Impact Assessment of the SUCCESS Program Livelihood Activities in the Padre Ramos Estuary Nature Reserve of Nicaragua

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Cover Photos:
    Left,   Jiquilillo Beach tourism area
    Right, Bakery in La Arenosa community

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Abstract

The impact of livelihood activities of the USAID-URI SUCCESS Program implemented in several communities surrounding the Padre Ramos Nature Reserve in Nicaragua were assessed. Impact variables included household income, material style of life, degree of livelihood diversification and dependence on fishing, net revenues of enterprises assisted, as well as perceptions of changes in community cohesion, relationships with local government, and business skills. A questionnaire was administered to a random sample of project beneficiaries and non-project beneficiaries in the communities assisted by the Program. Weaknesses of this assessment methodology were a small sample size and the lack of baseline information, but overall, the data suggest positive impacts of the Program. Mean income of beneficiary households was slightly higher than non-beneficiaries (US$ 2,366 and US$ 2,249 respectively) but was not a statistically significant difference. The mean revenue generated per enterprise assisted was US$ 543 which represents 23 percent of overall income. Project beneficiaries tend to be materially better off, have a greater diversity of livelihood activities, less dependence on fishing, and a more positive future outlook in terms of their livelihood security compared to non-beneficiaries. The program had a small impact on helping some people leave the illegal post-larvae fishery. A majority of project beneficiaries felt that the livelihood activities improved their business skills and helped develop stronger social ties in the community, which can be an important factor for successful community-based resource management. Successful enterprises was correlated with individual as opposed to group businesses, existing rather then new businesses, larger participant direct investments in the enterprise assisted as opposed to project grants and subsidies, and the type of training and extension services provided by the program. This study concluded that household income and net revenues are poor measures for assessing impact and that material style of life, livelihood diversification and perception of change indicators are likely better measures to use, especially for extremely poor, rural, and natural resource dependent households such as those in the communities surrounding the Padre Ramos estuary.

Resumen

En este trabajo se evalúan los impactos de las actividades alternativas o modos de vida promovidos e implementados por el Programa USAID-URI-SUCCESS en varias comunidades la Reserva Natural Padre Ramos. Las variables evaluadas incluyen ingresos por familia, comodidades, grado de diversificación, dependencia de la pesca, ingresos netos en las actividades asistidas, así como las percepciones de cambios en cuanto a la cohesión de la comunidad, relaciones con el gobierno local y habilidades para emprender negocios. Se distribuyo un cuestionario de forma aleatoria para una muestra de beneficiarios y no beneficiarios del proyecto en las comunidades que asistió el Programa. Los datos obtenidos muestran impactos positivos sin embargo, la metodología utilizada tiene su debílidad en el pequeño tamaño de la muestra, y la falta de información base inicial. La media de ingresos de las familias beneficiarias fue ligeramente superior a las familias de no beneficiarios (US$ 2,366 y US$ 2,249 respecitivamente) pero no fue una diferencia estadísticamente significative. Los ingresos medios generados por las empresas asistidas fueron de US$ 543 lo que representa el 23 por ciento del total de ingresos. Los beneficiarios del proyecto tienden a tener mejor número de comodidades y mayor capacidad de diversificación en sus formas de vida, menos dependencia de las pesquerias, y una sentimiento más positivo respecto al futuro en relación con su seguridad en los modos de vida en comparación con los no beneficiarios. El programa tuvo pequeño impacto en ayudar a un pequeño grupo a abandonar practicas ilegales de pesca de larva de camarón. Una mayoría de los beneficiarios del proyecto sintío que las actividades promovidas por el Programa mejoraron sus capacidades para los negocios y les ayudaron a fortalezer sus vínculos sociales con la comunidad, lo cual puede ser un importante factor para el éxito de la gestión de recursos a nivel comunitario. Las empresas con más exito estuvieron correlacionadas con iniciativas ya creadas e individuales, más que con nuevos negocios o grupos de negocios. Los participantes de las empresas asistidas hicieron inversiones directas en vez de apoyarse en subsidios o contribuciones del proyecto. La capacitación y los servicios de extensión fueron proveídos por el programa. Este estudio concluye que los ingresos familiares y los ingresos netos son pobres medidas para valorar el impacto. Sin embargo, las comodidades, la diversificación en los modos de vida y la percepción de cambio son probablemente mejores indicadores para utilizar, especialmente en comunidades rurales pobres donde las familias son dependientes de los recursos naturales tales como es el caso del Estuario Padre Ramos.

Research Design and Methodology

Livelihood development strategies are common components of integrated coastal management and marine conservation programs. These strategies often have several basic premises whereby tangible benefits and especially, improved livelihoods for coastal communities will have beneficial impacts on sustainable management and conservation of coastal and marine resources (Pollnac et al. 2001, Christie et al. 2005, Pomeroy and Pollnac 2005). Such programs also tend to introduce alternative livelihood activities as a strategy to reduce pressure on the resource, but empirical evidence suggests this does not always occur even if successful alternatives are provided (Sievanen, et al. 2005). In addition, implementation difficulties will not always assure that attempts at introducing alternative livelihoods will result in adoption by intended beneficiaries or improved income (Wells et al. 2007). While we will not delve into the theory of these relationships here, this paper assesses the impact of the USAID-URI SUCCESS Program livelihood strategies and particularly their influence on sustainable resources management. These livelihood activities were carried out in Nicaragua from 2005 to 2008. Several specific questions regarding project livelihood impact are addressed:

