Micronesia Challenge
Socio-economic Pilot Study, Palau

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EXECUTIVE SUMMARY

The Micronesia Challenge (MC), a regional conservation initiative, was endorsed in 2006 by chief executives from the Federated States of Micronesia, the Republic of Palau, the Republic of the Marshall Islands, the U.S. territory of Guam and the Common wealth of the Northern Mariana Islands. As a commitment by Micronesian leaders to conserve the natural resources across Micronesia, the overall goal of the MC is to "effectively conserve at least 30% of near-shore marine resources and 20% of terrestrial resources by the year 2020" (micronesiachallenge.org). Based on this common goal by Micronesian leaders, each respective Micronesian jurisdiction has committed long-term efforts towards achieving this desired goal.

Each MC jurisdictions have enacted local initiatives such as that of the Palau Protected Areas Network (PAN). The PAN was enacted by national law in the Republic of Palau in 2003, and serves as a national conservation strategy that creates a system of protected areas, in order to effectively conserve Palau's biodiversity. The PAN, along with its sustainable funding mechanism, is the primary tool in achieving Palau's commitment towards the MC. With the goals of the MC, it is essential to monitor the resources and social impacts of protected areas overtime, as this is crucial for effective management of protected areas, as well as achieving the goals of the MC. Information obtained from biological and social monitoring, will enable resource managers to make informed management decisions regarding protected areas. Within each MC jurisdiction, numerous key agencies have been tasked with carrying out biological and

social monitoring of resources, in order to track the progress of the MC, as well as to provide the necessary information that is needed for resource management.

In September 2013, the Palau International Coral Reef Center in collaboration with the University of British Columbia Fisheries Centre carried out the MC Socioeconomic Pilot Study. The study took place in Ngardmau State, a village located in the northeastern part of Babeldaob Island. The village has a system of conservation areas, known as the Ongedechuul System of Conservation Areas (OSCA) which is comprised of two marine protected areas, and two terrestrial protected areas. In 2010, the OSCA became a member of the PAN.

The purpose of this pilot study was to test key MC and Palau socio-economic indicators that were decided upon during the 1st MC Socioeconomic measures meeting in August 2012. Results from this pilot study show that only less than half (44%) of the respondents were aware of the MC, which indicates the need to raise awareness for the MC. On the contrary, majority of the respondents were aware of the PAN (88%), and were able to name at least one purpose of the PAN. Of the households that were surveyed, 94% stated that one or more of their family members participated in fishing. In addition, respondents that participated in fishing stated declines in fishing habitat and catch per unit effort (CPUE) and one third indicated having to travel longer distances for fishing over the last five years. More than half of the respondents who took part in fishing activities also reported declines in the size and abundance of their targeted species over the past five years. Further results of this study show that most respondents did not attribute any changes to fishing or farming activities due to the protected

areas, with 87% of households reporting that the protected areas did not have an effect on either their household income or expenditures. In relation to, 50% of households indicated that fishing is one of its top three sources of household income. In terms of the public water system in Ngardmau village, 100% and 94% of the respondents were satisfied with the quality and quantity of the public water system, respectively.

We can conclude from the results of this study that monitoring of ecological and socio-economic indicators is critical for making informed management decisions, as well as for assessing the changes and trends in resources overtime. Based on the results of this study, we were able to assess the perceptions and interactions of Ngardmau Community members with their protected areas. We were also able to investigate the awareness and understanding of community members regarding their protected areas, the Palau PAN, and the MC. As a result of the indicators tested throughout this study, we can indicate the need to raise awareness regarding conservation initiatives, such as that of the MC. Although community members were not able to attribute any changes to fishing or farming activities due to the protected areas, they were still supportive of their protected areas, the PAN and MC. Future assessments based on the methods and indicators used throughout this study are required, in order to assess changes and trends in resources overtime, and to provide relevant information to resource managers and stakeholders.

INTRODUCTION

Socio-economic information provides an understanding of the social, cultural, economic and political characteristics and conditions of individuals, households, groups, organizations and communities. It can help coastal managers identify potential problems and focus management priorities accordingly (Bunce & Pomeroy, 2003). The objectives of this study were to: (1) develop research methods to monitor socio-economic indicators in MC/PAN sites of Palau that can be used as a protocol for future MC and PAN socio-economic monitoring (2) conduct a study that includes MC indicators, Palau Indicators, the Ongedechuul System of Conservation Areas (OSCA) Indicators and questions relevant to PICRC research agenda (3) conduct a series of workshops on data collection, entry, analysis, and write up to increase local capacity for socio-economic research in Palau (4) refine methods used in pilot study and implement in remaining MC and PAN sites in Palau and (5) give presentations back to community and government stakeholders on our preliminary findings. Through this study we will be able to devise a socio-economic monitoring protocol for Palau's PAN sites, as well as for MC jurisdictions. The methods and indicators that were used in this study will be refined and will be further implemented across PAN and MC sites.

METHODS

Indicators

Socio-economic indicators of human well-being are information on a specific condition that can be collected repeatedly over time to indicate change in that condition (Wongbusarakum & Pomeroy, 2008). Once chosen the indicators can be used to determine what questions should be asked and who the respondents should be.

Prior to this study guideline indicators had already been identified for the MC areas (Nevitt & Wongbusarakum, 2013), as well as specifically for Palau. Some of these indicators overlap (for example food availability), while others were found in one or the other (for example one Palau indicator is water availability which is not outlined in the MC indicators). The intention of the MC addendum guidelines was not to be an exhaustive list of indicators with the recognition that different indicators will be relevant in different contexts (Nevitt & Wongbusarakum, 2013). In this pilot study we have tested five of the eleven indicators outlined in Nevitt & Wongbusarakum 2013 and they are as follows[1]:

- MC1: Perception of change in food availability
- MC2: Household participation in MC management planning or decision making

[1]Please refer to Nevitt & Wongbusarakum page 9 for the full list of MC indicators

- MC4: Change in violations and illegal activities related to fishing, harvesting and use of natural resources
- MC8: Community awareness of MC
- MC9: Community support for MC

The Palau indicators were developed in a series of meetings of the Palau Socio-economic group in 2012. The indicators were further discussed prior to this pilot study and the indicators used are as follows:

- PI1: Household food availability and sources
- PI2: Household dependence on local food resources
- PI3: Level of harvesting from local resources and their conditions - fishers and farmers
- PI4: Household income, expenses and subsistence distribution by source
- PI5: Perception of quality and quantity of water

Finally we included goals from the Ngardmau OSCA management plan (Ngardmau State Republic of Palau, 2011), which were specific to the community where we conducted our pilot study.

- OSCA1-3: By 2014, 95% of residents of Ngardmau state are aware of sedimentation and its causes and impacts, and at least 95% of the Ngardmau State community is aware and fully supportive of the OSCA and its boundaries, purpose, and rules.

