

PIDP

Pacific Islands Development Program

VAVA'U HOUSEWIFE SURVEY
OF TIDAL AREA USAGE



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by

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I. INTRODUCTION

Discussions with Tonga Fisheries Division personnel and a search into their files revealed a lack of an information data base on the tidal flats area being ear-marked for the proposed mullet farm or Vava'u. A survey was then initiated through the villages surrounding and utilizing the area for information on its resources.

The scope of the survey was two-fold aimed primarily at the village officers and housewives. The rationale behind such a two-pronged approach was that the village officer was responsible for coordinating communal activities within each village whereas the housewife was the main user of the area foraging the mud flats for edible organisms. The survey scope, however, was limited by time and available manpower resources. This report summarizes that part of the survey directed toward housewives.

Basically, housewives were interviewed to get information on the tidal flat area in terms of (1) range of edible/marketable marine forms within, (2) level of harvest of these resources, (3) catch and effort, and (4) appreciable changes of standing stock over the years.

II. METHODS

PIDP's aquaculture team flew to Vava'u (August 1983) to have a closer examination of the proposed mullet farm site. A questionnaire was designed to try to obtain as much information as possible on the site. This and the accompanying answer sheet are included in the appendices (see Appendices A and B).

With the assistance of four staff members of the Vava'u fisheries department, interviews were held with housewives from the seven villages surrounding the proposed mullet farm site. These included (1) Houma, (2) Ha'akio, (3) Ta'anea, (4) Ha'alaufuli, (5) Tu'anekivale, (6) Holeva, and (7) Koloa (see Figure 1).

The housewives nominated for this survey were those identified by the village officer as being most familiar with the study area with respect to food availability and its harvest.