- Whether the project has increased household incomes or diversified sources of income compared to non-project beneficiaries
- Level of net revenues generated by enterprises assisted
- Whether the project has impacted other quality of life measures
- Whether households involved in livelihood activities have reduced dependence on fishing, or have different attitudes towards resource management and conservation compared to non-project beneficiaries
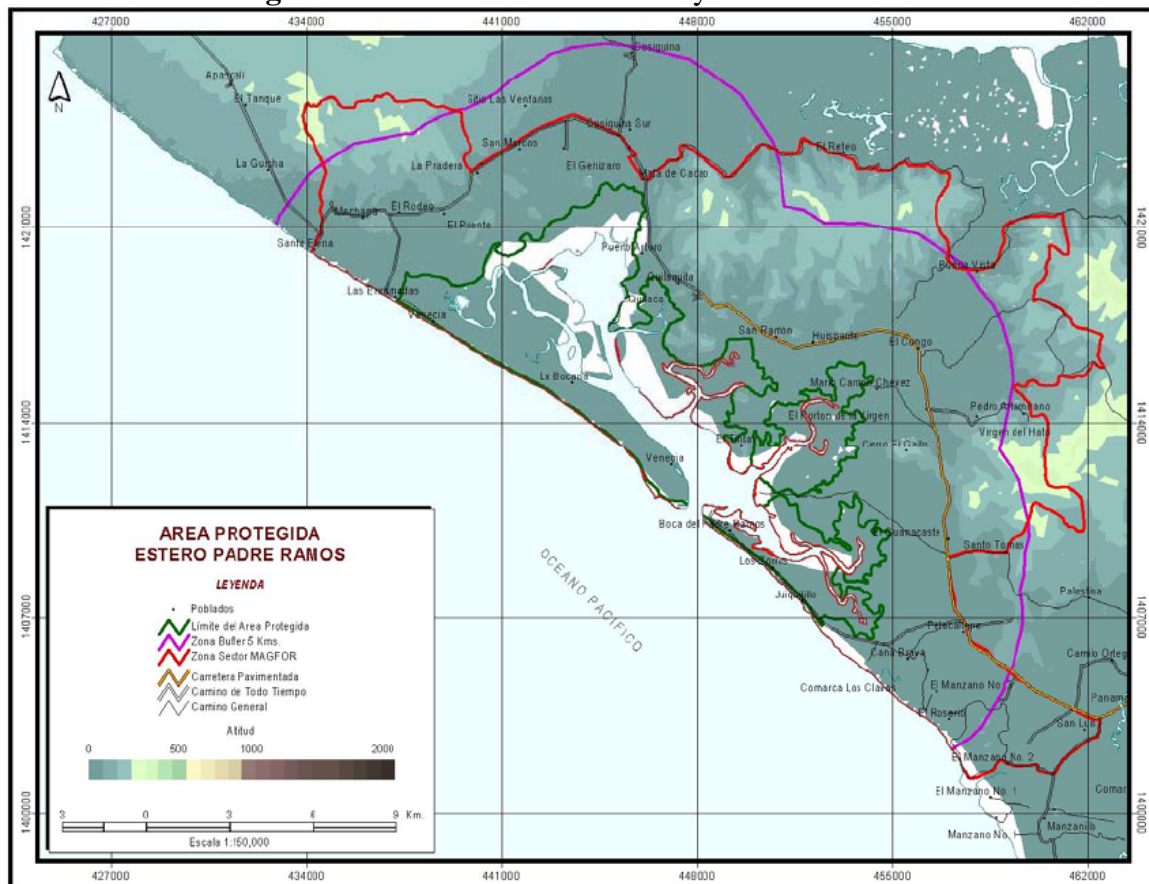- What factors influence increased net revenues of enterprises assisted

Impact variables included household income, net revenues generated from enterprise activities assisted, number of household productive activities (diversification variable), material style of life indicators and dependence on fishing as a household activity. The relationship between demographic factors and selected project input variables were compared with impact variables and analyzed for statistical significance. The research design used for most of the analysis was a standard project – non-project (control) comparison used to gauge impacts of project activities on project beneficiaries. No longitudinal data was collected or available for pre-post project comparisons, which is a weakness of this analysis.

A survey questionnaire was developed in English and then translated into Spanish that was consistent with the survey instrument administered in Thailand and Tanzania project sites so that cross country comparisons would be possible. Questionnaires were administered to a sample of project beneficiaries and non-beneficiaries at the project field site of Padre Ramos Estuary (see Figure 1). Project beneficiaries were systematically selected from a list (every third name) of the entire population of project beneficiaries provided by local project staff. This sampling strategy was selected in order to ensure that the different enterprise types (e.g. mariculture, bread making, jewelry making) provided assistance by the project were all represented in the sample. It included beneficiaries that were no longer active with the project at the time the survey took place (March 2008), but who did receive assistance in previous years. Only beneficiaries that had business activities on-going for at least six months were included to ensure that they had

time to start generating revenues after start up. In cases where there was more than one beneficiary within the same household, only one beneficiary per household was interviewed. Some SUCCESS project beneficiaries received assistance from other previous donor projects, and for others, the SUCCESS project was the first donor initiative they interacted with. We did not distinguish between those beneficiaries who participated in SUCCESS project activities versus other projects. Non-project (non-SUCCESS project) respondents were selected through a systematic random sample from several villages in the Padre Ramos area where project beneficiaries reside.

The actual sample size of project beneficiaries was 20 households out of a total population of 60 households, or a sample of 33% of the beneficiary population. The sample size was larger for non-beneficiaries at 36 household respondents from villages with a total population of approximately 1600 persons representing approximately 350 households. While the initial goal was to have a larger sample of both project and non-project beneficiaries, time and resource constraints did not allow us to fully reach the sample targets initially set. Interviews were conducted on-site by a URI research assistant who was a native speaker of Spanish and was trained and supervised by the CRC principal investigator. The URI research assistant was assisted by a paid local assistant from the Padre Ramos area. Local project staff from UCA/CIDEA were not involved in direct interviewing to reduce chances of respondent bias.