- OSCA1-7: By 2015, there is no illegal fishing in Ngermasech and IleaklBeluu.
- OSCA1-13: By January 2014, OSCA is clearly contributing to maintaining the subsistence and sustainable livelihoods of the people of Ngardmau.
- OSCA3-2: By 2015, citizens of Ngardmau continue to work together to monitor and manage the conservation areas.

Surveys

We identified four populations to create specific interviews for:

- *Key informants* – included community leader from the Council of Chiefs, State legislature, and the Board of Commission
- *Head of Households* – identified as women and men who are the oldest providing members of the household
- *Individual adults* – identified as community members 18 years or older
- *Individual children* – identified as community members between 6 and 17 years old

All surveys were translated into Palauan, and the interviews were conducted in English or Palauan or a mixture of the two. Interviews were conducted by PICRC research staff that had been trained in interview methods[2].

[2]All four interview schedules can be found in appendices 1-4.

Site and respondent selection

Ngardmau has two marine and two terrestrial protected areas which are together referred to as the Ongedechuul System of Conservation Areas or OSCA (Ngardmau State Republic of Palau, 2011). This is a PAN site and so is part of the MC. With the help and permission of the local government, respondents were randomly selected from the Ngardmau 2013 census. In cases where a randomly selected respondent was not available or did not wish to participate, another individual from the community was randomly selected.

Ngardmau has three smaller hamlets: Ngetbong, Urdmang, and Ngerutoi. There are 67 households with a total population size of 223 individuals. Most residents are 18 or older (79%), and there are slightly more males than females (1.07 males for every female). Among adults 35% had obtained a college degree, 41% had obtained a high school diploma, and 24% had completed elementary school. Most families (63%) had one or more adults with a college degree.

Sample size

The sample size of randomly selected individuals, households, and children, was chosen to be approximately 25%, although in all categories with the exception of individual women the final proportion was just over that goal (Table 1). This is a smaller sample proportion than the 50% recommended in SEM-Pasifika based on the population size (Wongbusarakum & Pomeroy,

2008), but follows the sample size recommendations outlined in the guidelines for social monitoring in South East Asia (Bunce & Pomeroy, 2003).

Table 1. Sample size, population size and proportion of sampling for different interviews

Category	n	N	%
Adult women	17	75	23
Adult men	26	99	26
Households	18	67	27
Children	13	48	27
Key Informants*	10	16	63

*Includes members of Board & Commission, Council of Chiefs, and Legislature

RESULTS

We will focus on the MC indicators, but as there is some overlap with Palau Indicators (PI) the PIs will be labeled for clarity.

MC Indicators

- **MC1: Perception of change in food availability**

  Most respondents did not attribute changes in locally sourced marine and terrestrial food availability to the protected areas (Table 2). This was also true of water quality and quantity. Over one third of respondents (37.5%) said they knew of a family in Ngardmau that struggles to find food, which suggests there may be some level of food insecurity (PI1).

Households ate a greater number of imported food items (1.93 SE= 0.27) per day than locally sourced foods (1.04 SE=0.30), even though just over half of the respondents said they preferred local food (56%, n=18, PI2).

Only 38% of people said they had noticed a change in their food over the last five years. Those that did cited greater availability of imported foods, but also less engagement in fishing and farming. As one respondent said "my sisters and wife have jobs now", suggesting that an increase in salary work has left less time for subsistence marine and terrestrial resource use.

Table 2. The reported effect of the Protected Area on food and water availability

PA effects on:	Decreased	No Change	Increased
Food from fishing invertebrates	0.00	**0.67**	0.33
Food from fishing of fish	0.07	**0.73**	0.20
Food from farming	0.00	**1.00**	0.00
Food from hunting	0.00	**0.93**	0.07
Water quality	0.07	**0.93**	0.07
Water quantity	0.07	**0.87**	0.13

- **MC2: Household participation in MC management planning or decision making**

40% of households interviewed reported having at least one member that participates in resource management, but this is not necessarily specific to the MC planning and

decision making. It would also be important to further explore what constitutes participation as there may be issues of participatory exclusion (Agarwal, 2001).

- **MC4: Change in violations and illegal activities related to fishing, harvesting and use of natural resources**

  Less than half (44%) of individual respondents reported that there was illegal harvesting of natural resources from the protected areas. However there was a relatively high proportion of respondents who stated that they did not know (21%) which may indicate that they were unwilling to answer the question. Of those that did state that poaching occurs, there was no clear consensus on changes over time with roughly equivalent numbers stating that poaching has increased (42%), or decreased (47%) over the last five years.

- **MC8: Community awareness of MC**

  While most respondents had heard of the PAN, less than half had heard of the MC. In both cases the proportion of respondents that could name at least one purpose of the conservation initiative was even smaller (Figure 1).

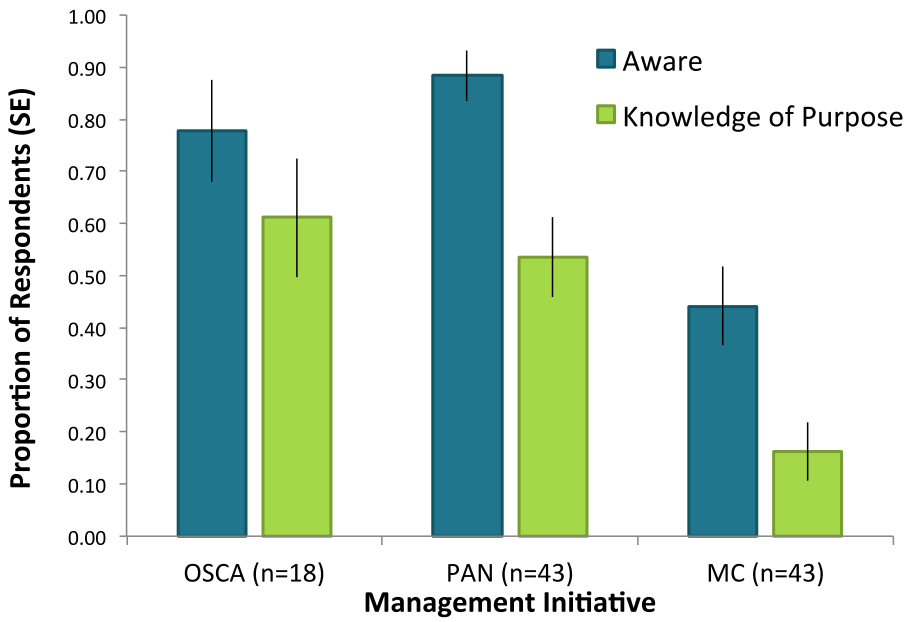

Figure1. Respondent awareness of three conservation initiatives and their purpose

- **MC9: Community support for MC**

There were no respondents that were unsupportive of PAN or the MC, although the number of neutral responses, and respondents declining to answer was greater for the MC than PAN (Figure 2). This may have been a result of people being less aware of the MC and so not being willing or able to formulate an opinion.

