



## Impact of Cyclone Winston on Mud Crab Fishers in Fiji



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Cover photos: Mud crab fisher from Nasau village (Navakasiga District) in Bua Province / Yashika Nand/WCS

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Firstly, we would like to thank all the fishers for participating in this study and openly sharing how Cyclone Winston impacted their fishery. We thank the Ministry of Fisheries for supporting this work. This work would not have been possible without the generous support of the Flora Family Foundation (#2015-2694) and David and Lucile Packard Foundation (#2015-41007).

## TABLE OF CONTENTS

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ACKNOWLEDGEMENTS.....	3
TABLE OF CONTENTS .....	3
EXECUTIVE SUMMARY .....	4
1. INTRODUCTION .....	6
2. METHODS.....	7
3. RESULTS AND DISCUSSION .....	9
3.1 How did the cyclone impact harvesting patterns? .....	9
3.2 Did the use of harvested mud crabs change? .....	10
3.3 Did mud crab sales change post-cyclone? .....	12
3.4 Are fishers collecting other seafood? .....	13
3.5 Is fishing the only source of income for mud crab fishers? .....	14
3.6 Perceived impact to mangrove systems.....	15
3.7 Impact to fisheries gear and infrastructure .....	16
CONCLUSION AND RECOMMENDATIONS.....	17
APPENDIX 1. Post-Cyclone Fisheries Impact Assessment: Mud crabs for Subsistence and Livelihoods.....	18

## EXECUTIVE SUMMARY

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On 20 February 2016, Fiji was hit by Category 5 Tropical Cyclone Winston which caused damages and losses estimated at FJ\$1.99 billion.<sup>1</sup> Fisheries, which made up 1.8% of Fiji's GDP in 2015, sustained damages and losses estimated at over FJ\$40.7 million. A study was conducted in April to May 2016 to assess social and economic impact of Cyclone Winston on the mud crab fishery in Bua Province, and provide recommendations for government and development partners on where recovery and rehabilitation efforts should be directed. The results were compared to pre-cyclone data collected during a value chain analysis of the mud crab fishery in 2015.

The study found 48.5% of mud crab fishers stopped harvesting crabs due to difficulties accessing their collection sites, damages and losses sustained to fishing gear and boats, and because many were focussed on repairing their homes. The most damaged infrastructure reported was boats (78.6%), which included *bilibili* (bamboo rafts) and boats (with and without engines). Over half of the fishers (68%) noticed a change in the number of crabs caught post-cyclone. Whilst the majority of these fishers noted that they were catching less mud crabs after the cyclone, 25% of fishers (from the districts of Bua, Dama and Lekutu) actually noted an increase in the number of mud crabs caught.

For less impacted villages buyers made more frequent trips to buy mud crabs directly from fishers. An increase in market price was reported by 29.4% of fishers. On average crabs were sold for \$14/kg, and ranging from \$8/kg to \$18/kg across Bua Province, post-cyclone Winston. This is on average 13% higher than pre-cyclone prices which averaged \$10.90/kg. Women earned less than men both before and after the cyclone. Given the need for cash and these higher prices offered, many fishers preferred to sell to middlemen rather than consume them in their households and increased their harvesting efforts.

Most mud crab fishers had other livelihoods (e.g. kava, weaving, coconuts) to supplement their income. Depending on the severity and type of gear damaged the majority of fishers (72.2%) were planning to use income from alternative sources to repair or replace damaged equipment. Some fishers (11.1%) had no alternative plan, as mud crab was their only source of income.

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<sup>1</sup> Government of Fiji (2016) Fiji Post-Disaster Needs Assessment. Tropical Cyclone Winston, February 20, 2016.

The following recommendations are made from this study:

- (i) Ensure government support to fishing communities is gender sensitive and takes into consideration the losses and damages incurred by women fishers;
- (ii) Provide up to date information to women fishers on pricing to ensure they get a fair price for their mud crabs;
- (iii) Encourage villages and districts to establish regulations or guidelines for the mud crab fishery which promotes the resilience of the fishery to cyclone events;
- (iv) Ensure districts with damaged mangrove *tabu* areas remain closed to help promote recovery; and
- (v) Continue monitor the mud crab fishery to gauge the recovery of the fishery and the impact to subsistence and livelihoods in Bua Province.

# 1. INTRODUCTION

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On 20 February 2016, Fiji was hit by Category 5 Tropical Cyclone Winston. It was one of the largest cyclones in the South Pacific and left a trail of destruction along its path over a 24-hour period. Across Fiji 30,369 homes, 495 schools and 88 medical facilities were damaged or destroyed and 44 people lost their lives.<sup>2</sup> The cyclone destroyed food and agricultural crops on a large scale and impacted the livelihoods of 62 percent of the population. The total value of damages and losses estimated at FJ\$1.99 billion, with fisheries, which made up 1.8% of Fiji's GDP in 2015, sustaining damages and losses estimated at over FJ\$40.7 million.<sup>2</sup> A post-cyclone village-level assessment led by the Wildlife Conservation Society (WCS), the Fiji Locally Managed Marine Area (FLMMA) network and partners, documented losses in boats, engines, fishing and post-harvest gear totalling FJ\$2,960,139 across six provinces.<sup>3</sup> Losses in fishing gear and infrastructure impacted key fisheries such as coral reef fish, sea cucumbers, prawns, shrimp and mud crabs.<sup>3</sup>

The mud crab fishery is largely a domestic fishery in Fiji that provides a source of food and livelihoods for local communities with access to mangrove forests (WCS, unpublished data). In late 2015, WCS conducted the first supply and value chain analysis (VCA) of the wild caught mud crab fishery focusing on Bua Province. The VCA study examined the fishery in detail, across all the market players and assessed their investments along the wild caught mud crab supply chain. The VCA established that mud crab harvesting is dominated by women fishers and is largely done by *iTaukei* communities within mangrove forests and adjacent mud and sandflats within their customary fishing grounds (WCS unpublished data). The VCA also documented catch, size preferences, prices and markets targeted by fishers and the contribution of the fishery to household income.