Figure 1. The Padre Ramos Estuary Nature Reserve.

SOURCE: Aldén, 2005.

Demographics

It is not unusual for project beneficiaries in various kinds of development assistance projects to have different demographic characteristics compared to non-beneficiary groups. One of the issues that often arise in project implementation is whether project benefits get captured by local elites and whether disadvantaged groups get access to project services as well. For instance, is any one ethnic, religious or gender group overrepresented in the beneficiary group compared to the overall population? In SUCCESS, women are one traditionally disadvantaged group that we wanted ensure had access to project services and its potential benefits.

There were more females in the beneficiary group (65%) but this difference is not statistically significant (Table 1).

Table 1: Gender differences by groups.

Group	Male	Female	N
Non-beneficiary	47.2	52.8	36
Beneficiary	35.0	65.0	20
Total	42.9	57.1	
N	24	32	56
Pearson Chi-square = 0.784, df = 1.000, p > 0.1			

Beneficiaries were slightly younger on average (42 years) than non-beneficiaries (45 years) but this difference was also not statistically significant (see Table 2). There was a highly significant difference in years of education (see Table 2) between beneficiaries (8.7 years) and non-beneficiaries (4.8 years). Beneficiary household size was slightly larger than non-beneficiaries but not statistically significant (Table 2).

Table 2: Comparison of age, years of education, and household size by group.

Group	N	Mean	SD
Age			
Non-beneficiary	36	45.31	16.03
Beneficiary	20	42.05	15.47
t = 0.745, df = 40.6, p>0.05			
Years education			
Non-beneficiary	36	4.83	3.85
Beneficiary	20	8.70	5.40
t = -2.827, df = 30.0, p<0.01			
Household size			
Non-beneficiary	36	4.36	1.96
Beneficiary	20	4.60	1.76
t = -0.453, df = 54, p > 0.1			

There were slightly more evangelicals in the beneficiary group but this was not a statistically significant difference (Table 3). Household income was positively correlated with years of education (r = 0.430, p = 0.01), but was not correlated with gender, age, religion or household size of the respondent.

Table 3: Percent distribution of religion by group.

Group	No Religion	Christian	Evangelical	Other	N
Non-beneficiary	27.8	44.4	27.8	0.0	36
Beneficiary	20.0	25.0	50.0	5.0	20
Total	25.0	37.5	35.7	1.8	
N	14	21	20	1	56
Pearson Chi-square = 5.185, df = 3.000, p > 0.1					

This information indicates that the project tended to be biased towards more educated individuals on the one hand, but did not lean strongly towards any other demographic groups.

Income

Mean annual income of non-beneficiary households and beneficiary households sample is US$ 2,590 and US$ 3,561 respectively (see Table 4) indicating a considerably higher income of beneficiary households. However, this difference was not statistically significant. There was one case each of an extreme outlier (over $14,000) for beneficiaries and non-beneficiaries. When these outliers were removed, standard errors within the subgroup samples was considerably reduced. Mean income of non-beneficiary and beneficiary households is US$2,249 and US$ 2,366 respectively (see Table 4). While beneficiary households still have a slightly higher household income with the outliers removed, this also is not a statistically significant difference.

Table 4: Comparison of household income (US $) of beneficiaries and non-beneficiaries.

Group	N	Mean	SD
Entire sample			
Non-beneficiary	36	2589	2801
Beneficiary	20	3561	5606
Outliers removed			
Non-beneficiary	35	2248	1941
Beneficiary	19	2365	1735
Entire sample: t = -0.726, df = 24.4, p>0.05 *Outliers removed:* t= -0.227, df = 40.8, p>0.05			

There is an extremely high positive correlation between beneficiary household annual income and annual net revenues generated from project supported enterprises (r = 0.894, p < 0.001, N = 20). However, when the one extreme outlier of income in the beneficiary sample (> $20,000) was removed from the analysis, there is no statistically significant correlation (r = 0.343, p=0.15, N = 19). The mean revenue generated per enterprise assisted is US$ 832, but with the outlier case removed, it is US$ 543 which represents 23 percent of overall income. Of the 20 beneficiaries sampled, 11 (55%) are generating revenues from enterprises assisted of which 45% (5) are female. Of those beneficiaries not generating revenues, 89% (9) are female.

While there were differences in enterprise net revenues between enterprise types (Table 5), these differences were not statistically significant.

4

Table 5: Comparison of mean enterprise revenues by enterprise type.

Enterprise Type	Mean Enterprise Revenue (US $)	SE	N
Aquaculture	3343	680	6
Tourism	2604	745	5
Jewelry	1844	1178	2
Bakery/Hammocks	1364	680	6

(ANOVA F-ratio = 1.512, $p > .05$)

Project beneficiaries were asked to rank the degree of importance of income (1 = not at all, 5 = very important) from the enterprise assisted in relation to overall household income (Table 6). Forty percent of respondents ranked it as not at all importance (rank 1) and only five percent ranked it as very important (rank of 5). This suggests that the enterprises in most cases will not be viewed as alternatives to other sources of income but more likely to be viewed as supplementary to previous sources of existing income.

Table 6: Degree of importance of enterprise assisted to overall household income.

	Rank						
	1	**2**	**3**	**4**	**5**	**Total**	**N**
Percent of Respondents	40.0	25.0	15.0	15.0	5.0	100.0	20

Beneficiaries were asked whether they used different types of lending mechanisms in the past. Sixty percent responded that they did. Of those who use lending institutions, 75% used commercial banks and the other 25% borrowed from family members or relatives, and two-thirds said they still use these lending mechanisms. Family borrowers tend to have higher enterprise revenues and household incomes compared to commercial borrowers (Table 7). Past borrowers have higher household incomes and enterprise revenues than non-borrowers (Table 8) but this is not statistically significant. Current borrowers have higher household incomes ($p < 0.05$) and enterprise revenues ($P > 0.1$) than non-borrowers. These results suggest that borrowers, regardless of mechanism, tend to do better, but family borrowers do best.