Just over half of the respondents (56%) felt that the benefits of the OSCA were shared equally, while 11% felt that it was not equal and that government officials and their family members saw a larger benefit. One third of respondents declined to answer this question.

Most respondents (72%) didn't want new protected areas in Ngardmau. Those in favor of management by *bul*[3] (24%) and management by legislation (29%) were fairly equal, but the largest proportion of people suggested management by both was best (47%). Those that prefer *bul* cite reasons of cultural and national pride. Those that prefer legislation suggest that *bul* is ineffective as a management measure. Those that prefer both did not point to the weakness of *bul*, but instead suggested that legislation would add strength to the process.

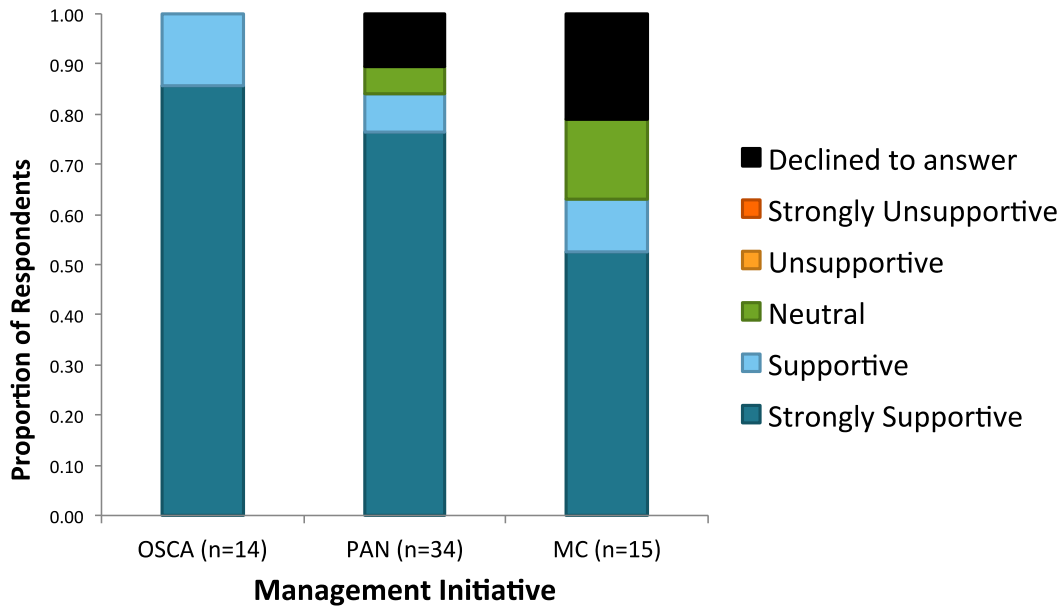

Figure 2. Proportional support responses for different conservation initiatives

Palau Indicators

[3] *Bul* refers to a Palauan traditional form of conservation where certain restrictions are placed to regulate the harvesting of plants or fishing. The *bul* would only be lifted, if the village chiefs or men's clubs observed that the reefs and/or plants were ready to be harvested again.

- **PI3:Level of harvesting from local resources and their conditions - fishers and farmers**

  All but one household interviewed (94%) had one or more family members that participated in fishing. Fewer households participated in farming (55%), and only one household participated in hunting (6%).

  Women and men participate in farming and fishing, although men's fishing effort is significantly higher than that of women (Figure 3). Most fishers reported a decline in fishing habitat and catch per unit effort (CPUE), and one third report having to go longer distances to fish (Table 3) in the last five years. More than half of fishers also report declines in the size and abundance of the species they target during the same time period (Table 3). Perceptions of change in farm production was not as consistent with one third reporting declines, and one half reporting no change.

  When asked to describe the effect of the protected areas on fishing and farming measures, most respondents reported no change due to the protected areas, although for distance traveled one third reported that it had decreased due to the protected areas (Table 4).

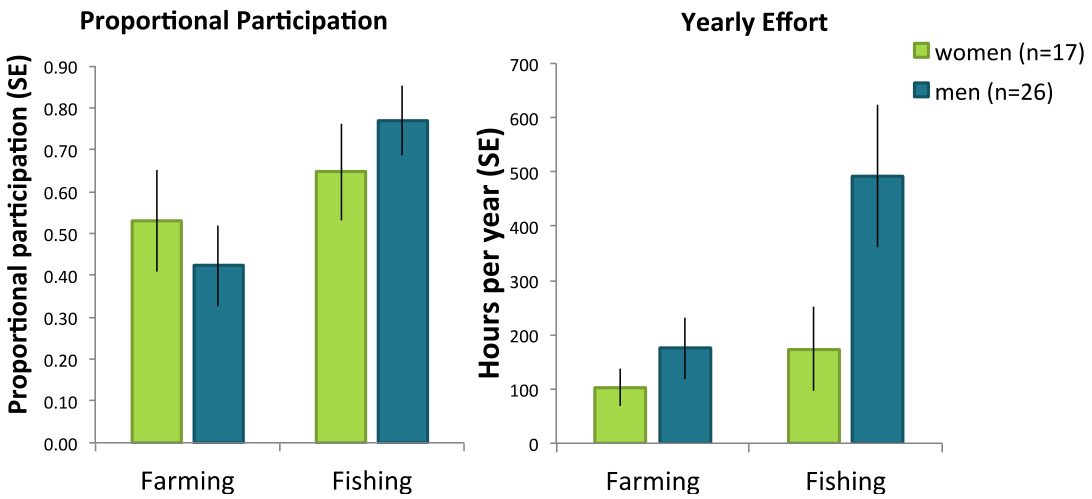

Figure 3. A) Proportion of respondents participating in farming and fishing. B) Mean effort (hours) per year in farming and fishing.

Table 3. Perception of change over time in key resource use categories

Five Year Changes in:	Decreased	No Change	Increased
Fishing habitat	**0.78**	0.15	0.07
Fishing CPUE	**0.71**	0.26	0.03
Fishing distance	0.07	**0.60**	0.33
Animal Abundance	**0.59**	0.21	0.20
Animal Size	**0.53**	0.27	0.20
Farming production	0.33	**0.50**	0.17

Table 4. Perception of effect of Protected Areas on key resource use categories

PA effects on:	Decreased	No Change	Increased
Fishing habitat	0.10	**0.70**	0.20
Fishing CPUE	0.10	**0.80**	0.10
Fishing distance	0.33	**0.50**	0.17
Farming production	0.00	**0.95**	0.05

- **PI4: Household income, expenses and subsistence distribution by source**

Most adults in Ngardmau hold a salary job (72%, n=47), and of those 91% are government jobs. All but one household surveyed had at least one adult with a salary job (94%, n=18).