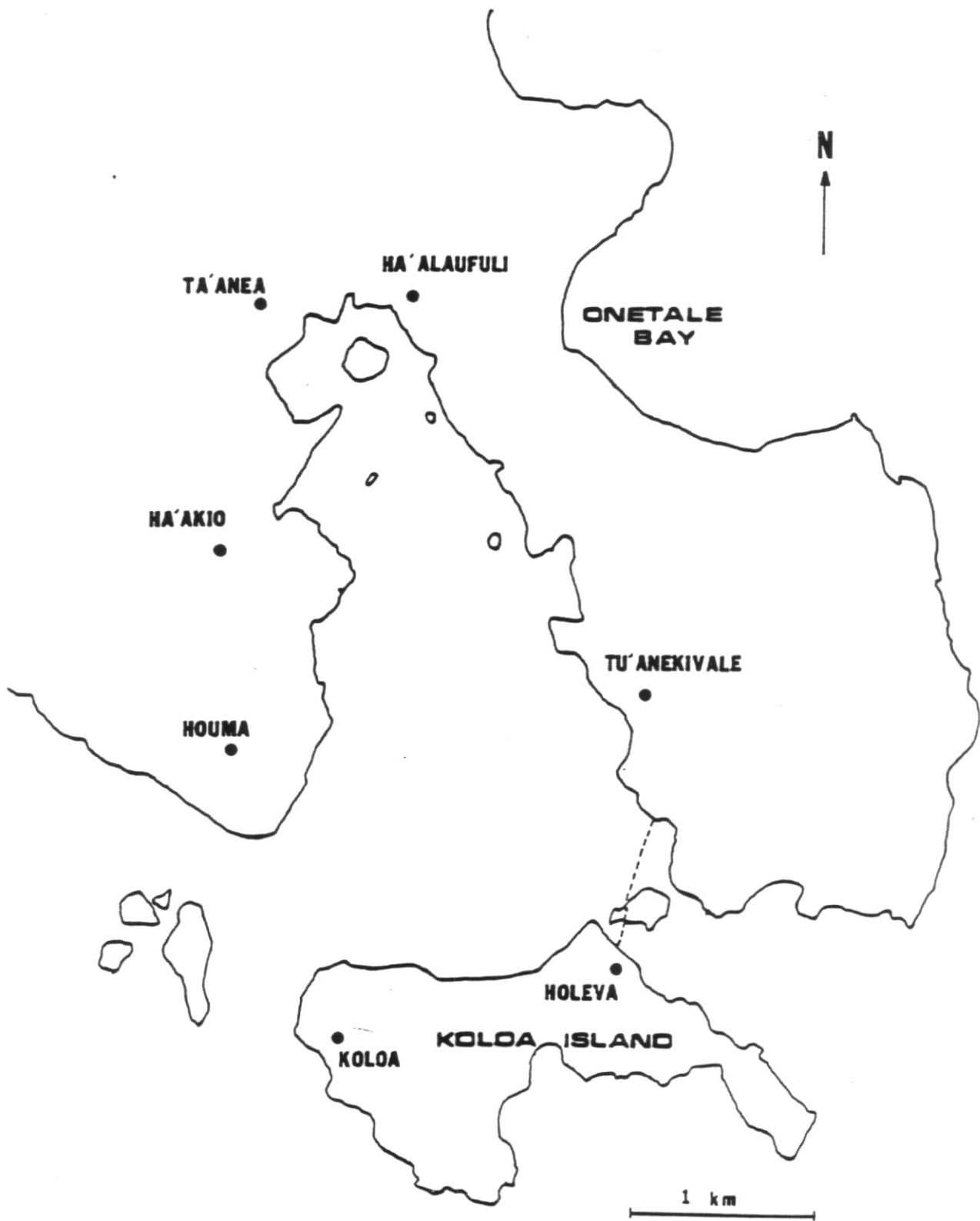


Figure 1. Map of Tidal Flats Area of Proposed Mullet Farm

III. RESULTS

Items Collected

According to the housewives surveyed, several items were collected from the tidal area. Among them were seaweed, sea cucumber, shellfish, jellyfish, crab, and various fish species. Table 1 lists specific food items collected from the tidal area.

Periods of Abundance

In addition to identifying specific items collected, housewives were asked to identify periods of abundance for these items and the harvest period. According to housewives, all items were harvested year around. Responses to the abundance period question for each seafood item were quite diverse (see Table 2). For any one seafood item, responses ranged from year around to summer only. Most items appeared to have summer peak abundances.

Generally, it was observed that summer months were conducive to good growth rates. Although fishing activities were carried out throughout the year, the major activity was during the warmer months. It was noted that mullet was best caught using nets in the early mornings.

Changes in Tidal Area Production

Housewives were asked if they had noted any changes in harvest in the tidal flats area. Responses are noted in Table 3. It was interesting to note that most villages identified a general decrease not only in the variety but also in the number of food items currently harvested from the area. When increases in harvest were noted, it was qualified by noting

Table 1. Listing of Food Items Currently Harvested from the Tidal Area

| <u>Local Name</u> | <u>Common English Name</u> |
|------------------------------------|----------------------------|
| limu | sea weed |
| loli lomu — — — muli'one | sea cucumbers |
| kaloa kuku-to'o — — — | shellfish |
| paka | crabs |
| tafolo | crabs (box) |
| fua te'efo — — — kanahe | mullet |
| matu | silver bream |
| nofu | stonefish |
| tanutanu | tang |
| sipesipa | small silvery sardine |
| kolokalu | jellyfish |
| ngou'a | |
| toke | toothed eel |
| vete | goatfish |
| kopoa | catfish |
| fate | sea perch |
| totao | (not identified) |

Table 2. Seafood Items and Their Abundance Period
According to Village Housewives

| <u>Seafood Item</u> | <u>Abundance Period</u> | <u>Village</u> |
|---------------------|--------------------------------|---|
| Crab | Year around, peak at Christmas | Houma; Ha'akio |
| | Summer, peak at Christmas | Ta'anea |
| | Summer | Ha'alaufuli; Tu'anequivale |
| | All year | Holeva; Koloa |
| Sea Shells | Year around, peak at Christmas | Houma; Ha'akio |
| | Summer, peak at Christmas | Ta'anea |
| | Summer | Ha'alaufuli; Tu'anequivale |
| | All year | Holeva; Koloa |
| Cucumbers | Year around, peak at Christmas | Houma; Ha'akio |
| | Summer, peak at Christmas | Ta'anea |
| | All Year | Ha'alaufuli; Tu'anequivale; Holeva; Koloa |
| | | |
| Bivalves | September - December | Houma |
| | Year around, peak December | Ha'akio |
| | Summer, peak at Christmas | Ta'anea |
| | All year | Ha'alaufuli; Holeva; Koloa |
| | Summer | Tu'anequivale |
| Seaweed | September - December | Houma |
| | October - January | Ha'akio |
| | All year | Ta'anea; Holeva; Ha'alaufuli; Koloa |
| | September - March | Tu'anequivale |
| | | |
| Fish | Year around | Houma; Holeva; Ha'akio; Ha'alaufuli; Tu'anequivale; Koloa |
| | Summer, peak at Christmas | Ta'anea |

