translates to about 20% of the 1,155 infrastructure projects implemented by GEM at the time that the study was conducted. The evaluation covered 24 RIPs and 209 BIPs. Results of the analyses indicate that of the total 233 sampled projects, 210 projects (or 90.1%) exhibited positive NPVs. Of those projects with positive NPVs, 24 are RIPs (or 100%) and 186 out of 209 (or 89.0%) projects are BIPs. These translate to a very high percentage of sound investment projects using a discount rate of 12%. Using a social discount rate of 3 percent, 225 projects (96.6%) of the total sampled projects have positive NPVs. The 3% discount is perhaps more reasonable in some cases, considering the social nature of some projects as indicated by their locations and the purpose for which they were implemented. At this rate, all the sampled RIP projects have positive NPVs while 201 of the 209 BIP projects (96.2%) have positive NPVs.

On average, the economic indicators show that all the RIP projects in Mindanao have good economic results. At a 12% discount rate, they yielded an extremely high positive average NPV of PhP 56,023,578; their average EIRR is 34.56%; and the average BCR is 2.59. Hence, every peso invested yielded a return of PhP 2.59. Among the RIPs, the airport project is the most profitable investment. This is followed by road upgrading projects, bridges, and port/boat landings. The Sanga-Sanga Airport in Bongao, Tawi-Tawi, the only airport project sampled, posted the highest NPV of PhP 468,458,189. With a BCR of 3.90. The Sanga-Sanga Airport project yielded a return of PhP 3.90 for every peso invested. This is higher than for a road project where every investment of PhP 1 yielded a PhP 2.74 return.

The BIPs, on average, also demonstrated good economic results. The average NPV of the BIP projects, however, is lower compared to RIP projects. This is understandable because the scope of a BIP is not as large as a RIP. The average NPV of a BIP is PhP 3,486,912 at a 12% discount rate, with an EIRR of 28.72%, and a BCR of 2.00. Hence, every peso invested in the BIP yielded a return of PhP 2.00.

It is interesting to note that, except for the trading centers, all BIPs posted favorable economic indicators. Based on the magnitude of the NPVs, road upgrades projects proved to be best BIP investment followed by barangay bridges, boat landings, grains solar dryers, warehouses/ solar dryers and trading centers. All road upgrades and the grains solar dryers posted positive NPVs.

As expected, the RIPs yielded higher NPVs than the BIPs. The difference in the value of NPVs is large. This is because of the scope of the projects, strategic locations and the greater number of beneficiaries directly and indirectly affected by the

projects. The average NPVs of the two types of projects were compared statistically. Results showed that there are significant differences between the two. *The NPVs of the RIPs are much higher than the NPVs of the BIPs. This means that RIPs have greater economic impacts than their BIP counterparts.*

The NPVs of the different categories of projects were also compared using an analysis of variance. In the computation, the airport was omitted because of lack of degrees of freedom, there being only one airport under study. Results of the statistical analysis showed significant differences among sub categories of RIPs. This means that the NPVs of the different RIP projects were statistically not comparable. The NPVs of the road upgrade projects were higher than the NPVs of the bridge projects. The NPVs of the boat landings, however, were statistically comparable to the bridges and the road projects.

For the BIPs, results also showed significant differences among categories. The NPVs of the different BIP categories are not statistically comparable to each other. The NPVs of the road projects for example, are higher, followed by barangay bridges. The NPVs of the bridges are statistically comparable to that of the boat landings, solar dryers, warehouse/ solar dryers but higher than the trading centers, which are comparable to the boat landings, solar dryers and warehouse/solar dryers.

On average, the poverty incidence in both the project areas and the control barangays has increased over the period, with the percentage of population under the poverty threshold often higher in the project barangays. GEM project effects could not overcome the poverty increases in Mindanao as a whole.

Incomes increased in the barangays where GEM infrastructure is located, and that increase is statisti-

cally significant. In the “without” project barangays incomes did not increase significantly.

A particularly interesting result of the study is the apparent positive effects of the infrastructure projects on improvement to the peace and security conditions in project areas. The results of the survey provide strong evidence that the USAID infrastructure projects have significantly reduced the incidence of rido/clan feuds; encounters between the military and rebel groups; incidences of insurgent bombing within the barangays; incidences of insurgent bombing in neighboring barangays; murder; theft, and domestic violence in the “with project” barangays. Further, the percentage reduction of the incidence of conflict is significantly higher in the “with-project,” compared to the control barangays. The reduction of incidences of conflict in the “with-project” barangays are all statistically significant; with the exception of kidnapping. This is in contrast to the “without-project” barangays where only the reduction in the incidence of murder is statistically significant. *It may be concluded therefore that the GEM infrastructure projects have contributed considerably to the improvement of peace and security of the project barangays, more so in the ARMM project barangays.* These results underlined the fact that the benefits from the GEM infrastructure projects go beyond economic and financial returns.

13.1 Summary of conclusions

1. In the barangays where there was USAID-GEM infrastructure, incomes increased. There was no corresponding significant increase in incomes in the “without” project barangays.
2. Almost all people said that GEM infrastructure improved quality life and incomes.
3. Almost all people, during the focus group discussions, expressed a desire for more and better roads.
4. Farm-to-market roads of the types that can be constructed under the BIP category of projects are highly valued by rural residents and thus in great demand.
5. Aside from the airport, roads have the highest benefit-cost ratios.
6. Building more roads and bridges makes economic sense and is supported by the field-work and statistical analysis.
7. That RIP category of projects has a higher average benefit-cost ratio than does the BIP category of projects. Based on the criteria of this study, building more RIPs makes greater economic sense than building more BIPs. However, this does not take into account social or geographical benefits or political objectives.
8. Building GEM infrastructure in a barangay is related to reductions in violence in that barangay.
9. Infrastructure in the ARMM or high-conflict areas of Mindanao returns the same net economic benefits as projects built elsewhere in Mindanao.

Acknowledgements



USAID's Growth with Equity in Mindanao Program

The Growth with Equity in Mindanao Program is financed by the U.S. Agency for International Development and implemented in partnership with the Mindanao Development Authority (MinDA).

The General Contractor is The Louis Berger Group, Inc.

This publication was made possible through support provided by USAID under the terms of Contract No. AID 492-C-00-08-00001-00. Opinions expressed do not necessarily reflect the views of USAID.