Just over half of interviewed households reported an income between $500 and $1000 (USD) per month, with the second greatest proportion reporting an income of under $500 per month, and the remainder reporting a monthly income of between $1000-$1500 (Table 5).

Table 5. Proportion of households in each monthly income category (n=18)

Monthly income category	Less than $500	$500-1000	$1000-1500	$1500-2000	$2000-2500	$More than 2500
Proportion of households	0.28	**0.56**	0.17	0	0	0

Almost all households (94%, n=18) reported that income from a salary was one of their top three sources of household income. The next most common source of income was

fishing with 50% of households reporting fishing as one of the top three source of household income. Other sources of income included farming, pensions, selling goods at the market and tourism. The top household expenses included utilities (including rent, reported in the top three expenses of 89% of households, n=18), food (83%), and customs (44%)[4].

Most respondents felt that the Protected Areas had had no effect on their household income or expenditures (87%, n=15).

- **PI5: Perception of quality and quantity of water**

  All but one respondent used the public water (94%, n=18). Of those that used the public water 100%, and 94% were satisfied with the quality and quantity of the water respectively.

OSCA Indicators

- **OSCA1-3: Awareness of sedimentation and OSCA**

  All but one of 18 respondents (90%) could name at least one cause of sedimentation, and 78% could describe at least one ecological impact of sedimentation.

  While most respondents were aware of the OSCA, the proportion of respondents with knowledge of the specifics related to the purpose, rules, and boundaries declined

[4] Customs are those traditional and cultural events and practices that take place in Palauan society (e.g. traditional first birth ceremony, funerals etc.)

(Figure 4). 86% of respondents strongly supported the OSCA, and 14% supported it (Figure 2). Four respondents declined to answer this question.

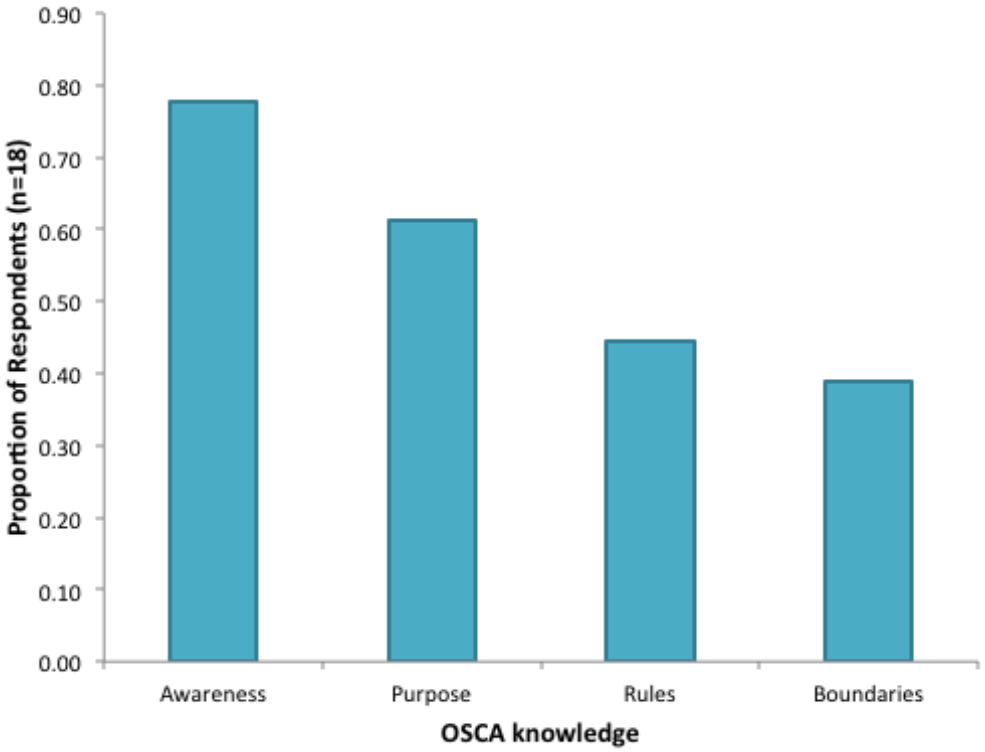

Figure 4. The percentage of respondents (n=18) that has knowledge of the OSCA in four different categories

- **OSCA1-7: No Illegal fishing**

  44% of respondents reported illegal harvesting from the protected areas. Please see section MC4 for more details.

- **OSCA1-13: OSCA contributes to subsistence and sustainable livelihoods**

  Please see PI3-PI5 for more details.

- **OSCA3-2: Citizens of Ngardmau continue to work together to monitor and manage the conservation areas.**

  Please see MC2 for more details.

Child surveys

Of the thirteen children that were interviewed, 9 stated that they fish, and 5 reported that they farm. 7 children felt that there was a threat to fisheries, 1 felt that there wasn't, and 5 declined to answer. Out of the 13 children surveyed, 7 indicated that they are aware of the conservation areas in Ngardmau.

Key Informant (KI) Interviews

All key informant respondents felt that there was a benefit to the OSCA. Of the 9 key informant interviewees, 4 felt that there was a need for additional conservation areas in Ngardmau and 5 (44%) reported that there was not enough enforcement of natural resource rules in Ngardmau. In addition, 6 key informants felt that everyone benefits equally from the OSCA and only 5 reported that there is enough research monitoring of natural resource rules in Ngardmau.

Most KI respondents (66%) strongly suggested the need for additional funding, capacity building, and resources for conservation officers and State office staff, in order to improve management of natural resources. The remaining three KI respondents declined to answer this question. Two of the KI respondents felt that an increase in the community's awareness of

conservation areas, values, and boundaries would lead to better management of natural resources, while 1 key informant reported the need to engage community members in the decision making process and management of protected areas.

All key informant interviewees were knowledgeable or had heard of the PAN, and 77% knew of at least one purpose of the PAN. Most of the key informant respondents greatly support the PAN. On questions regarding the MC, all but one KI respondents were aware of the MC, but only 3 could name at least one purpose of the MC. Of the 9 KI respondents, 2 greatly supported the MC, with 4 supported the MC, and 2 reported that they are neutral towards the MC. The final KI respondent declined to answer this question.