Table 3. Changes in Tidal Area Noted by Housewives and Related Comments

| <u>Village</u> | <u>Recent Change in Tidal Area</u> | <u>Comments</u> |
|----------------|------------------------------------|--|
| Houma | decrease | Despite increased effort, harvest gradually decreasing in variety and number of food items. May be due to increased fishing pressure. |
| | increase | As new areas visited no appreciable reduction. In fact harvest increases with each area visited. |
| Ha'akio | increase | The more effort, the higher the harvest. The more continuous the cropping, the greater the offtakes - blessing. |
| Ta'anea | decrease | The amount of shellfish currently cropped has decreased. Fish frequently caught before, now absent. Reasons for decreases may include increased fishing pressure and the impact of causeway on water circulation. |
| Ha'alaufuli | decrease | Even with increased fishing effort, the catch is greatly reduced. Cause includes frequenting of favorite "beds" by housewives. |
| | increase | If different areas were visited each time perhaps no reduction in offtakes would result. The widespread distribution of effort may ensure uniform collection from all areas. |
| Tu'anequivale | decrease | Reduction in catch size despite increasing effort. Takes longer to collect the same amount of food items as in the past. Reasons include the environmental impact of the causeway and the fertilizer use at the seaweed operation that may be detrimental to other marine forms. |
| Holeva | decrease | Reduced catch despite increased effort attributed to impacts of causeway and overfishing. Seaweed farm may have an impact on this too. |
| Koloa | decrease | Reduction in catch per effort. Substantial increase in effort required to maintain catch. Reduction attributed to the causeway. Dead organisms found during collection trips. |

that different areas were cropped during each visit. The reason attributed to this increased harvest was the uniform fishing pressure throughout the tidal area. Reasons given for decreased harvests were fishing pressure, environmental impact of the causeway, and possible repercussions of fertilizer applications at the seaweed project site off Koloa village.

It was generally felt throughout the area that the causeway had some disastrous effect on the area. This could be related to tampering with the biological equilibrium that existed prior to the construction of the causeway. The resultant water circulation pattern could have caused the siltation that was noted in the back bay area.

Harvest Uses

Housewives were asked to identify the end use of seafood items collected in the tidal area. Table 4 lists results. In most villages, in addition to home consumption, some collected seafoods were sold. This was usually done when food items collected were in excess of home needs.

The practice of selling only excess harvest may be changing. With the heavy reliance on a cash economy, villagers are turning to the tidal area as a potential source of revenue.

Further information was solicited on revenues from sales. Responses were obtained from three villages. Annual sale revenues estimates per household of Houma was T\$120, Ha'akio T\$1,140, and Koloa T\$260. Housewives from other villages did not respond to this question.

Of special note is the fact that there are two other villages not located on the fringe of the bay that also depend on this area for food items. These are Holonga and Leimatua (see Figure 2). People from these villages are transported to the tidal area weekly on collection trips.

Table 4. Tidal Area Seafood Usage By Villages

| <u>Village</u> | <u>Usage</u> |
|----------------|-------------------------------|
| Houma | Home consumption, excess sold |
| Ha'akio | Home consumption, excess sold |
| Ta'anea | Home and sales |
| Ha'alaufuli | Home and sales |
| Tu'anekivale | Home and sales |
| Holeva | Home and sales |
| Koloa | Home and sales |