The data collected for the VCA in 2015 provided baseline data to assess the impact of Cyclone Winston on the mud crab fishery in Bua Province. WCS, FLMMA and the Ministry of Fisheries conducted a study to:

- (i) assess the social and economic impact of Cyclone Winston on the mud crab fishery in Bua Province two to three months after the cyclone; and
- (ii) provide recommendations for government and development partners on where recovery and rehabilitation efforts should be directed.

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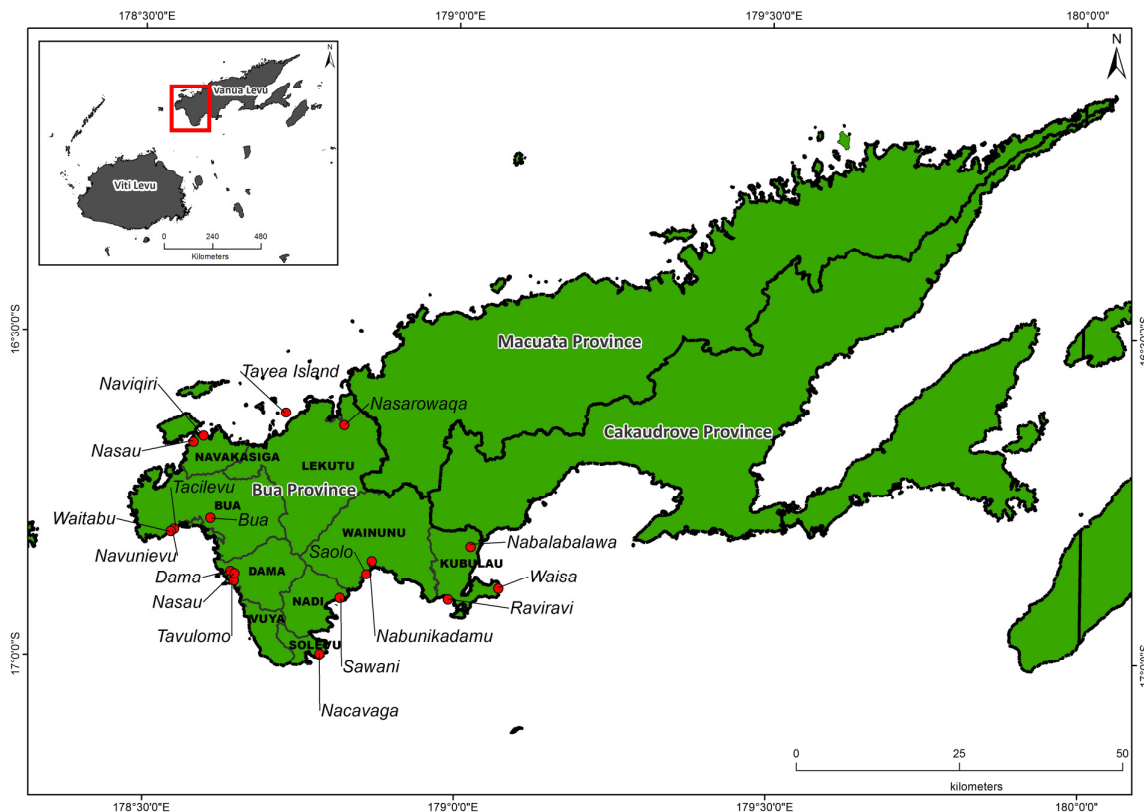
<sup>2</sup> Government of Fiji (2016) Fiji Post-Disaster Needs Assessment. Tropical Cyclone Winston, February 20, 2016. Government of Fiji, Suva, Fiji. 148 pp.

<sup>3</sup> Chaston Chaston Radway K, Manley M, Mangubhai S, Sokowaqanilotu E, Lalavanua W, Bogiva A, Caginitoba A, Delai T, Draniatu M, Dulunaqio S, Fox M, Koroawaqa I, Naisilisili W, Rabukawaqa A, Ravonoloa K, Veibi T (2016) Impact of Tropical Cyclone Winston on Fisheries-Dependent Communities in Fiji. Report No. 03/16. Wildlife Conservation Society, Suva, Fiji. 79 pp.

## 2. METHODS

A socioeconomic questionnaire was conducted in Vanua Levu two to three months after Cyclone Winston, from 13 April to 13 May, 2016 (Appendix 1). A total of 68 mud crab fishers were interviewed in 16 communities across 8 districts in Bua Province (Fig. 1, Table 1). Each interview took 30–40 minutes and was conducted in people's homes in the *iTaukei* language by trained female local interviewers. Of the 68 people interviewed, 90% were women and 10% were men, and 58 (85.3%) had participated in the pre-cyclone VCA analysis.

To compare pre- and post-cyclone responses of fishers, the majority of the questions asked were identical or complementary to those in the earlier VCA. The questionnaire provided a quantitative approach designed to obtain information on mud crab dependency and how mud crab fishing activities, such as site, catch and fate of mud crabs had changed since the cyclone. It also examined price changes, the ability of fishers to sell mud crabs, as well as the impact of the cyclone on mangrove habitats and fisheries infrastructure.



**Figure 1.** Location of villages in Fiji where mud crab fishers were interviewed in Bua Province. Source: Ingrid Qauqau/WCS

**Table 1.** The districts, villages and gender distribution of mud crab fishers interviewed in Bua Province during pre-cyclone (WCS, unpublished data) and post-cyclone impact studies.

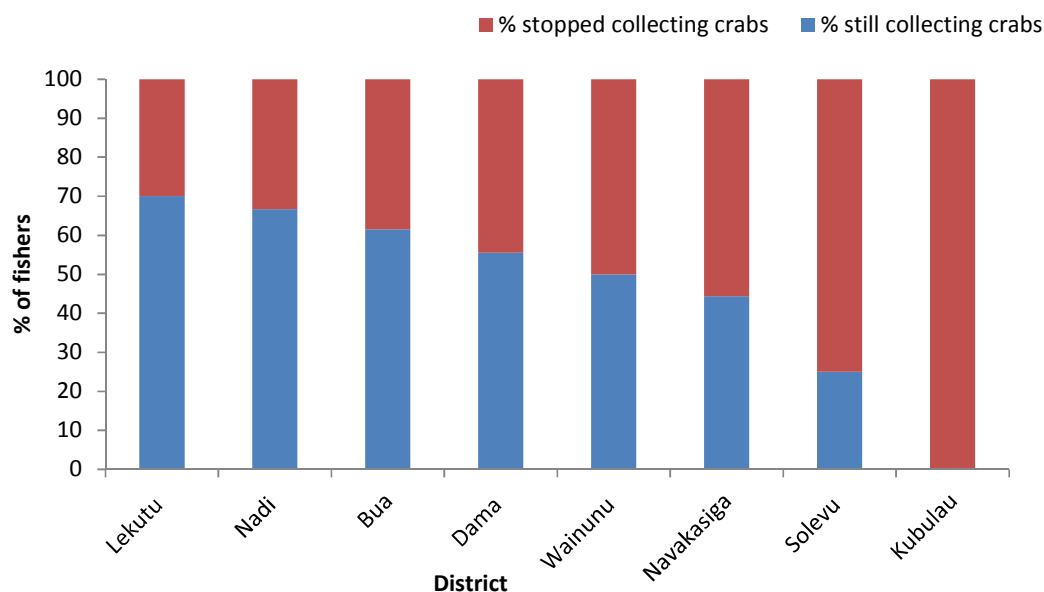
District	Village / Settlement	Pre-cyclone		Post-cyclone	
		#women	#men	#women	#men
Bua	Bua Lomanikoro	4		3	
	Navunievu	11	2	9	1
Dama	Dama	5		3	
	Nasau	5	1	2	
	Tavulomo	4		4	
Kubulau	Nabalabalawa	2		2	
	Raviravi	5		2	
	Waisa	5	1	3	1
Lekutu	Nasarowaqa	5		3	
	Navakadara Estate		1		
	Tavea	5	3	5	2
Nadi	Nasolo	2	1		
	Sawani	5		3	
Navakasiga	Naiviqiri	3		3	
	Nasau Navakasiga	15		6	
Solevu	Cavaga	3	1	3	1
Wainunu	Daria	1	1		
	Nabuniikadamu	7		2	
	Nakorotiki	1			
	Saolo	8	2	8	2



### 3. RESULTS AND DISCUSSION

#### 3.1 How did the cyclone impact harvesting patterns?

Two to three months following Cyclone Winston, 51.5% of the fishers interviewed in Bua Province had stopped collecting mud crabs, with notable differences between districts. For example in Kubulau District all fishers stopped collecting mud crabs, compared to Lekutu where only 30% of fishers had stopped (Fig. 2). Damage to infrastructure and/or collection sites (i.e. mangroves and crab holes) were given as the primary reasons fishers stopped collecting. Other reasons included bad weather, the presence of a mangrove *tabu* area, illness or being busy with village repairs following the cyclone.



**Figure 2.** The percentage of fishers collecting mud crabs two to three months after Cyclone Winston in Bua Province.

Just under half of the fishers returned to mangrove forests to harvest mud crabs 36.3 days on average after the cyclone. For the 48.5% of fishers who continued collecting mud crabs across Bua Province, only 7.1% reported that their harvesting sites had changed. For the majority of new sites (77.4%), the travel time was less than one hour, with a maximum of 2 hours being reported for only 13% of new sites. The travel time was similar to pre-cyclone where travel to harvest areas was usually one hour or less (74.3%), with only some fishers traveling 2 hours (14.7%) or longer (11.0%). This suggests that despite the cyclone prompting/forcing some fishers to choose new sites in the 2–3 months following, these were not necessarily further

away. The primary methods of crab collection were hand collection (57.1%) and using hand nets (25.7%), which were almost identical to the percentages recorded pre-cyclone.

Over half of the fishers (68%) noticed a change in the number of crabs caught post-cyclone. Whilst the majority of these fishers noted that they were catching less mud crabs after the cyclone, 25% of fishers (from the districts of Bua, Dama and Lekutu) actually noted an increase in the number of mud crabs caught. Less than half (42.5%) of the fishers thought the actual size of mud crabs had changed post-cyclone. The average number of number of crabs caught per trip post-cyclone averaged 4.9, but there was variation within and between districts (Table 2). Kubulau, Nadi and Solevu districts reported the lowest count per trip of 0-2 crabs and Wainunu reported the largest of approximately 10 crabs per trip.

**Table 2.** Average number and weight of crabs caught per fishing trip post-cyclone Winston, by fishers from seven districts in Bua Province. Range shown in parentheses. Blanks indicate no data were provided.

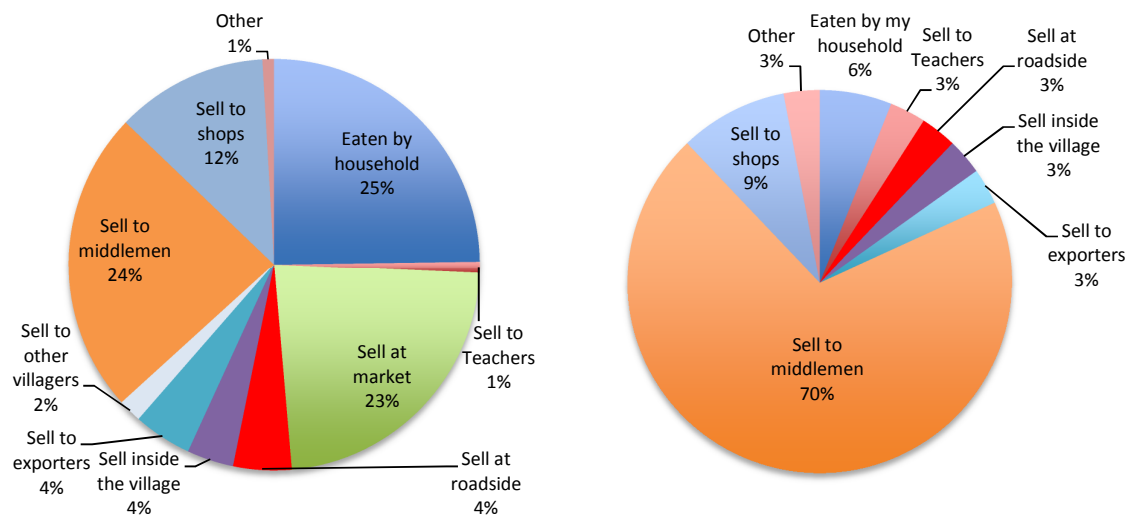
District	Individual crab(s)	Weight (kg)
Bua	4.3 (3-9)	5
Dama	6.7 (6-7)	8
Kubulau	0	
Lekutu	7.6 (3-15)	
Nadi	1 (1-2)	
Navakasiga	4.3 (3-10)	
Solevu	1-2	
Wainunu	9.8 (1-12)	
Overall	4.9 (1-15)	6.5 (5-8)

### 3.2 Did the use of harvested mud crabs change?

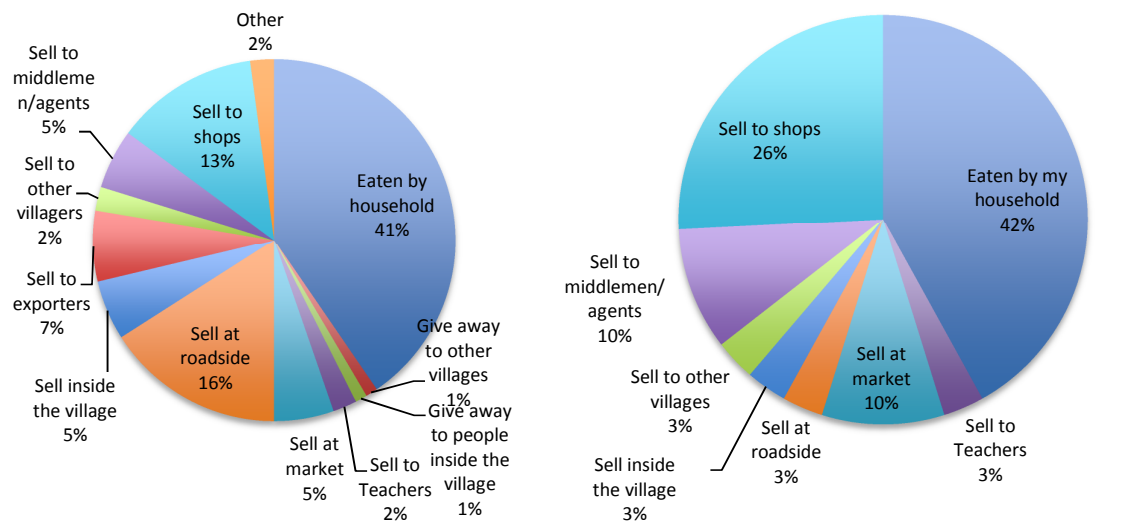
Fishers were asked to rank what was the main use of the mud crabs they collected, and their pre- and post-cyclone responses were compared. Figures 3 and 4 show what fishers listed as the most common (rank 1) and the second most common (rank 2) use of mud crabs caught by fishers in Bua Province, respectively.

Prior to the cyclone the most frequent use of mud crabs was consumption by the household (25%), closely followed by sale to middlemen (24%) and sale to local markets (23%) (Fig. 3). Middlemen frequently visited even very remote villages to source mud crabs. Post-cyclone, the rankings changed with the most frequent use of mud crabs was for sale to middlemen (70%) (Fig. 3). This shift in rankings might be explained by the decrease in harvesting of mud crabs in cyclone affected areas where mangroves were extensively damaged prompting middlemen to actively source mud

crabs from other districts (M. Fox, pers. comms.). Alternatively, fishers may have preferentially chosen to sell their crabs rather than consume them to generate much-needed income to rebuild their homes and lives post-Cyclone Winston. (S. Mangubhai, pers. comm.). Pre- and post-cyclone, the second most common use of mud crabs was consumption by households (Figs. 3–4).



**Figure 3.** The number one use of mud crabs pre- (left) and post- (right) Cyclone Winston.



**Figure 4.** The number two use of mud crabs pre- (left) and post- (right) Cyclone Winston.

### 3.3 Did mud crab sales change post-cyclone?

#### Ability to sell mud crabs

Of the fishers interviewed, approximately 20% stated the cyclone impacted their ability to sell mud crabs. This was largely caused by damage to infrastructure limiting accessibility to markets, damage to mangroves systems making crab harvesting difficult, or a perceived decrease in mud crab stocks. Interestingly, some positive impacts from the cyclone were identified. These included buyers making more frequent trips to the less affected villages to buy mud crabs directly from fishers, and an increase in market price (reported by 29.4% of fishers). These data are consistent with fishers preferentially selecting to sell to middlemen rather than consume them in their households, and selling mud crabs more frequently post-cyclone Winston. Prior to the cyclone, crabs were mostly sold once a month (39%) or once a week (27%). After the cyclone the majority of fishers were selling crabs on weekly basis (75.8%) with a small percentage of fishers (21.2%) selling crabs on monthly basis.

#### Price of mud crabs

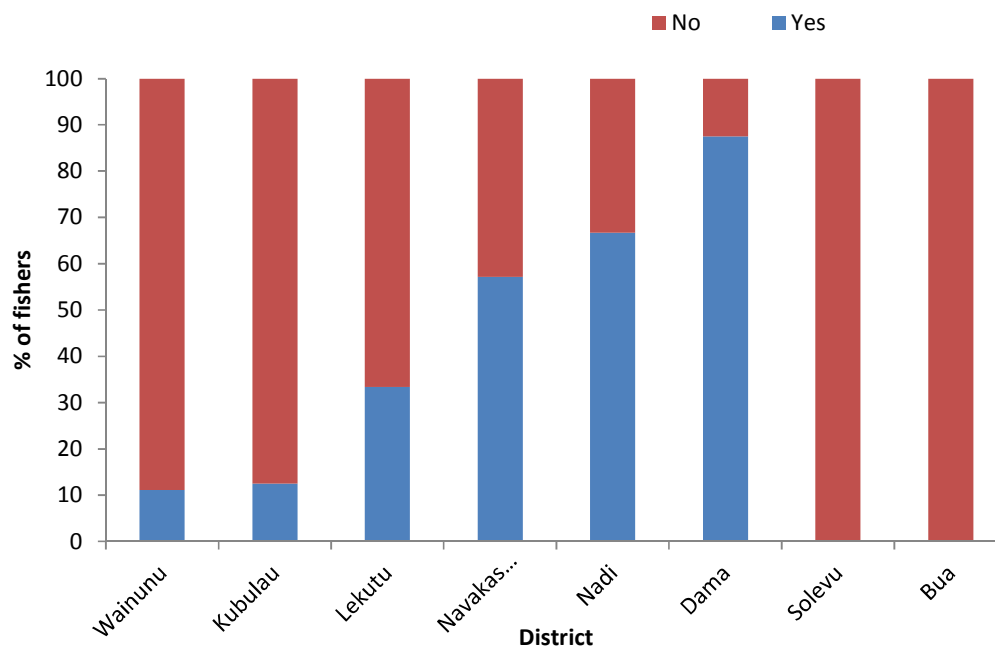
On average crabs were sold for \$14/kg, and ranging from \$8/kg to \$18/kg across Bua Province, post-cyclone Winston. This is on average 13% higher than pre-cyclone prices which averaged \$10.90/kg. The earlier VCA led by WCS showed men received on average a higher price (5% more) than women per kilogram of mud crabs in Bua Province. Women sold crabs at an average price of \$13.80/kg whilst the average price fetched by men was \$15.30/kg (Table 3). While sale prices increased for men and women post-cyclone, women were paid less than men in all districts except Lekutu.

**Table 3.** Average price/kg received by mud crab fishers pre- and post-cyclone across eight districts in Bua Province.

District	Pre-Cyclone		Post-Cyclone	
	Women	Men	Women	Men
Bua	3.17		13.10	<b>14.00</b>
Dama	15.60		13.40	
Kubulau	<b>10.70</b>	10.00	14.00	
Lekutu	<b>12.08</b>	11.40	17.40	<b>16.10</b>
Nadi	6.25		10.00	
Navakasiga	10.67		14.00	
Solevu	<b>12.00</b>	10.00		
Wainunu	10.13	12.67	10.00	<b>13.00</b>
<b>Overall average</b>	<b>10.90</b>	<b>11.50</b>	<b>13.80</b>	<b>15.30</b>

### 3.4 Are fishers collecting other seafood?

With changes in the availability of mud crabs interviewers asked if fishers opted to harvest other seafood to compensate for loss in income when they were unable to harvest or sell crabs. The responses differed between districts but showed little relationship to their location relative to the cyclone impact zone.<sup>4</sup> The highest percentage of fishers harvesting other seafood (fish or sea cucumber) for sale was from Dama District (87.5%), whilst Solevu and Bua Districts did not harvest any other seafood (Fig. 5). Most fishers from Solevu District did not have fishing licences and therefore were not selling to local markets in Nabouwalu, Savusavu or Labasa. Most fishers stated they only sell seafood items if and when someone specifically makes a request. In Kubulau, where all mud crab fishing had stopped in the period two to three months after the cyclone, only 12.5% of fishers collected other seafood (Fig. 5).

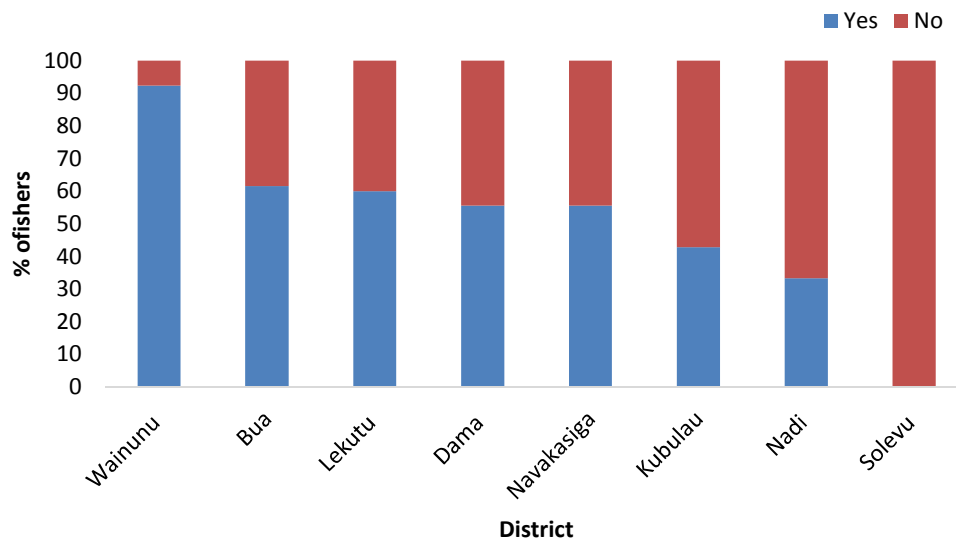


**Figure 5.** Percentage of fishers who reported collecting other seafood types post-Cyclone Winston.

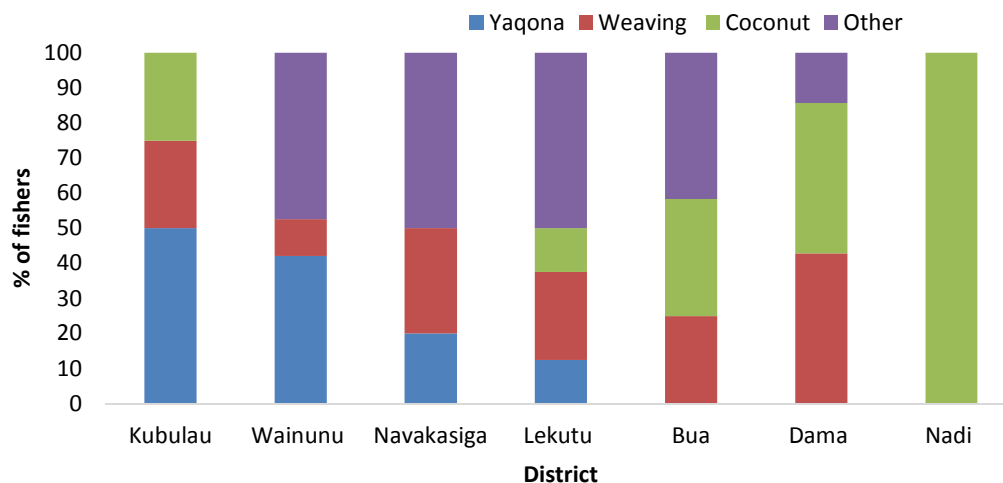
<sup>4</sup> See Figure 1 in Chaston Radway K, Manley M, Mangubhai S, Sokowaqanilotu E, Lalavanua W, Bogiva A, Caginitoba A, Delai T, Draniatu M, Dulunaqio S, Fox M, Koroiwaqa I, Naisilisili W, Rabukawaqa A, Ravonoloa K, Veibi T (2016) Impact of Tropical Cyclone Winston on Fisheries-Dependent Communities in Fiji. Report No. 03/16. Wildlife Conservation Society, Suva, Fiji. 79 pp.

### 3.5 Is fishing the only source of income for mud crab fishers?

With the exception of Solevu and to some degree Wainunu District, most mud crab fishers had other livelihoods to supplement their income (Fig. 6). The top three alternative sources of income were kava (*yaqona*), weaving and coconut (Fig. 7). In Nadi District coconut was the only non-fish related source of income whilst in other districts there was a greater variety of income sources.



**Figure 6.** Fisher dependency on other sources of income aside from fishing.



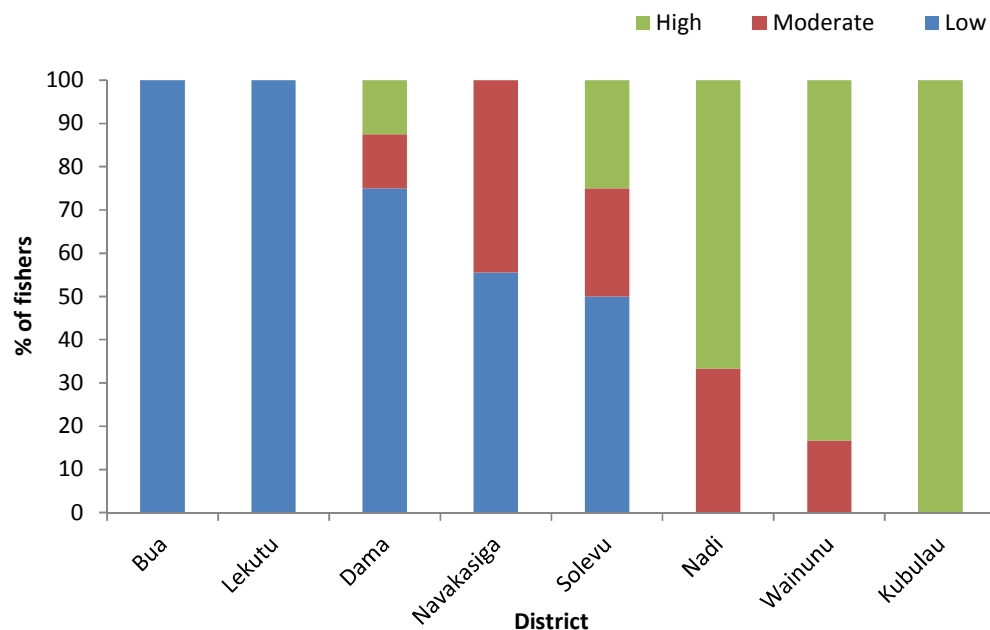
**Figure 7.** Top three sources of non-fishing derived income across Bua Province.

### 3.6 Perceived impact to mangrove systems

#### Mangroves

The perceived impact of Cyclone Winston on mangrove systems varied between districts. It was categorised under three levels of damage; mildly, moderately and highly impacted. Bua and Lekutu were perceived by mud crab fishers to only have had mild levels of damage to mangrove forests, compared to Kubulau, Wainunu and Nadi districts (Fig. 8). This is consistent with the direction the cyclone moved. It is important to acknowledge that these results only provide information on the perceptions of mangrove loss, which is extremely subjective and should therefore not be used alone in the absence of biophysical assessments that can validate community perceptions.

The survey also endeavoured to establish people's perceptions of the importance of mangrove forests in providing support and/or protecting villages from cyclones. The majority (87.3%) of fishers agreed that mangroves provided protection for crabs, other invertebrates and fish. They also identified the role mangroves played in protecting the shoreline from high-energy waves, preventing river banks from eroding and as breeding grounds for fish, crabs and other invertebrates. Only 12.7% of fishers did not think mangroves provided any form of protection and these were mainly from the Districts of Kubulau, Wainunu and Nadi. These were the same three districts that had reported the highest level of damage to mangrove forests from Cyclone Winston.



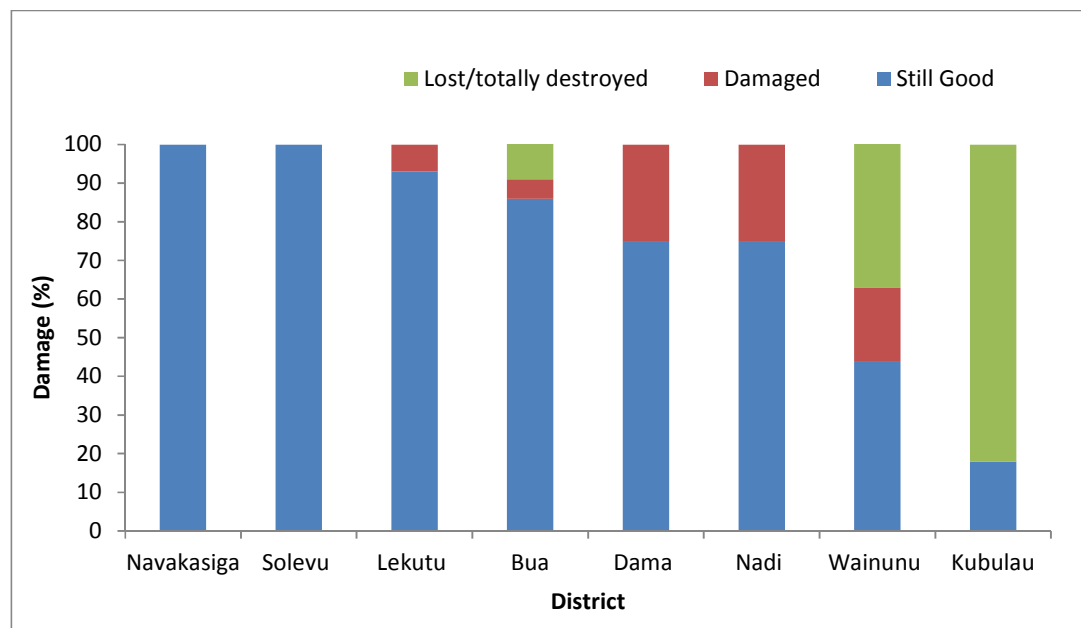
**Figure 8.** Perceived levels of impact on mangrove systems across Bua Province

### 3.7 Impact to fisheries gear and infrastructure

Cyclone Winston caused damages to crab gear, boats, and diving and snorkelling gear, and this varied across the districts (Fig. 9). The level of damage varied from 'still good' or 'damaged' to 'lost/totally damaged'. Based on the cost of repair and replacement, boats and dive and snorkelling gear would have the highest cost for repair and replacement. However, we are unable to estimate the total damages and losses per district due to missing information from fishers and because not all villages were surveyed in each district.

The most damaged infrastructure reported was boats (78.6%), which included bilibili (bamboo rafts), wooden boats (with and without engines) and other types of boats (with and without engines). Damaged boats were mainly owned by the individual mud crab fishers (63.6%) or 'others' (36.4%), but frequently used by fishers. To address the damage, fishers planned to share and use other boats within the village/districts when needed. The second most damaged infrastructure item listed identified was the ice plant in the town of Nabouwalu. Many fishers stated that they would be reliant on getting ice from Nakadrudru in Lekutu, until the plan in Nabouwalu was fixed.

Depending on the severity and type of gear damaged the majority of fishers (72.2%) were planning to use income from alternative sources (if possible) cover the costs to repair or replace damaged equipment. Some fishers (11.1%) had no alternative plan, as mud crab was their only source of income.



**Figure 9.** Level of damage of fishing gear across districts in Bua province.



## CONCLUSION AND RECOMMENDATIONS

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Cyclone Winston caused wide scale impact to fisheries-dependent communities across the impact zone in Fiji with notable differences between men and women depending on their investment in coastal fisheries.<sup>5</sup> This study enabled a detailed analysis of the impact of Cyclone Winston on the mud crab fishery, included changes in fishing effort, catch volumes and prices.

During the survey, communities specifically requested for government assistance with: (i) repairing/replacing fishing gear; (ii) standardizing market price for crabs so that they can earn enough money to pay for their damage; (iii) creating a mud crab nursery to help restock populations in the mangroves; and (iv) find new markets that will buy at higher prices from mud crab fishers.

The following recommendations are made from this study:

- a. Ensure government support to fishing communities is gender sensitive and takes into consideration the losses and damages incurred by women fishers;
- b. Provide up to date information to women fishers on pricing to ensure they get a fair price for their mud crabs;
- c. Encourage villages and districts to establish regulations or guidelines for the mud crab fishery which promotes the resilience of the fishery to cyclone events;
- d. Ensure districts with damaged mangrove *tabu* areas remain closed to help promote recovery; and
- e. Continue monitor the mud crab fishery to gauge the recovery of the fishery and the impact to subsistence and livelihoods in Bua Province.

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<sup>5</sup> Chaston Radway K, Manley M, Mangubhai S, Sokowaqanilotu E, Lalavanua W, Bogiva A, Caginitoba A, Delai T, Draniatu M, Dulunaqio S, Fox M, Koroiwaqa I, Naisilisili W, Rabukawaqa A, Ravonoloa K, Veibi T (2016) Impact of Tropical Cyclone Winston on Fisheries-Dependent Communities in Fiji. Report No. 03/16. Wildlife Conservation Society, Suva, Fiji. 79 pp.

## **APPENDIX 1. Post-Cyclone Fisheries Impact Assessment: Mud crabs for Subsistence and Livelihoods Questionnaire**



Survey Number \_\_\_\_\_  
Date of Interview \_\_\_\_\_  
Interviewer's Name \_\_\_\_\_  
Organisation Name \_\_\_\_\_

## Post-Cyclone Fisheries Impact Assessment: Mud crabs for Subsistence and Livelihoods

### Goals of this survey:

- To assess the effects of Tropical Cyclone (TC) Winston on Fiji's mangrove systems and the fishers that depend on them for food security and livelihoods.
- To provide gender-disaggregated information to national, divisional and provincial government offices on the impact of TC Winston on coastal communities.
- To provide gender sensitive data to government, NGOs and donors that will inform strategies and initiatives to assist fisher woman in the post-cyclone recovery process.

### Respondents' Information & Demographics:

Respondent's name	
Gender (Male/Female)	
Village	
District	
Province	
Number of people in household	

### Mud Crab Dependency

1. Have you been collecting mud crabs after Cyclone Winston?

☐ Yes ☐ No. Why? \_\_\_\_\_



**When** did you start collecting mud crabs after the cyclone? \_\_\_\_\_

2. Has the site where you normally collect mud crabs from (**before** TC Winston) changed from where you collect crabs now (**after** TC Winston)?

☐ Yes (Go to Q3) Explain: \_\_\_\_\_

☐ No (Go to Q 4) Explain: \_\_\_\_\_

3. How long does it take you to reach this site(s)?

☐ <1 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ >5



Survey Number \_\_\_\_\_  
Date of Interview \_\_\_\_\_  
Interviewer's Name \_\_\_\_\_  
Organisation Name \_\_\_\_\_

4. Has the method/gear you normally use to collect mud crabs with (**before** TC Winston) changed from the method/gear you currently use collect crabs (**after** TC Winston)?

☐ Yes (Go to Q5) Explain: \_\_\_\_\_

☐ No (Go to Q6) Explain: \_\_\_\_\_

5. What gear/method do you use now?

☐ Hand collection      ☐ Crab trap      ☐ Spear      ☐ Hand net  
☐ Hook & line      ☐ Scoop net      ☐ Gillnet      ☐ Other: \_\_\_\_\_

6. Has the frequency of your fishing trips (to collect mud crabs) changed, following the cyclone?

☐ Yes (Go to Q7) Explain: \_\_\_\_\_

☐ No (Go to Q 8) Explain: \_\_\_\_\_

7. How often do you go out now to collect mud crabs (**after** TC Winston)?

Specify frequency: \_\_\_\_\_ weekly/monthly/other: \_\_\_\_\_

8. Overall, has there been any change in the number (quantity) of mud crabs that you currently catch (**after** TC Winston) compared to before the cyclone?

☐ Yes (Go to Q9) Explain: \_\_\_\_\_

☐ No (Go to Q10) Explain: \_\_\_\_\_

9. What is the quantity of mud crabs you collect now (**after** TC Winston), per trip?

\_\_\_\_\_ Indicate whether quantity is in: kg or individual crabs

10. Overall, have you noticed any change in the size of mud crabs that you currently catch (**after** TC Winston) compared to before the cyclone?

☐ Yes Explain: \_\_\_\_\_

☐ No Explain: \_\_\_\_\_



Survey Number \_\_\_\_\_  
Date of Interview \_\_\_\_\_  
Interviewer's Name \_\_\_\_\_  
Organisation Name \_\_\_\_\_

11. What do you do with the mud crabs that you catch?

☐

Eat only  
(Go to Q13)

☐

Sell only  
(Go to Q12)

☐

Both: Eat and Sell  
(Go to Q12)

12. Has the cyclone impacted your ability to sell mud crabs?

☐

Yes Explain: \_\_\_\_\_

☐

No Explain: \_\_\_\_\_

13. Has the cyclone impacted the price you sell (mud crabs) for?

☐

Yes Explain: \_\_\_\_\_

☐

No Explain: \_\_\_\_\_

14. How often do you currently (**after** TC Winston) sell mud crabs?

Specify frequency: \_\_\_\_\_ weekly/monthly/other: \_\_\_\_\_

15. What price do you currently (**after** TC Winston) sell mud crabs for?

FJ\$ \_\_\_\_\_ **kgor individual** (Circle whether price unit: in kgor Individual)

16. Currently (**after** TC Winston), do you also catch other seafood to sell?

☐

Yes (Go to Q 17)

☐

No

17. What other seafood do you currently sell? (List them)

- a. \_\_\_\_\_ Sale frequency: \_\_\_\_\_ wk/month/other: \_\_\_\_\_
- b. \_\_\_\_\_ Sale frequency: \_\_\_\_\_ wk/month/other: \_\_\_\_\_
- c. \_\_\_\_\_ Sale frequency: \_\_\_\_\_ wk/month/other: \_\_\_\_\_
- d. \_\_\_\_\_ Sale frequency: \_\_\_\_\_ wk/month/other: \_\_\_\_\_
- e. \_\_\_\_\_ Sale frequency: \_\_\_\_\_ wk/month/other: \_\_\_\_\_



Survey Number \_\_\_\_\_  
Date of Interview \_\_\_\_\_  
Interviewer's Name \_\_\_\_\_  
Organisation Name \_\_\_\_\_

18. Do you currently (**after** TC Winston) have any other source on income, **unrelated to fishing**?

☐ No ☐ Yes Specify income source: \_\_\_\_\_

19. How does this income source (in Q18) compare to your income derived from fishing? (Explain)

\_\_\_\_\_

20. Has your community made any rules about managing the mud crab fishery following the cyclone?

☐ No ☐ Yes Specify rules: \_\_\_\_\_

21. What are the fishing losses your household has encountered?

Explain: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### **Ecosystem & Fisheries Infrastructure Impact**

22. How has the mangrove in your fishing area been affected by TC Winston?

☐ Mildly impacted ☐ Moderately impacted ☐ Highly impacted

23. From your perception, did having a mangrove system in place provide any form of protection for your community from the cyclone?

☐ Yes Explain: \_\_\_\_\_

☐ No Explain: \_\_\_\_\_

24. Does your community have a mangrove tabu area?

☐ Yes ☐ No (Go to 26)



Survey Number \_\_\_\_\_  
Date of Interview \_\_\_\_\_  
Interviewer's Name \_\_\_\_\_  
Organisation Name \_\_\_\_\_

25. Did the cyclone affect the mangrove tabu area differently from the open area?

☐ Yes Explain: \_\_\_\_\_

☐ No Explain: \_\_\_\_\_

26. Please list the fishing gear that **you own** and indicate their status **after** TC Winston and also the cost of repairing or replacing the affected gear:

Gear name	Tick which one applies			Repair or replacement cost (FJD)
	Still Good	Damaged	Lost /Totally destroyed	

27. How do you intend to address the damage or loss in gear? \_\_\_\_\_

\_\_\_\_\_

28. What infrastructure (e.g. boats, outboards, *bilibili*, ice plant, storage, refrigeration etc.) that your household previously had access to (**before** TC Winston), which has now been affected?

(List them& indicate if they belonged to your household or someone else)

- a. \_\_\_\_\_ - belongs to this **household / someone else**
- b. \_\_\_\_\_ - belongs to this **household / someone else**
- c. \_\_\_\_\_ - belongs to this **household / someone else**
- d. \_\_\_\_\_ - belongs to this **household / someone else**
- e. \_\_\_\_\_ - belongs to this **household / someone else**
- f. \_\_\_\_\_ - belongs to this **household / someone else**

29. How do you or the village intend to address the damage or loss of infrastructure (in Q28 above)?

\_\_\_\_\_

30. Is there anything else you would like to add or specific request to government relating to mud crab fisheries?

\_\_\_\_\_