CONCLUSION AND RECOMMENDATIONS

As a result of this MC pilot Socio-economic study, we were able to test key socio-economic indicators that can be used in Palau and across Micronesia. We will also be reviewing all of the indicators that were used in this study, and revisit those indicators that were left out. Some of the key indicators included the respondents' perception of change in food availability to which most interviewees did not attribute changes in locally sourced marine and terrestrial food availability to the protected areas. In terms of participation in resource management, even though 40% of households indicated that at least one member of their household has participated in resource management, this was not indicative of MC planning and decision-making. While less than half (44%) of the respondents stated that there was illegal harvesting of

natural resources from the protected areas, there was no clear indication that poaching in protected areas has increased or decreased over the past five years.

As a result of this study, we can determine that Ngardmau community members were aware and knowledgeable of the Palau PAN and that most respondents supported the PAN. In contrast, less than half of the survey respondents had heard of the MC, which indicates the need to increase community awareness of the MC in order to increase people's understanding and awareness of the conservation initiative. No respondents were unsupportive of the PAN or the MC. In terms of indicators regarding equal distribution of benefits, more than half of the respondents (56%) felt that the benefits of the OSCA were shared equally, with 11% reporting that benefits were not equal attributing a larger benefit to government officials and their relatives. While most respondents (72%) did not want new protected areas in Ngardmau, 47% suggested that a combined management by *bul* and by legislation would be best for Ngardmau as the combination strengthens the management process.

94% of the households that were surveyed reported one or more family members participating in fishing, with fewer households (55%) participating in farming. Those respondents that participated in fishing stated declines in fishing habitat and catch per unit effort (CPUE), with one third reporting going longer distances for fishing within the last five years. Similarly, over half of the respondents who participated in fishing reported declines in the size and abundance of their targeted species over the past five years. In terms of the effect of the protected areas on fishing and farming, nearly all respondents did not attribute any changes to fishing and

farming activities due to the protected areas, however one third reported that distance traveled had decreased because of the protected areas. 50% of households reported fishing as one of its top three source of household income, however 87% of households felt that the protected areas did not have an effect on either their household income or expenditures. Finally, majority of the respondents were satisfied with the quality (100%) and quantity (94%) of the public water system in Ngardmau.

The results of this study illustrate the perceptions and interactions of Ngardmau community members with their protected areas. Even though there was a need to increase people's awareness of the MC, there were positive results in terms of most community members being aware and supportive of the PAN and OSCA. Even with the support from the community, continued educational awareness of the benefits of protected areas is crucial for the effectiveness and success of protected areas in Palau and Micronesia. Most community members could not attribute any changes to their fishing or farming activities as a result of the protected areas. With these results in mind, continued socio-economic monitoring along with ecological monitoring is necessary in order to ensure that information regarding the biological, social, economic, cultural and political benefits of protected areas are tracked overtime and are useful for making informed management decisions. Monitoring of the ecological and social impacts of protected areas across PAN and MC sites will only allow for a better understanding of the status, changes, and trends of natural resources in Palau and Micronesia and will facilitate the efforts of MC jurisdictions in achieving the desired goals of the MC.

Next Steps

The MC Pilot Study in Palau created information on key socio-economic indicators identified by the MC and Palau socio-economic groups. The next step is to examine the indicators most important to making informed management decisions, and then repeat this study in the other 13 Palau states with MC sites.

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APPENDICES

Appendix 1: Copy of Household Survey

Appendix 2: Copy of Individual Adults Survey

Appendix 3: Copy of Individual Children Survey

Appendix 4: Copy of Key Informant Interview Survey

APPENDIX 1: PALAU PICRC SOCIO-ECONOMIC HOUSEHOLD SURVEY (FIELD TEST)

Date (day, month): _____201__ Gender of Respondent:_____
Interviewer(s): _____ Village: _____

Step 1: INTRODUCTION – CONFIDENTIALITY – PERMISSION
Step 2: DEMOGRAPHICS and LIVELIHOOD

1. First, we would like to ask you questions about the people who live in your household. Household refers to anyone who lives in the same house, share the same kitchen. (PICRC 1)

{Instructions: check the gender of the interviewee}
1a) What is your age?
b) what is the highest education you completed?
c) what is your citizenship?
d) List all the members in your household, {repeat a-c for each household member}

	GENDER		AGE	Completed level of education			CITIZENSHIP	
	female	male		elementary	high school	college	Palau	Other
Interviewee	☐	☐	__	☐	☐	☐	☐	_____
1_____	☐	☐	__	☐	☐	☐	☐	_____
2_____	☐	☐	__	☐	☐	☐	☐	_____
3_____	☐	☐	__	☐	☐	☐	☐	_____
4_____	☐	☐	__	☐	☐	☐	☐	_____
5_____	☐	☐	__	☐	☐	☐	☐	_____
6_____	☐	☐	__	☐	☐	☐	☐	_____
7_____	☐	☐	__	☐	☐	☐	☐	_____

2. What livelihood (subsistence and income) activities does each family member do? (PI1, PI4)

2a) Do you fish?{Instructions: If NO, leave both check boxes blank}
b) If yes, do you fish for money, or fish or both?
c) Does anybody else in your household fish for fish? {Instructions: If NO, leave both check boxes blank}
d) {Instruction: repeat steps a-c for the remaining five activities}

Fishing Fish		Fishing Inverts		Farming crops		Livestock		Hunting land animals		Job with salary		Other
For $	For food	For $	For food	For $	For food	For $	For food	For $	For food	gov	non-gov	

Interviewee							
1	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐	_____
2	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐	_____
3	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐	_____
4	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐	_____
5	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐	_____
6	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐	_____
7	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐	☐ ☐	_____

3. What are the top 3 sources of income for your household? {Do not say categories, Rank 1-3} (PI4)

FISHING fish	FISHING Inverts	FARMING crops	LIVE-STOCK	HUNTING	SALARY	GIFTS FROM FAMILY	FAMILY CUSTOM	PENSION /SOCIAL SECURITY	OTHER _____
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

4. What is the monthly income level of your household?{Instructions: list different income categories, and check which apply} (PI4)

Less than 500$	$500-1000	$1001-1500	$1501-2000	$2001-2500	More than $2500	Do not wish to say
☐	☐	☐	☐	☐	☐	☐

5. What are the top 3 expenses for your household? {Do not say categories, Rank 1-3}(PI4)

FAMILY CUSTOM	FOOD	FISHING(fuel, boat, gear, repairs)	FARMING (tools)	HOUSE HOLD (clothing, etc.)	EDU-CATION	TRANS-PORT (cars, bikes, airplanes)	EMPLOY-EES	RENT or MORT-GAGE	UTILITES	OTHER Alcohol, tobacco, betelnut
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

6. (PI4, OSCA1-13)

6a) Has the conservation area changed your household income? {If NO, mark not changed box}

6b) If yes, has it increased or decreased your household income?