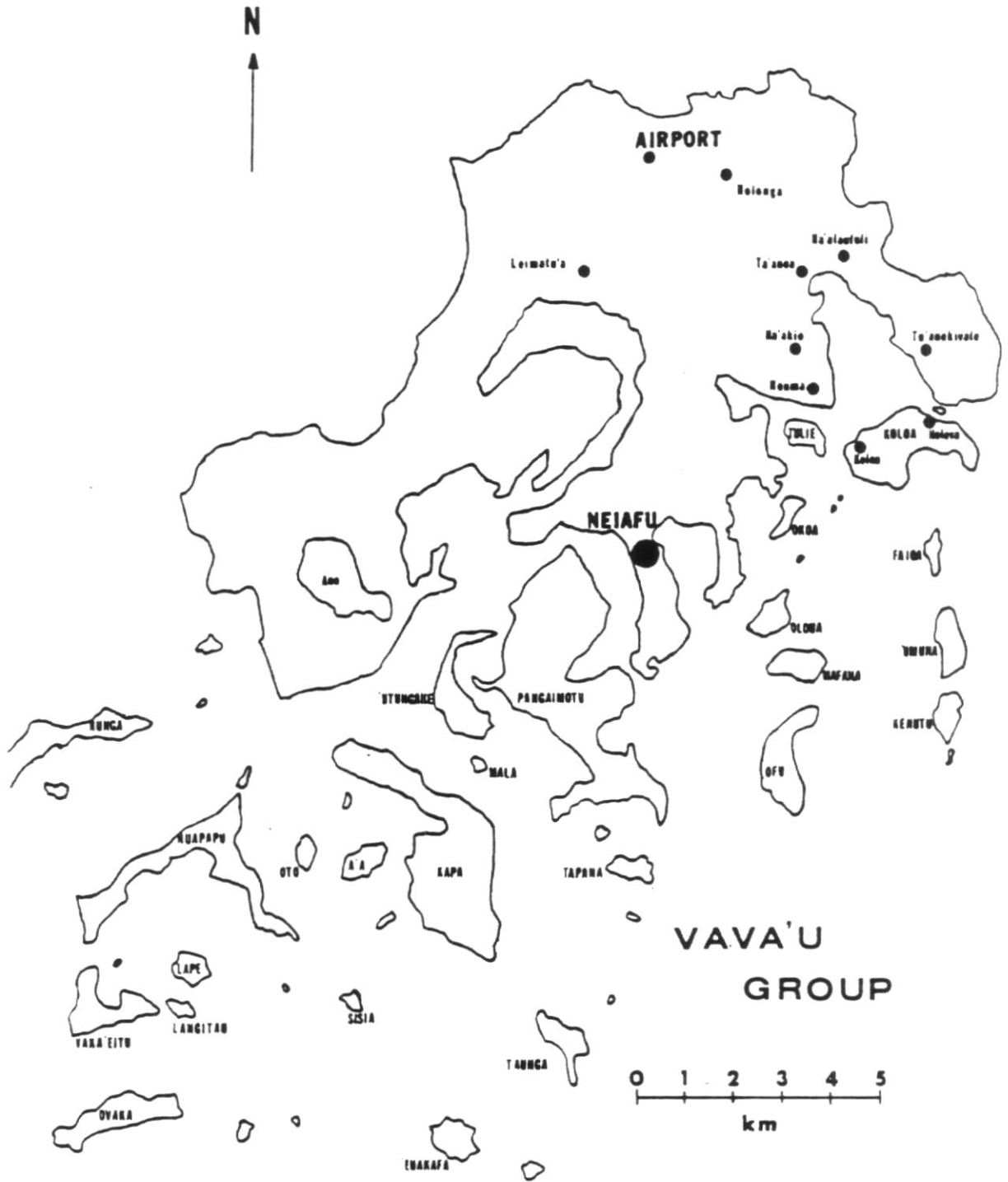


Figure 2. Map of Vava'u Area

Harvest and Effort

A series of questions was developed in order to obtain some base information on harvest per effort. Constraints of this study limited detailed data gathering, but rough estimates were obtained.

Estimates were obtained on harvests per week (see Table 5). These estimates were converted to kg/week based on 2.5 kg/basket.

Weekly harvest estimates (per household) were expanded to harvest estimates (per village) per year (see Table 5). This was based on population and household estimates provided by the hurricane relief offices (see Table 6).

It should be noted that the 232,505 kg/year harvest is (1) a very rough estimate of yearly harvest and (2) at best, an incomplete estimate. The estimate is crude because of the limited sample size of housewives surveyed. It is incomplete because, as noted earlier, two villages some distance away collect seafood items from the tidal area. Table 6 provides basic population information on these villages. However, no harvest information was obtained for either village. Based on their sizes (Leimatua 2,846 and Holonga 606), their impact on the total catches from the tidal area may be significant.