Table 7: Differences in household income and enterprise revenues by borrowing type.

Lending Mechanism	N	Mean	SD
Household income(US $)			
Commercial bank	8	2555	979
Family/relatives	3	3334	2767
Enterprise revenues(US $)			
Commercial bank	8	539	676
Family/relatives	3	863	474

(N = 11, $p > 0.1$)

Table 8: Differences in household income and enterprise revenues for lenders and non-lenders.

Group	N	Mean	SD
Household income(US $)			
Past non-borrower	8	1812	1949
Past borrower	11	2768	1528
Enterprise revenues(US $)			
Past non-borrower	8	426	795
Past borrower	11	627	622
Household income(US $)*			
Current non- borrower	10	1552	946
Current borrower	9	3269	2005
Enterprise revenue(US $)s			
Current non- borrower	10	341	525
Current borrower	9	767	802

(N = 19,   * $p < 0.05$)

Degree of Diversification of Productive Activities

Rank of productive activities of beneficiary and non-beneficiary households sampled is compared in Tables 9 and 10. Project beneficiaries tend to be more diversified than non-beneficiaries with higher percentages of households with second and third rank productive activities. Aquaculture, trading (includes bread making) and tourism have the highest total overall percentages of households engaged in these activities among beneficiaries, whereas none of these rank as the highest totals for non-beneficiaries. This is in part a reflection of the types of enterprises assisted among project beneficiaries.

These results suggest the possibility that project activities are diversifying household livelihoods, an important quality of life goal in poverty stricken areas such as Padre Ramos.

Table 9: Percent rank of productive activities for beneficiary households.

Activity	1	2	3	4	5	Total
Aquaculture	10.00	20.00	5.00	5.00	0.00	40
Trading	20.00	15.00	0.00	0.00	0.00	35
Tourism	0.00	10.00	15.00	0.00	5.00	30
Labor	20.00	5.00	5.00	0.00	0.00	30
Fishing	5.00	10.00	0.00	0.00	0.00	15
Farming	0.00	5.00	10.00	0.00	0.00	15
Livestock	5.00	10.00	5.00	0.00	0.00	20
Govt. officer	10.00	0.000	0.00	0.00	0.00	10
Restaurant	5.00	0.000	0.00	0.00	0.00	5
Other	25.00	5.00	0.00	0.00	0.00	30
Total	100.00	80.00	40.00	5.00	5.00	

(N=20)

Table 10: Percent rank of productive activities for non-beneficiary households.

Activity	1	2	3	4	5	Total
Labor	30.56	11.11	5.56	2.78	0.00	50
Trading	11.11	13.90	11.11	0.00	0.00	36
Livestock	19.44	5.56	0.00	0.00	0.00	25
Fishing	13.89	2.78	0.00	0.00	0.00	17
Farming	2.78	5.56	2.78	0.00	0.00	11
Restaurant	2.78	8.33	0.00	0.00	0.00	11
Aquaculture	2.78	2.78	0.00	2.78	0.00	8
Govt. officer	2.78	2.78	0.00	0.00	0.00	6
Tourism	2.78	0.00	0.00	0.00	0.00	3
Other	11.11	13.90	5.56	0.00	0.00	31
Total	100.01	68.70	25.00	5.56	0.00	

(N=36)

Project beneficiaries also tend to fish less, also suggesting that project activities may be reducing pressure on fish stocks. However, the average number of productive activities between groups, while higher for project beneficiaries, is not statistically significant (Table 11). The difference between the percent that rank fishing first and second, while lower for project beneficiaries, is not statistically significant (Table 12).

Table 11: Comparison of the average number of productive activities in the household.

Group	N	Mean	SD
Non-beneficiary	36	1.97	0.878
Beneficiary	20	2.30	0.979

(t = -1.285, df = 54, p > 0.05)

Table 12: Comparison of fishing and non-fishing households by beneficiary group.

Group	Non-fishing	Fishing	Total	N
Non-beneficiary	83.3	16.7	100.0	36
Beneficiary	85.0	15.0	100.0	20
Total	83.9	16.1	100.0	
N	47	9		56

(Chi-square = 0.026, p > 0.1)

Material Style of Wealth and Quality of Life

Table 13 and 14 summarize material style of wealth indicators including household structure, electrified and non-electrified household contents, as well as quality of life indicators such as presence of electricity, water, well and toilet. Of these measures that showed statistically significant differences, non-beneficiaries tended to have higher percentages of lower quality flooring made of "*caña*" (cane stalks), and open or no windows (Table 13).

Beneficiaries had higher percentages of electrical and non-electrical contents including range, radio cassette, living room set, table and sewing machine (Table 14). There were no significant differences on quality of life indicators. It should be noted that several of the beneficiaries

interviewed did not live permanently in the rural project site communities but in the larger nearby towns of El Viejo and Chinandega. In the houses sampled in these towns, we observed that respondents tend to use gas ranges rather than wood cooking stoves and are more likely to have electricity and piped water. No subsample of non-beneficiaries was made in these towns and this may have biased these results. However, these results suggest that beneficiaries tend to be materially better off than non-beneficiaries, consistent with slightly higher levels of household income reported above.

Table 13: Percent distribution of household structures by beneficiary group.