6c) Has the increase/decrease, been small or large?
d) {Repeat steps a-c for household expenditures}

	Greatly Increased	Somewhat Increased	Not changed	Somewhat decreased	Greatly decreased	I don't know
the household income	☐	☐	☐	☐	☐	☐
the household expenses	☐	☐	☐	☐	☐	☐

STEP 3: FOOD

7. Do you know of any household in your community that struggles to find food? Yes or No. Circle one. (PI1/MC1)

8. a) What local food did your family eat (Yesterday, two, three) (PI2)
b) What imported foods did your family eat (Yesterday, two, three)

	Yesterday?	Two days ago?	Three days ago?
LOCAL FOODS			
Taro/Tapioca/Sweet potato	☐	☐	☐
Fish	☐	☐	☐
Invertebrates	☐	☐	☐
Fruit	☐	☐	☐
Vegetables	☐	☐	☐
Other	☐	☐	☐
IMPORTED FOODS			
Rice / Noodles / Bread	☐	☐	☐
Canned food	☐	☐	☐
Chicken / Pork / Beef	☐	☐	☐
Fruits	☐	☐	☐
Vegetables	☐	☐	☐
Other	☐	☐	☐

9. Do you prefer LOCAL or IMPORTED foods? (circle one) If yes, WHY? (PI2)

10. Do you eat different things now compared to five years ago? YES / NO(circle one) If yes, WHY? (PI2)

11. (MC1, PI1, PI2)
11a) Has the conservation area changed the availability of fishing fish for your household? {If NO, mark not changed box}
11b) If yes, has it increased or decreased the availability of fishing fish for your household?
11c) Has the increase/decrease, been small or large?
11d) {Repeat steps a-c for fishing invertebrates}

	Greatly Increased	Somewhat Increased	Not changed	Somewhat decreased	Greatly decreased	I don't know
the availability of food from fishing fish for my household	☐	☐	☐	☐	☐	☐
the availability of food from fishing invertebrates for my household	☐	☐	☐	☐	☐	☐

12. The Conservation Areas have ___ (MC1, PI2) same as # 11

	Greatly Increased	Somewhat Increased	Not changed	Somewhat decreased	Greatly decreased	I don't know
the availability of farm food for my household	☐	☐	☐	☐	☐	☐
The availability of livestock food for my household	☐	☐	☐	☐	☐	☐
the availability of food from hunting for my household	☐	☐	☐	☐	☐	☐

Step 4: FRESH WATER

13. Where does your drinking water come from?
14. Please rank the quality/quantity of your public freshwater (PI5)
{Read the categories, exclude I don't know category}

	Great	Good	Neutral	Bad	Very Bad	I don't know
quality	☐	☐	☐	☐	☐	☐
quantity	☐	☐	☐	☐	☐	☐

15. The Conservation Areas have ___ (PI7)

	Greatly Increased	Somewhat Increased	Not changed	Somewhat decreased	Greatly decreased	I don't know
the quantity of public fresh water for my household	☐	☐	☐	☐	☐	☐
the quality of public fresh water for my household	☐	☐	☐	☐	☐	☐

16. Are there any threats to public freshwater? YES/NO (circle one) If YES, then what? (PI7)

17. What do you think is the answer to the threats?

THANK YOU!

NOTES:

APPENDIX 2: PALAU PICRC SOCIO-ECONOMIC INDIVIDUAL SURVEY
(FIELD TEST)
ADULT (18+) and YOUTH (14-18)

Date (day, month): _____201__
Interviewer(s): _____
Gender of Respondent: _____
Age of Respondent: _____

Village: _____
Household ID _____
Respondent # _____

Step 1: FISHING ACTIVITIES

1. Have you fished at least once in the last year (including invertebrate fishing?) YES/ NO (circle one). If not skip to questions #15
   1a) How many years have you fished? ____
   1b) What fishing methods have you used within the last year?

		glean	spear (walking)	spear (diving)	spear (canoe)	hand line	rod& reel	trap	cast net ____	gill net ____ (net mesh size)	Troll net ____	other
2. How many ____ do you normally fish?(by fishing method) (PI3)	times/ week (month)											
	hours/ trip											
	months/ year											
3. How many ___ do you personally catch per fishing trip? (PI3)	lbs or baskets											
	# of animals											

4. What percent of your catch do you use for ___per month (PI3)

eating											
selling											
giving away											
family custom											

5. When you go fishing what are the top three habitats you fish in the most? {Rank 1-3, Do each method one by one} (PI3)

	glean	spear (walking)	spear (diving)	spear (canoe)	hand line	rod& reel	trap	cast net	gill net	troll net	other	TOTAL
rock / sand intertidal	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
reef tops	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
mangrove	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
sea grass	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Coastal reef	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
lagoon	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
outer reef	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
pelagic / open ocean	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
other	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

6. Has the quality of the marine habitat you mostly fish in ___ (#1habitat_____)(PI3)

	Greatly Improved	Somewhat Improved	Not changed	Somewhat declined	Greatly declined	I don't know
over the past five years	☐	☐	☐	☐	☐	☐
because of the MPA	☐	☐	☐	☐	☐	☐

8. List the marine animals you catch most (1=most) and their size (PI3)

	name	size
1		
2		
3		
4		
5		

9. In the last 5 years has the ___ 1=decreased, 2=increased, 3=not changed, 4=don't know, in the last 5 years?(PI3)

abundance of this animal	Size of this animal

10. Overall my fish/invertebrate (circle one) catch has ___(PI3)
.1a) Has the conservation area changed the availability of fishing fish for your household? {If NO, mar ıot changed box}
.1b) If yes, has it increased or decreased the availability of fishing fish for your household?
.1c) Has the increase/decrease, been small or large?
.1d) {Repeat steps a-c for fishing invertebrates}

	Greatly Increased	Somewhat Increased	Not changed	Somewhat decreased	Greatly decreased	I don't know
over the past five years	☐	☐	☐	☐	☐	☐
because of the MPA	☐	☐	☐	☐	☐	☐

11. The time I have to fish to catch the same amount of fish has___ (PI3)
.1a) Has the conservation area changed the availability of fishing fish for your household? {If NO, mar ıot changed box}
.1b) If yes, has it increased or decreased the availability of fishing fish for your household?
.1c) Has the increase/decrease, been small or large?
.1d) {Repeat steps a-c for fishing invertebrates}

	Greatly Increased	Somewhat Increased	Not changed	Somewhat decreased	Greatly decreased	I don't know
over the past five years	☐	☐	☐	☐	☐	☐
because of the MPA	☐	☐	☐	☐	☐	☐

12. The distance I travel to fish has___ (PI3)
.1a) Has the conservation area changed the availability of fishing fish for your household? {If NO, mar ıot changed box}
.1b) If yes, has it increased or decreased the availability of fishing fish for your household?
.1c) Has the increase/decrease, been small or large?
.1d) {Repeat steps a-c for fishing invertebrates}