These rough harvest estimates could also be interfaced with area estimates. If 232,505 kg/year is divided by 480 ha (the area of the tidal area), an estimate of 484 kg/ha/year is obtained for annual productivity. However, these weights include shell weight (about 60 to 70 percent of total weight). Flesh weight is only about 30 to 40 percent. Flesh production of 169.53 kg/ha/year was obtained for the tidal flats area. Trip (or effort) information was also obtained (see Table 7). Both trip and harvest estimates were combined to calculate kg/person/hour estimates given in Table 7. Harvest per effort (person hour) was 0.4 to 2.1 kg/person/hour.

Table 5. Shellfish Harvest Per Household

| <u>Village</u> | <u>baskets/household/week</u> | <u>kg/household/week</u> ^{*1} | <u>kg/year</u> ^{*2} |
|----------------|-------------------------------|--|------------------------------|
| Houma | 5 | 12.5 | 22,100 |
| Ha'akio | 4 | 10 | 18,720 |
| Ta'anea | 4 | 10 | 50,960 |
| Ha'alaufuli | 5 | 12.5 | 59,150 |
| Tu'anequivale | 3 | 7.5 | 37,050 |
| Holeva | 4 | 10 | 10,920 |
| Koloa | <u>5.5</u> | <u>13.75</u> | <u>33,605</u> |
| | 30.5 | 76.25 | 232,505 |

*1 Based on 2.5 kg/basket conversion.

*2 Based on (kg/household/week) x (52 weeks/year) x (household/village).
household/village information from Table 7.

Table 6. Population Estimates of Villages
Using the Tidal Area

| <u>Villages Adjacent to Area</u> | <u>Population</u> | <u>Households</u> |
|--------------------------------------|-------------------|-------------------|
| Houma | 183 | 34 |
| Ha'akio | 175 | 36 |
| Ta'anea | 634 | 98 |
| Ha'alaufuli | 524 | 91 |
| Tu'anequivale | 484 | 95 |
| Holeva | 129 | 21 |
| Koloa | <u>255</u> | <u>47</u> |
| SUBTOTAL | <u>2384</u> | <u>422</u> |
| <u>Other Users of Tidal Area</u> | | |
| Leimatua | 2846 | 500 |
| Holonga | <u>606</u> | <u>90</u> |
| SUBTOTAL | <u>3452</u> | <u>590</u> |
| TOTAL | <u>5836</u> | <u>1012</u> |

Source: hurricane relief files.

Table 7. Tidal Area Harvest and Effort Estimates

| <u>Village</u> | <u>trips/week/ household</u> | <u>people/trip</u> | <u>hours/trip</u> *1 | <u>kg/person/hour</u> *2 |
|----------------|----------------------------------|--------------------|----------------------|--------------------------|
| Houma | 3 | 1 | 2 | 2.1 |
| Ha'akio | 3 | 2 | 3 | .6 |
| Ta'anea | 2 | 2 | 3 | .8 |
| Ha'alaufuli | 3 | 2 | 5 | .4 |
| Tu'ane kivale | 3 | 1 | 2 | 1.3 |
| Holeva | 3 | 2 | 2 | .8 |
| Koloa | 6 | 2 | 3 | .4 |

*1 Based on 2.5 kg/basket conversion of baskets of shellfish harvested/week.

*2 Calculated from information provided in this table and in Table 6.

Seafood Consumption

Information was obtained on seafood consumption. In most villages, sources of seafood included both family collection and local markets (see Table 8). Local market purchases, however, comprised minute proportion of the total seafood consumption with fish and clams being the major items purchased.

Information was also compiled on the number of seafood meals consumed per household per week (see Table 9). Estimates were also obtained on shellfish consumed per week per household. On an average, about 10.9 kg shellfish were consumed per household per week. These estimates were expanded to yearly estimates based on household estimates provided in Table 6.

Table 8. Sources of Seafood Consumed
and Specific Seafood Items Purchased

| <u>Village</u> | <u>Source</u> | <u>Seafood Quantity and Items Purchased</u> |
|----------------|---------------------------|---|
| Houma | Family collection | None |
| Ha'akio | Family collection, market | Some (fish) |
| Ta'anea | Family collection, market | Some (fish/clams) |
| Ha'alaufuli | Family collection, market | Some (fish/clams) |
| Tu'ane kivale | Family collection | None |
| Holeva | Family collection, market | Some (fish/clams) |
| Kolca | Family collection, market | Some (fish) |

Table 9. Shellfish Consumption Estimates

| <u>Village</u> | <u>Seafood Meals</u> <u>Per Week</u> | <u>Shellfish Consumed</u> | |
|----------------|---|---|---|
| | | <u>Per Household</u> <u>Per Week</u> (kg) | <u>Per Household</u> <u>Per Year</u> (kg) |
| Houma | 8 | 12.5 | 22,100 |
| Ha'akio | 6 | 10 | 18,720 |
| Ta'anea | 6 | 10 | 50,960 |
| Ha'alaufuli | 6 | 12.5 | 59,150 |
| Tu'ane kivale | 4 | 7.5 | 37,050 |
| Holeva | 6 | 10 | 10,920 |
| Koloa | 8 | <u>13.75</u> | <u>33,605</u> |
| TOTAL | | <u>76.25</u> | <u>232,505</u> |

DISCUSSION

As stated earlier, the rationale for the survey was to gain an insight into the tidal area with respect to its resources and its utilization patterns. Interest in the area was based on the recent Cabinet decision to seek funds to develop the bay into a mullet farm to replenish dwindling natural stocks. The area provides supplemental protein and the livelihood for a substantial number of people (almost 6,000 people, Table 6). This does not include the people from other areas who purchase produce from here through the market at Neiafu.

Even though harvest is carried out the year around, collection activities intensify during the warm summer months when food items are also plentiful, reaching a peak abundance period around December. Concern was expressed at the decline in the standing stocks of the area. Villagers were spending more time fulfilling their needs than in the past. Reasons put forward for this included (1) over fishing, (2) environmental impact of the causeway, and (3) possible implications of the application of fertilizers at the seaweed project off Koloa village.

The problem of overfishing is understandable with increasing population. Coupled with this, the advent of a cash economy has placed extra pressure on the area to fulfil the monetary needs of an increasing population.

The sad thing about the construction of the causeway was the lack of liaison between the two government departments, works and fisheries. Had there been communication between them, the causeway could have been modified so as not to substantially tamper with the water circulation in the area.

It was noted that housewives generally agreed with the idea of a farm for regeneration of depleted stocks of mullets. Reservations, however, were expressed on the availability of other sheltered sites from which villagers could harvest seafood as is currently done in the tidal flat area.

APPENDIX A

Village Housewife Questionnaire

Tidal Area Usage Questions (Housewives)

1. How many people do you cater for per meal?

2. How many meals of seafood do you serve per week?

3. How many kilograms of seafood do you serve per meal?

4. What are the sources of your seafood?

Market _____
Co-op _____
Villagers _____
Family collection _____
Other (specify) _____

5. How much of your seafood consumption is purchased?

Some _____
Half _____
Most _____
All _____

6. How many collection trips do you make a week?

7. How many people accompany you on these collection trips?

8. How long do you spend on these trips?

9. Could you indicate the various items collected?

10. Could you specify the abundance period of these items?

11. How many harvests per week are made of these items?

12. How much of these collected seafood items are sold?

A: _____

B: _____

C: _____

D: _____

13. What would be the total annual revenue from the sale of these seafood items?

14. What specific changes have you notified in seafood abundance in the adjacent tidal flats?

Increase _____

No Change _____

Decrease _____

15. Could you be more specific with the change observed within the area?

16. To what do you attribute these changes?

APPENDIX B

Sample Answer Sheet

Housewife

Answer Sheet Page 1

1. People/meal _____

2. Seafood meals/week _____

3. Kg seafood/meal _____

4. Source of seafood

Market _____

Co-op _____

Villagers _____

Family Collection _____

Other (specify) _____

5. Purchase seafood

some _____
half _____
most _____
all _____

6. Collection trips/week _____

7. People/collection trip _____

8. Duration of trip _____

9. Items collected

10. Abundance period

11. Harvest/week

A _____
B _____
C _____
D _____
E _____
F _____

12. Seafood items sold

- A _____
- B _____
- C _____
- D _____

13. Revenue from sales/year _____

14. Tidal flat seafood change

- increase _____
- no change _____
- decrease _____

15. Changes noticed _____

16. Possible causes _____

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