Item	Non-beneficiary	Beneficiary	Total
*FLOOR***			
Caña (cane stalks)	*61.11*	*50.00*	57.14
Wood	*2.78*	*25.00*	10.71
Concrete	*25.00*	*10.00*	19.64
Tile	*0.00*	*5.00*	1.79
Other	*11.11*	*10.00*	10.71
*WINDOW**			
Open/none	*47.22*	*35.00*	42.86
Wood	*2.78*	*25.00*	10.71
Glass	*47.22*	*40.00*	44.64
Other	*2.78*	*0.00*	1.79
ROOF			
Palm	41.67	50.00	44.64
Wood	11.11	0.00	7.14
Tin	2.78	0.00	1.79
Tile	44.44	50.00	46.43
WALL			
Caña (cane stalks)	8.33	0.00	5.36
Wood/mud	36.11	30.00	33.93
Concrete	25.00	40.00	30.36
Tile	22.22	30.00	25.00
Other	8.33	0.00	5.36
N	**36**	**20**	**56**

(* Chi-square $p < 0.10$ ** Chi-square $p < 0.05$ *** Chi-square $p < 0.01$)

Table 14: Percent distribution of household contents & quality-of-life indicators.

Item	Non-beneficiary	Beneficiary	Total
CONTENTS (electrical)			
Range***	*8.33*	*40.00*	19.64
Radio cassette*	*69.44*	*90.00*	76.79
Electric fan	30.56	25.00	28.57
Fridge	27.78	45.00	33.93
VCD player	22.22	10.00	17.86
Video game	0.00	5.00	1.79
TV	52.78	60.00	55.36
Wash	2.78	15.00	7.14
Computer	0.00	5.00	1.79
CONTENTS (non-electrical)			
Living room set***	*33.33*	*70.00*	46.43
Table**	*66.67*	*95.00*	76.79
Sewing machine*	*25.00*	*50.00*	33.93
Display cabinet	8.33	15.00	10.71
Chairs	91.67	95.00	92.86
Bench	25.00	15.00	21.43
Bicycle	52.78	60.00	55.36
QUALITY OF LIFE INDICATORS			
Electric	66.67	60.00	64.29
Piped water	22.22	40.00	28.57
Well	58.33	50.00	55.36
Toilet	69.44	70.00	69.64
N	**36**	**20**	**56**

(*Chi-square $p < 0.10$ ** Chi-square $p < 0.05$ *** Chi-square $p < 0.01$)

Community Empowerment and Livelihood Security

Greater community empowerment concerning resource management and perceptions of livelihood security are other forms of potential non-income related benefits of project activities. These were assessed in several ways. Beneficiary respondents were asked whether they agreed or disagreed with statements that involvement in livelihood activities helped to create stronger social ties with other community members, helped create better coordination between residents and local government, or, helped them to be a better business person. They were asked to rank statements on a scale from one to five with one being strongly disagree, five being strongly agree and three being neutral. The frequency distribution of responses is provided in Table 15 below. None of these responses was significantly related to household income or revenues generated by enterprises assisted. Respondents felt that the livelihood activities helped create stronger social ties but there was no trend evident in whether they felt it helped create better coordination with local government. The majority felt that the livelihood activities helped them become a better business person.

These results suggest that livelihood activities have created some benefits other than income related. Individuals seem to have higher self esteem in terms of business skills and perceptions

of improved community cohesion. The former indicates a perception of tangible benefit from the project and the latter can be an important asset for developing community consensus and compliance with resource management rules. Unfortunately, it seemed to have had no impact on building stronger relations with local government, which would have been another important asset for resource management.

Table 15: Percent frequency of responses to community empowerment and livelihood security questions.

Livelihood activities helped to:	Rank					N
	1	2	3	4	5	
Create stronger social ties	5.0	0.0	15.0	45.0	35.0	20
Create better coordination between residents and local government	25.0	10.0	25.0	25.0	15.0	20
Helped me to be a better business person	5.0	10.0	15.0	50.0	20.0	20

Another approach to measuring community empowerment and livelihood security was used that attempted to look at changes in situations over time using a baseline independent method. Participants were shown a ladder-like diagram with 10 steps. The respondent is told that the first step represents the worst possible situation and the highest step is the best situation and then read a statement of those worse and best case situations. The subject would then be asked where on this ladder they are today (a self-anchoring aspect of the scale), then asked to indicate where it was three years ago and where he/she believes it will be 3 years in the future. The actual scale value is not important but what is evaluated is the difference between past and present or future and present scenarios. The past assesses their perceptions of change during the time period the project was implemented, whereas the future change assesses their outlook moving forward. Positive values represent improvements whereas negative values indicate worsening situations. By comparing beneficiaries and non-beneficiaries, we can assess whether the project may have influenced any of these perceptions. Three scenarios or indicators of possible benefit were used; household livelihood security; community empowerment or control over resources; and community unity and cohesion. Each of these was assessed from a past as well as a future perspective.

Self Anchoring Scale Statements

Household Livelihood Security: The first step indicates you're your household is in need of more income and/or food in order to sustain yourselves. The highest step indicates that your household is fully engaged in livelihood and food gathering activities and these provide enough for the household to sustain and prosper.

Community Empowerment - control over resources: The first step indicates a community where the people have no control over access to the community's coastal resources--anyone from anywhere is free to come and fish, gather shellfish, cultivate seaweed, etc. The highest step indicates a community where the people have the right to control and develop rules over the use of the coastal resources of their community.

Community Unity and Cohesion: The first step represents a situation where there is no community spirit and unity in villages. Residents do what benefits their own household without considering others. The highest step represents a situation where the community is well-organized and unified. Residents are friendly to one another and help each other when possible.

All of the six indicators assessed had positive values for both beneficiaries and non-beneficiaries that indicate on average, they all have a positive outlook on change that has occurred in the past three years as well as expected change for the immediate future. Using a test of difference in means (two-way t-test) for perceptions of change over the past three years, there were no significant differences on any of these indicators between beneficiaries and non beneficiaries. In terms of future outlook, there was a significant difference concerning household security (t = -2.483, df = 54, p < 0.05) indicating that beneficiaries have more positive future perceptions of change than non-beneficiaries. There were no significant differences between these self-anchoring scale measures with household income or enterprise revenues.

Factors Influencing Household Income, Net Revenues and Livelihood Diversification

Household income, net revenues of enterprises assisted and average number of productive activities in the household were compared with enterprise characteristics and type of project interventions. Simple correlations were reviewed for significance if the independent variable was interval data. A test of the difference of means (two-way t-test) was reviewed for other independent variables that were yes-no responses (yes meaning it had that type of intervention or characteristic). Significant relationships (showing statistical significance at p < 0.1) are summarized below. For means tests, means are not shown but whether the intervention resulted in a higher or lower mean for the variable is reported.

Household income was related to:

- total investment in the enterprise (r = 0.886, p = 0.001)
- aquaculture enterprises (higher mean for aquaculture businesses p < 0.1)
- Individual or family business versus group business (higher mean for individual or family businesses p < 0.1)
- Extension assistance on best practices in shrimp farming
- bakery and hammock enterprises (lower mean for bakery and hammock enterprises assisted p < 0.1)
- training related to production (lower mean for those receiving training on production methods only p = 0.001)

Total enterprise revenue was related to:

- total investment (r = 0.843, p < 0.001).
- aquaculture enterprises (higher mean for aquaculture businesses p < 0.5)
- tourism enterprises(lower for tourism enterprises p < 0.1)
- existing enterprises (lower for new enterprises p < 0.05)
- enterprises that are primary source of income (higher p = 0.001)
- provided extension services by the project (higher if provided by the project p < 0.1)
- training on best management practices on shrimp farming (higher if this type p< 0.05)

Neither household income nor enterprise revenue was correlated with the value of grant materials provided, duration of training provided, degree of satisfaction with extension services provided, amount of experience the individual had with the enterprise, number of employees, or the average number of household productive activities.

The average number of productive activities in the household was related to:

- individual or family enterprise as compared to group (higher mean for individual or family enterprise $p < 0.1$)
- extension assistance on best practices in shrimp farming
- training on production of product (lower compared to those not receiving this type of training $p < 0.01$)

Household income is only weakly correlated to net revenues generated by the enterprise assisted (with the one outlier is removed), and therefore is not likely to be a good indicator of project impact. This weak relationship is also partially due to the fact that most beneficiaries stated that the enterprise assisted was not very important in overall household earnings. In addition, since no baseline data exists, we are unable to tease out the difference among existing businesses of what the level of investment and net revenues was at the time the project started working with the beneficiary versus after several years of project assistance. Therefore, net revenue generated is likely poor measure of project impact as well. Nevertheless, working with the data in hand can provide some indication as to likely project impacts and factors associated with higher levels of success.

As noted above, existing enterprises tended to have higher net revenues generated than new businesses, explaining why aquaculture (existing business) enterprises tend to do better and tourism (new) tends to do worse (and households involved in hammock and bakery enterprises (new) also tended to have lower levels of household income). Enterprises assisted that were a primary source of income tended to generate more revenues as we would expect. The total amount of investment is positively correlated with enterprise revenues and total household income. Since the value of grant assistance (value of materials and supplies donated, not value of training or extension services) is not related to revenues generated, the investments made by the enterprise owners themselves seems to be an important factor in obtaining higher revenues and household incomes. Households benefiting from project extension services also tended to result in higher net revenues although the length of time services have been provided and frequency of visits did not seem to be related. It should also be noted that those obtaining extension services tended to be very satisfied with the extension services provided (Table 16). What seems to be more important is the type of assistance and training provided. Training on production assistance tends to be related to lower household income and revenues, whereas training and technical assistance on best management practices for shrimp culture also tend to be related to higher income, revenues and livelihood diversification. Family or individually owned enterprises also tend to do better with respect to income and livelihood diversification variables.

Table 16: Degree of satisfaction of project beneficiaries with project services provided.

	Rank						N
	1	**2**	**3**	**4**	**5**	**Total**	
Percent of respondents	0.0	10.0	5.0	40.0	45.0	100.0	20

(1 = not satisfied at all, 3 = neutral, 5 = highly satisfied)

There were no significant differences in household income or enterprise net revenues, regardless of whether the enterprise assisted was still operating or not. Seven (35%) of the 20 beneficiaries surveyed had stopped operating the enterprise assisted. Reasons stated were low profits (30%), as well as group conflict and poor management which combined, accounted for approximately 41% of the responses (Table 17). The enterprises that were no longer in operation were jewelry and hammock businesses. Five (71%) of the 7 respondents that stopped were involved in group enterprises whereas only 4 (33%) of the 12 respondents with ongoing businesses were group enterprises. While not statistically significant (Yates corrected Chi-square = 2.574, df = 1, p = 0.259), it suggests group businesses tend to fail due to group dynamics and/or lower profits.

Table 17: Frequency distribution of responses of why the enterprise stopped operating.

Reason	Percent	N
Group conflict or lack of leadership	29.4	5
Low profits or increase in cost of inputs	29.4	5
Poor management	11.8	2
Lack of time or not enough income from alternative	11.8	2
Sickness or death in the family	11.8	2
New job	5.9	1

(N= 17 as some of the 7 respondents had more than one response)

Reducing Pressure on Natural Resources

As previously noted, the data on household productive activities does not indicate any strong difference in the level of dependence on fishing of project and non-project beneficiaries. However, of those beneficiaries that did fish, specific questions were asked as to whether they reduced or stopped fishing due to the livelihood assistance provided by the project. Four beneficiaries interviewed were involved in fishing. These were the women *larveros* in Padre Ramos that were involved in bakery and hammock making as alternatives to this illegal fishing activity. Of these individuals, three-quarters either stopped or reduced fishing. However, only one (24%) stopped fishing due to project interventions stating a viable alternative livelihood option as the reason. Three quarters of the respondents stated the reason for reduced fishing as due to a poor and unprofitable fishing season. The survey was carried out during the low season for shrimp larvae and this may have influenced responses concerning poor harvests, responding from a seasonal rather than an annual perspective. When probed on the response of poor fishing, the *larveros* indicated it is also difficult to compete with hatcheries now as private shrimp farms only want larvae from hatcheries. One respondent stated that they only reduced fishing and did not stop altogether as they obtained better income from fishing compared to alternatives. While this is a very small sample size, it suggests that the project is having a slight impact on reduced fishing pressure but poor harvests and competition with hatcheries seems to be a greater reason for the exit out of the post-larvae shrimp fishery observed.

Sample Size and Power Analysis

The sample size of beneficiaries is small at only 20 beneficiary households but this is a relatively large proportion of the total population of beneficiaries of 60 households, or a sample of 33% of the beneficiary population. The sample size was larger for non-beneficiaries at 36 household respondents sampled from the approximately 350 households in the project villages. However, power analysis of sample versus population size for beneficiary and non-beneficiary populations below indicates that there is a high risk of a Type 2 error due to low sample size. While we are rejecting any differences between beneficiaries and non-beneficiaries for many of the analyses done above (using a 95% confidence level), there indeed may be a significant relationship which we have been unable to detect it in this sampling scheme and considering some of the high standard errors (sample variance) in variables measured.

Control Group: Village population of approximately 800 persons X 2 villages = 1600 persons/4.5 persons per household = 356 households. With a sample size of 36 at a 95% confidence level, the confidence interval is ± 15.5 percent. For a confidence interval of ± 5, a sample of 188 would have been needed, for a confidence interval of ± 10, a sample of 76 would have been needed, and for a confidence interval of ± 15, a sample of 38 would have been needed.

Beneficiary Group: Beneficiary population of 60 households. With a sample size of 20 households and a 95% confidence level, the confidence interval is ± 18 percent. For a confidence interval of ± 5, a sample size of 52 would have been needed, for a confidence interval of ± 10, a sample of 37 would have been needed, and for a confidence interval of ± 15, a sample of 25 would have been required.

Formulas used for calculating sample size (ss):

$$SS = \frac{Z^2 * (p) * (1-p)}{c^2}$$

Z = Z value (e.g. 1.96 for 95% confidence level)
p = percentage picking a choice, as a decimal (.5 used)
c = confidence interval, as a decimal (e.g. .04 = ± 4)

$$New\ SS = \frac{SS}{1+ (ss-1) / pop}$$

pop = population

(Source: http://www.surveysystem.com/sscalc.htm)

14

Discussion and Recommendations

Overall, there are useful patterns emerging from this analysis in spite of the fact it was difficult to show statistical significance as the small sample resulted in low statistical power. In order to obtain a higher confidence level that we are not accepting the null hypothesis of no impact when it is false, a larger sample size would have to be used. However, this would increase the cost of this type of impact assessment method. In addition, annual household income and net revenues generated from enterprises assisted is difficult to measure using the respondent recall method and shows high levels of variance. Even with a larger sample size, it is unclear whether a more certain result could be obtained. Income estimation is difficult for rural households in developing countries and especially for households with high levels of occupational multiplicity. Estimating fishing and farming income is particularly problematic due to the diversity of fishing methods used and crops grown and the degree of variability in harvest daily, seasonally and annually. Therefore these may not be the best indicators of project livelihood impact. Other researchers estimate fortnightly expenditures as a surrogate of income but this method is also viewed by many researchers as problematic. In addition, as many of the enterprises assisted only make up a small portion of overall household income and rarely were the most important source of household income, it will always be difficult to tease out with any degree of confidence, changes attributed to one source of household income over the many.

Material style of life and visible quality of life indicators (piped water, latrine) are easier to verify as they are directly observable within a household. As these are based on the sum total of material expenditures over a period of time, they are likely better indicators to use compared to income or expenditure data. However, it may take a longer timeframe before significant differences can be detected. Enterprise net revenues are also difficult to estimate using a recall method as enterprises often have highly variable revenues on a daily, weekly or monthly basis. Most of these household enterprises are small scale and keep no accounting records, so they are uncertain in trying to precisely quantify gross revenues, expenses or net revenues. Therefore quantifying the contribution of any one enterprise to overall household income is also problematic.

Longitudinal data with pre-project baselines as well as project versus control groups would have provided a better method of assessment than the just a one time survey conducted here. However, this would have increased costs considerably. Simple and rapid measures such as material style of life are likely to be more cost effective along with baseline independent measures such as perceptions of change by respondents over time.

If we can set aside the methodological challenges inherent in this type of assessment, and are willing to accept a not fully scientific certainty of the information from a statistical significance standpoint, the information gathered here is still useful qualitatively and shows consistent trends from the multiple indicators measured. Therefore, the results still provide a degree of validity as to impact. In almost all cases assessed, the differences or trends were in the right direction expected even if not statistically certain. Household income, material style of life, quality of life indicators, and average level of diversified sources of income, all suggest that project beneficiaries are better off than non-project beneficiaries. Without baseline data however, it is difficult to know whether they were better off before they were assisted by the project and

therefore are slightly better off now as well. There were no significant differences in most of the demographic characteristics between project and non-project beneficiaries, except education. Other than this exception, this would indicate no particular biases in participant selection within the population of potential project participants. However, the large difference in educational attainment does suggest some bias and since education is directly related to household income, this could indicate some project bias towards households that have higher incomes to begin with.

The project does seem to have had other important impacts where people involved in the livelihood activities perceive improved livelihood security compared to non-project participants. They also felt the project had helped them to develop better business skills which can prepare them for improved business success in the future. Perceptions of improved social ties also help set better enabling conditions for community participation in resource management. While the project seemed to have had no impact on building stronger community relations with local government. This is likely due to the almost complete absence of direct involvement by local government in field activities, particularly the livelihood initiatives. In the geographic area where this assessment was carried out, the project was not involved in direct resource management planning or implementation, so this probably weakens to some degree project participant perceptions of linkages of livelihoods with resource management. Where we did explicitly link opportunities for alternative livelihoods as a possible means to leave fishing as an occupation in order to reduce fishing pressure, we had a small and marginal impact. However, the hammock and bakery enterprises for the *larvero* women have not been very successful. This reinforces the findings of Pollnac et al. (2001), Pomeroy and Pollnac (2005) and Christie et al. (2005) that livelihood activities must be successful (demonstrate tangible benefits) to be truly beneficial towards marine resource management and conservation efforts. This brings us to the next question then as to what factors tend to result in successful livelihood activities.

While not directly assessed in this analysis, local staff of CIDEA believe that the livelihood activities are important for reasons other than just economic benefit. Many heads of households are forced to leave the community and their families for extended periods of time to work in distant areas such as Honduras or Managua so they can make ends meet. In this context, there are many single-headed households. This creates a special set of hardships and social issues for these households. This concern was reinforced by several project beneficiaries interviewed who described this problem and view potential livelihood alternatives that can keep families intact as advantageous.

The results of our analysis suggest that projects would have better livelihood impact if they assisted family or individually owned enterprises as opposed to group enterprises and enterprises where owners are willing to make larger investments of their own funds rather than rely heavily on grants provided by the project. Targeting growth or expansion of existing enterprises that are a primary source of household income is likely to yield larger returns at least in the short term (less than 3 years) if the goal is income generation.

With respect to grant support for new enterprises, some of the project beneficiaries interviewed expressed concerns about accepting commercial loans for new enterprises such as tourism. As this is a new and as yet untested enterprise in terms of earning potential, several said they would be reluctant to take a loan as the new venture was considered too risky at this stage. Commercial

banks are also often unwilling to loan to such ventures without hard collateral or well developed feasibility studies. In these cases, rather than providing subsidies, the SUCCESS program strategy for tourism development may be the proper course of action. The Program has primarily assisted by providing training, and conducting feasibility studies rather than direct subsidies. The pace of progress has been slower than expected in the long term, but may ultimately have better impact, but it is still too early to know for certain. Another concern with grant support is that many people view these as free handouts and do not truly value the resources provided, so they feel less committed to the enterprise than individuals that have a good deal of their own personal or family capital at stake. Many past donor and government programs have perpetuated the free handout mentality which is viewed by many as counterproductive to building sustainability and local ownership of livelihood initiatives.

Livelihood diversification is also a valid project goal (and relatively easy to measure) as this provides strengthened household resilience to potential economic shocks or natural disasters. This is particularly important for households living at or below poverty levels as tends to be the case in the Padre Ramos area. Livelihood security and risk reduction may be a more important initial goal in their minds than income improvements, especially if income improvements involve more risk, as is often the case with new enterprise ventures. For example, one of the women interviewed at the bakery project site admitted that she was making more from sale of bread than from shrimp larvae fishing, but was still not willing to give up that tried and true practice yet to spend more time at the new bakery. Developing new livelihood types is also more difficult and likely to have higher failure rates as evidenced with our hammock, jewelry and initial bakery projects, although the group arrangement of these enterprises was a significant contributing factor. These may also take a longer period of time before they start returning benefits. For instance, the eco-tourism activities in Padre Ramos estuary are only now just starting to attract tourists after a long period of three years of feasibility analysis and planning. So these starting benefits do not yet contribute much to the summary results captured here.

Projects need to provide direct extension services to clients if we are to improve existing businesses or promote adoption of new enterprises, but these services need to carefully target the type of extension services and training to the needs of the clients. Linked to this but not studied in depth here, is participant selection and external supporting agency entry into the community. CIDEA had not traditionally operated in the Padre Ramos Area prior to the SUCCESS Program but felt a need to start extending services beyond its traditional extension service area in nearby Puerto Morazán. CIDEA staff believe that another criteria for success is conducting careful baseline assessments of the community and getting to know the social and political context before selecting project participants to work with. This is important to help ensure that those selected are genuinely interested in the project services provided and not just looking for a free handout.

Lastly, these results have implications for USAID programs or any donor projects for that matter. Donors need to rethink objectives of livelihood activities linked to conservation initiatives. This involves rethinking what is considered successful and what is the best way to measure that success. As previously mentioned, indicators such as income and revenues generated are most likely not the easiest, least costly, and most accurate of measures. Equally acceptable indicators

may be material style of life and other quality of life measures, participant perceptions of change, and number and type of household livelihood activities (diversification or resilience measure).

Consideration also needs to be given to the time frame needed before tangible results can be seen or measured, particularly if new enterprises or income diversification are the goals. Donors and implementers will need patience as longer time frames of several years (3-4) will be needed before anything measurable is likely. Expanding existing enterprises or establishing community microfinance schemes are also unlikely to show results within one year and will also require longer time periods before significant impacts can be measured. The behavior changes needed to build entrepreneurship and sustainable improved resources use management ethics within these coastal communities takes time. These lessons are similar to those being learned in other locations of the SUCCESS family of projects. In such cases, intermediate benchmarks can serve as useful short term guideposts.

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