	Greatly Increased	Somewhat Increased	Not changed	Somewhat decreased	Greatly decreased	I don't know
over the past five years	☐	☐	☐	☐	☐	☐
because of the MPA	☐	☐	☐	☐	☐	☐

13. Are there any threats to fisheries? If so what? (PI3)

14. What are the solutions to threats for Palau's fisheries? (PI11)

Step 2: FARMING ACTIVITIES

15. Have you farmed at least once in the last year? YES/NO (circles one). If NO skip to question #22 (PI3)

16. How many ___ do you usually farm? (PI3)

Hours / week (months)	Months / year

17. In a month what percent of your farmed goods go to ___?(PI3)

Eating	Selling	Giving Away	Family Custom

18. In a month how many lbs or baskets do you harvest of these crops or animals? (PI3)

	Tapioca	Taro	sweet potato	Noni	Betelnut	Livestock	Other	Other
lbs								
basket								

19. My farm production has _____(PI3)

.1a) Has the conservation area changed the availability of fishing fish for your household? {If NO, mar ıot changed box}

.1b) If yes, has it increased or decreased the availability of fishing fish for your household?

.1c) Has the increase/decrease, been small or large?

.1d) {Repeat steps a-c for fishing invertebrates}

	Greatly Increased	Somewhat Increased	Not changed	Somewhat decreased	Greatly decreased	I don't know
over the past five years	☐	☐	☐	☐	☐	☐
because the Conservation Area was created	☐	☐	☐	☐	☐	☐

20. Are there any threats to farming? If so what?(PI3)

21. What are the solutions to threats for Palau's farming? (PI11)

STEP 3: GOVERNANCE

22. Do you know what the OSCA is? YES/ NO (circle one) (OSCA1-3)

23. What are the two main causes of sedimentation? (OSCA1-3)

23. What are the two main impacts of sedimentation? (OSCA1-3)

25. Are you aware of the OSCA___? (OSCA1-3)
    a) Purpose? YES/NO
    b) Rules? YES/NO
    c) Boundaries? YES/NO

26. Please rank your level of support for the OSCA (OSCA1-3)

Strongly Support	Support	Neutral	Do not support	Strongly do not support	I don't know
☐	☐	☐	☐	☐	☐

STEP 3: GOVERNANCE

22. Have you heard of ___ (MC8)			23. What are the two main purposes of ____ (MC8)	24. Do you ___ the ___ (MC 9)				
	YES	NO		Greatly support	Support	Neutral	Opposed	Greatly opposed
PAN protected area sites	☐	☐		☐	☐	☐	☐	☐
The Micronesia Challenge in Palau	☐	☐		☐	☐	☐	☐	☐
Closure of commercial fisheries in the Palau EEZ	☐	☐		☐	☐	☐	☐	☐

25. Illegal entry in the Conservation Areas (poaching) has ___ in the past five years (MC4, OSCA1-7)

Greatly Increased	Somewhat Increased	Not changed	Somewhat decreased	Greatly decreased	I don't know
☐	☐	☐	☐	☐	☐

26. There is ___ (PI11)

	Not enough	Just Enough	Too much	I don't know
enforcement of natural resource rules	☐	☐	☐	☐
monitoring of natural resources	☐	☐	☐	☐

27. Have you had the opportunity to participate in resource management planning and decision making ___ (MC2, OSCA3-2)

YES	NO	I don't know
☐	☐	☐

28. I participate in resource management planning and decision making ___ (MC2, OSCA3-2)

Never	Seldom	Some times	Often	Always	I don't know
☐	☐	☐	☐	☐	☐

29. What are your suggestions to improve management? (PI11)

30. Do you prefer management (CLARIFY MANAGEMENT of natural resources) overseen by *bul* or by legislation from the government, or both? Why? (PI8, PI11)

31. Do you support additional Conservation Areas in your state? YES / NO (circle one) (PI11)

32. Should any new Conservation Areas be **permanent** or **temporary**? (circle one) (PI11)

33. Does everyone benefit equally from the Conservation Areas? (PI11)

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	I don't know
☐	☐	☐	☐	☐	☐

34. If no, who benefits the most?

Do you have any questions/comments for us?

THANK YOU!

APPENDIX 3: PALAU PICRC SOCIO-ECONOMIC INDIVIDUAL SURVEY (FIELD TEST)
CHILD (6-13)

Date (day, month): _____201__
Interviewer(s): _____
Gender of Respondent: _____
Age of Respondent:___
Village:_____
Household ID:_____
Respondent #_____

Step 1: FISHING ACTIVITIES

1. Do you fish (including invertebrate fishing) YES/NO (circle one) If no skip to question #12 (PI3)

2. What fishing method to you use most (1), second most (2) etc. (X=never) (PI3)

glean	spear (walking)	spear (diving)	spear (canoe)	hand line	rod & reel	trap	cast net	gill net	troll net	other _____
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
							_____	_____	_____	

(net mesh size)

3. What habitat do you fish in most (1), second most (2) etc., (X=never) (PI3)

rock / sand intertidal	reef tops	mangrove	seagrass	coastal reef	lagoon	outer reef	pelagic / open ocean	other
☐	☐	☐	☐	☐	☐	☐	☐	☐

4. How many ____ do you normally fish? (PI3)

Trips / week (months)	Hours / trip	Months / year

5. How many ____ do you normally catch in one fishing trip? (PI3)

lbs Number of animals

6. What do you do with most of your catch? (Rank 1= most) (PI3)

Eating	Selling	Giving Away	Family Custom

7. List the marine animals you catch most (1=most) and their size (PI3)

	name	size
1		
2		
3		
4		
5		

9. Who do you fish with? (PICRC2)

10. How did you learn how to fish? (PICRC2)

11. Are there any threats to fishing? If so what? (PI11)

Step 2: FARMING ACTIVITIES

12. Do you farm YES/NO (circle one). If no skip to question #19 (PI3)

13. How many ___ do you usually farm? (PI3)

Hours / week (month)	Months / year

14. What do you do with most of your crops? (PI3)

Eating	Selling	Giving Away	Family Custom

15. What crops or animals do you farm? (PI3)

Tapioca	Taro	sweet potato	Noni	Beetlenut	Livestock	Other	Other

16. Who do you farm with? (PICRC2)

17. Who taught you to farm? (PICRC2)

18. Are there any threats to farming? If so what?(PI11)

Step 3: GOVERNANCE

19. Do you know about the Conservation Areas? (MC8)

20. What can you tell us about the Conservation Areas? (MC8)

21. What are the Conservation Areas for? (MC8)

22. What do you want to be when you grow up? (PI4)

23. Do you have any questions/comments for us?

THANK YOU!

NOTES:

APPENDIX 4: PALAU PICRC SOCIO-ECONOMIC KEY INFORMANTSURVEY (FIELD TEST)

Date (day, month): _____201__
Interviewer(s): _____
Gender of Respondent:_____
Village: _____
Name of Respondent: _____
Title of Respondent: _____

Step 1: INTRODUCTION

Hello my name is _____. I'm a researcher from PICRC and I'd like to ask you some questions about the management of natural resources in Ngardmau.

Step 2: PROTECTED AREAS

❖ We'd like to start with asking you some questions about the protected areas in Ngardmau.

1.a. Are there benefits of the OSCA? ☐YES ☐NO {*check one*}

1.b. {*If yes*} What are the benefits of the OSCA? {*Write key points and if possible key quotes*}

2.a. Are there any costs (or negative aspects) to the OSCA? ☐YES ☐NO {*check one*}

2.b. {*If yes*} What are the costs of the OSCA? {*Write key points and if possible key quotes*}

3.a. Does everyone benefit equally from the OSCA?☐YES ☐NO {*check one*}

3.b. {*If no*} Who benefits the most? {*Write key points and if possible key quotes*}

4. Who participates in resource management decision making in Ngardmau?

5. Do you think there is a need for additional Conservation Areas in your state? ☐YES ☐NO

6. Should any new Conservation Areas be ☐PERMANENT or ☐TEMPORARY? {*check one*}

7.a. Do you prefer management of natural resources to be overseen by:

☐*Bul*☐Legislation from the government ☐both

☐Other:_____ {*check one*}

7.b. WHY? {*Write key points and if possible key quotes*}.

8. What are your suggestions to improve management of natural resources?
{*Write key points and if possible key quotes*}

❖ Now we'd like to ask you questions enforcement of the Ngardmau Protected Areas.

9.a. Is there enough enforcement of natural resource rules?☐YES ☐NO {*check one*}

9.b. {*If no*} What is the solution? {*Write key points and if possible key quotes*}

10.a. Has there been any poaching activities in the Marine Conservation Areas in the last five years?
☐YES ☐NO {*check one; if no skip to question 11*}

10.b. {*If yes*} Has the poaching in the Marine Conservation Areas☐ INCREASED or ☐ DECREASED in the last 5 years? {*check one*}

10.c. Has the change in poaching in the Marine Conservation Areas been ☐SMALL or ☐LARGE?

11.a. Has there been any poaching activities in the Terrestrial Conservation Areas in the last five years?
☐YES ☐NO {*check one; if no skip to question 12*}

11.b. {*If yes*} Has the poaching in the Terrestrial Conservation Areas☐ INCREASED or ☐ DECREASED in the last 5 years? {*check one*}

11.c. Has the change in poaching the Terrestrial Conservation Areas been ☐SMALL or ☐LARGE? {*check one*}

12.a. Is there enough research monitoring of natural resources? ☐YES ☐NO {*check one*}

12.b. {*If no*} What is the solution? {*Write key points and if possible key quotes*}

❖ Now we're going to ask you a few questions about the impact of the Conservation Areas on the natural resources of Ngardmau.

13.a. Have the marine protected areas changed anything about fisheries in Ngardmau?
☐YES ☐NO {*check one*}

13.b. Please explain.

14.a. Have the terrestrial protected area changed anything about farming in Ngardmau?

☐YES ☐NO {*check one*}

14.b. Please explain.

15.a. Have the terrestrial protected areas changed the availability of freshwater in Ngardmau?

☐YES ☐NO {*check one*}

15.b. Please explain.

Step 3: FISHERIES

- Now we're going to ask you about fisheries, specifically questions about the sea cucumber fishery and the ban on the Napoleon Wrasse and Bumphead Parrotfish.

16. How many Ngardmau residents participated in the sea cucumber fishing that was sold for commercial export in 2011? _____

17.a. Do you support the ban on the national export of sea cucumbers that began in January 2012?

☐YES ☐NO {*check one*}

17.b. Why or Why not?

17.c. {*If no*} What alternative management options would you suggest regarding the ban on national export of sea cucumbers?

18.a. Has there been any illegal fishing for *Maml* or *Kemedukl* in the last 5 years?
☐YES ☐NO {*check one; if NO skip to #19*}

18.b. {*If yes*} Has the illegal fishing for *Maml* or *Kemedukl* ☐ INCREASED or ☐ DECREASED in the last 5 years? {check one}

18.c. {*If yes*} Has the change in illegal fishing for *Maml* or *Kemedukl* ☐ SMALL or ☐ LARGE?

19.a. Do you support the ban on harvesting of Napoleon Wrasse and Bumphead Parrot fish?
☐YES ☐NO {*check one*}

19.b. Please explain why or why not.

19.c. {If no} Which alternative management options would you suggest for *Maml* or *Kemedukl*? {*Tell them the choices and check the appropriate box*}

☐ Allow fishing only for subsistence and cultural uses, no selling in the market.

☐ No restrictions on fishing

☐ Other suggestions.

❖ Now we'd like to ask you questions about other resource management measures in Palau.
{*For questions 20-22, fill the blanks with the conservation initiative in the first column. Do all three questions with one conservation initiative then move on to the next*}

20. Have you heard of ___? {*check one*}			21. What are the two main purposes of ____? {*write notes on the first two purposes*}	22. Do you ___ the ___ ?{*at the first blank list the choices below, the second blank is from the first column*}				
	YES	NO		Greatly Support	Support	Neutral	Opposed	Greatly Opposed
Protected area network (PAN) sites	☐	☐	1. 2.	☐	☐	☐	☐	☐
The Micronesia Challenge in Palau	☐	☐	1. 2.	☐	☐	☐	☐	☐
Proposed closure of commercial fisheries in the Palau EEZ	☐	☐	1. 2.	☐	☐	☐	☐	☐

STEP 4: GENDER

- Finally we'd like to ask you some questions about the role of women and men in Palau.

23.a. Do men and women use the same natural resources (i.e. do men and women farm and fish the same way)? ☐YES ☐NO {*check one*}

23.b. Why or Why not?

23.c. {*If no*} What natural resources do women use?

23.d. {*If no*} What natural resources do men use?

24.a. Have the natural resource that women and men use changed in the last ten years?

☐YES ☐NO {*check one*}

24.bPlease explain.

25.a. Are there any other ways that the roles of women and men have changed in the last 10 years?

☐YES ☐NO {*check one*}

25.b. Please explain.

26.a. Do women and men have the same priorities for natural resource management?

☐YES ☐NO {*check one*}

26.b. Please explain.

Do you have any questions or comments for us? ***THANK YOU!***

NOTES: