Nadi Floods

ECONOMIC COSTS JANUARY 2009

SOPAC Technical Report 426

Nadi back road without flooding

Flood commences: 09/01/2009

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September 2009

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Economic costs of January 2009 Nadi floods

SOPAC Technical Report 426

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ABBREVIATIONS

DISMAC	National Disaster Management Office
FRCS	Fiji Red Cross Society
ICT	information and communication technology
NDMO	National Disaster Management Office
SOPAC	Pacific Islands Applied Geoscience Commission
UNDP	United Nations Development Programme

ACKNOWLEDGEMENTS

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Finally, many thanks to the community of Nadi for its enthusiasm and support. We were humbled by the community's participation and openness during a time of enormous loss. We sincerely hope the findings of this study will be used constructively to make life more resilient and safe in Nadi.

EXECUTIVE SUMMARY

In January 2009, heavy rain resulting from a tropical depression caused severe flooding in the North, Central and Western divisions of Fiji. Floods in Nadi led to death, severe damage and major disruption to services. This report documents a socioeconomic assessment of gross losses sustained by the local community in Nadi as a result of those floods. The Government of Fiji agreed for SOPAC to organise the assessment, which estimated losses for families and retail businesses, eateries, manufacturers/exporters and service businesses. (Hotels on Denarau Island were not included in the estimates of business losses.)

For the assessment, SOPAC used a sample of 947 households and businesses across greater Nadi as the basis for damage estimates (table A). It estimated gross losses for the sample interviewed, then extrapolated for all families and equivalent businesses across the survey region.

Table A: Sample size, Nadi

	Questionnaire used
Households	717
Businesses	230
Total	947

Losses, by sample

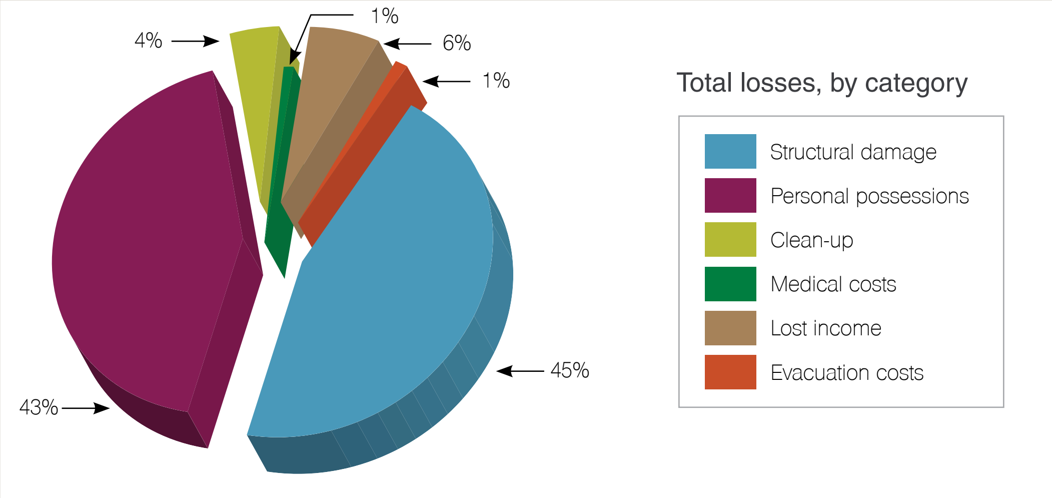
After the Nadi floods, 717 householders were interviewed about flood damage. Presumably due to variation in inundation and personal wealth, the gross losses reported by households varied extensively, from nil to over F$60 000 (table B). The 10 per cent of households who sustained losses of over F$10 000 each accounted for almost half of total losses reported. By comparison, two thirds of households reported individual losses of F$3000 or less, and they accounted for only 16 per cent of total household losses.

Table B: Reported household losses, Nadi survey area

Losses per business (F$)	Share of sample (%)	Total losses for sample (F$'000)	Share of total losses (%)
Nil	22	0	0
1–1000	21	97	4
1001–3000	22	334	12
3001–6000	17	500	19
6001–10 000	9	541	20
10 001+	10	1 198	45
Total	100	2 670	100

For the households interviewed, flood losses were valued at around F$2.7 million gross (table B), with structural damage and loss of personal possessions accounting for almost 90 per cent of total losses (figure A).

Figure A: Sample household losses, by cost category, Nadi survey area

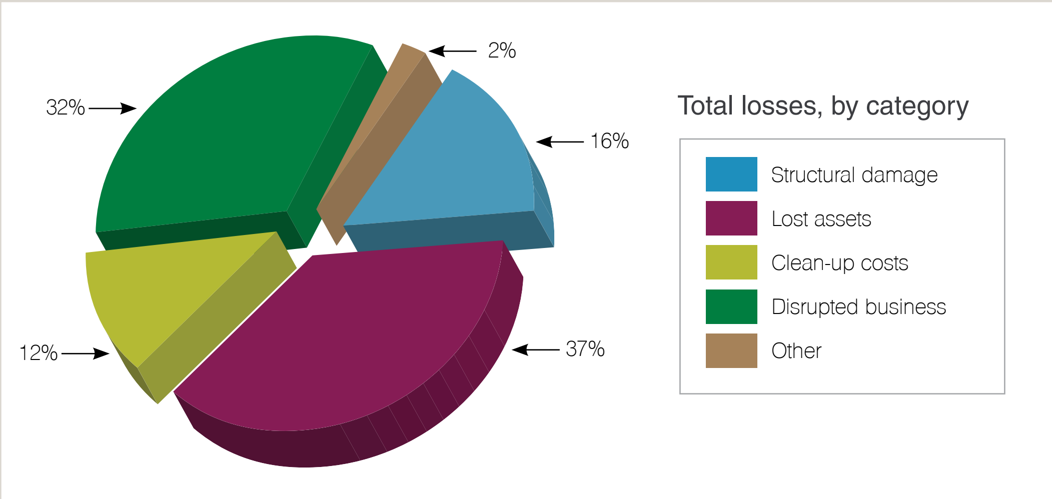


There were 230 businesses interviewed following the floods. They included retail outlets, eateries, wholesalers/exporters and service sector businesses (including transport). Gross flood losses for the sample were around F$32 million (table C), with the greatest proportion of losses arising in the retail sector. Around one third of losses arose because business services were disrupted (staff/clients were unable to reach the premises, the power and water were out, etc.) (figure B).

Table C: Sample business losses, Nadi survey area

	Total losses sample (F$m)	Lost business component (F$'000)	Share of business lost (%)
Retail, inc. petrol	18	8	44
Eateries	1	0	25
Exporters, manufacturers, wholesalers	2	1	42
Services	12	1	12
Total	32	10	–

Figure B: Sample business losses, by cost category, Nadi survey area



Total losses for the Nadi community sampled were thus around F$35 million gross (table D).

Table D: Total Nadi losses, by sample

	Value (F$m)	Share (%)
Household	2.7	8
Business	32.1	92
Total	34.8	100

Total estimated losses for the sample area

Extrapolating sample losses to households and like businesses in the survey region, total gross losses from the flood were an estimated F$244 million, of which the business community sustained 94 per cent (table E). The extent of economic losses may appear surprisingly high, but household and business surveys are rarely conducted following disasters, so private losses are seldom reported in any detail. Further, few survey respondents had any insurance, so even the private sector would rarely calculate losses for households and private businesses.

Table E: Total estimated losses for Nadi survey area

	Value (F$m)	Share (%)
Household	14.5	6
Business	229.5	94
Total	244.0	100

The values provided are only provisional estimates because they had to be generated quickly following the floods. They likely understate actual private losses, because (i) lost business to hotels on Denarau Island was not estimated (and is likely to be substantial); (ii) the total loss figure does not include any values for trauma or the loss of irreplaceable items such as business records; (iii) medical costs to families were subsidised by free health care made available during the emergency; and (iv) many householders and businesses were unable to estimate (or unprepared to disclose) some losses (for example, they did not know the value of some lost assets). Nevertheless, the estimates here do provide an order of magnitude for private losses.

Policy issues

On average, only 1 per cent of families and 12 per cent of businesses interviewed noted having any insurance to help them replace losses sustained during the floods. This lack of insurance can be expected to impede flood recovery, especially given many businesses and households stated they had no means to recover from the damage and might never recover.

Given the business earnings lost as a result of the floods, the loss of taxes from continued inoperation of businesses in Nadi is a national economic concern. Options to assist businesses (and households) to resume operations following future floods would substantially benefit the Fiji tax base. One option may be for the Government of Fiji to investigate how to increase access to loans or access to business insurance (given some businesses observed insurance is not always available where they operate). This approach would be consistent with the government's views in its February 2009 Consolidated Report on Flash Floods that there is a need to review the insurance industry. Discussions with the Chamber of Commerce and other stakeholder groups may also be helpful.

Water quality was reported to deteriorate significantly during the floods and, according to the survey, the problem frequently persisted weeks later. Of the household sampled, 70 per cent stated the water in their taps and/or in the river was not safe to drink following the floods, or was extremely dirty. This may partly explain the level of diarrhoea, skin infections, typhoid and fevers that respondents reported following the floods. Identifying short term solutions to water quality protection for families is thus critical to minimise health problems during any future floods. Equally importantly, long term watershed management and water quantity and quality improvement are critical to minimise future flood frequency and impacts around Nadi.

The government will also need to manage the Nadi community's perceptions of the cause of the floods. The most common perception was that poor drainage and lack of river dredging were responsible. Consequently, there is a strong public view that the government should engage in resolving these issues. The government may need to technically assess the actual flood causes and the solutions perceived necessary by the community, to determine the appropriateness of those solutions. It would then need to assess how and when to address the causes, and communicate that information to the community. If the community's perceived solutions are not appropriate and thus not pursued, the government risks being viewed as ineffective or irresponsible. Strategic awareness raising and communications work around flood causes and treatment will thus be valuable.

More generally, awareness of flood risks in Nadi will need to be increased, along with awareness of how to respond during a flood alert or warning. Few people seemed to recognise that floods are a natural occurrence around Nadi, and only half of those interviewed were aware they lived and/or operated in a flood risk area. Raising community awareness of the inherent flood risks around Nadi is likely to enhance disaster preparedness for future floods. Community awareness materials on disaster preparedness, as well as the continued effective dissemination of disaster warnings, are also important aspects of disaster risk management in Nadi. Many community representatives have called for improved flood warning systems generally.

A.

INTRODUCTION

The floods

Heavy rain resulting from a tropical depression and falling mainly during 7–10 January caused severe flooding in the North, Central and Western Divisions of Fiji in January 2009 (OCHA 2009). Areas devastated by the flood included the towns of Nadi, Ba and Labasa. At the height of the floods on 16 January, 169 evacuation centres catered for 11 458 people (Government of Fiji 2009). Nationwide, 11 fatalities occurred, including two deaths from flood related landslides. The Government of Fiji declared a 30 day state of natural disaster on 11 January.

The government assessed the cost of the floods over January and February 2009, estimating immediate costs (by mid-February) of around F$113 million (table 1). The estimated losses mostly do not include losses sustained by households. They do include some losses to the private sector, although these estimates are expected to be provisional.

Table 1: National flood damage assessments

Sector	Central/ eastern (F$)	Western (F$)	Northern (F$)	Total (F$)
Roads	7 506 620	15 173 422	5 771 260	28 451 302
Water and sewerage	740 000	6 950 000	3 530 000	11 220 000
Crops	3 031 746	12 370 653	565 647	15 968 046
Livestock	1 680 201	2 280 316	35 282	3 995 799
Drainage	1 607 723	15 863 789	1 994 500	19 466 012
Education	138 000	915 960	420 000	1 473 960
Health	350 000	130 000	35 000	515 000
Housing		3 000 000		3 000 000
Sugar		24 600 000		24 600 000
Telecommunications				1 300 000
Electricity				3 000 000
Total	15 054 290	81 284 140	12 351 689	112 990 119

Source: Government of Fiji 2009.

Purpose of this study

Following the floods, the Government of Fiji agreed with the Pacific Islands Applied Geoscience Commission (SOPAC) to organise a socioeconomic impact assessment of the floods on households and businesses in Nadi. This report describes the findings of that assessment. The assessment – which was conducted in collaboration with the UNDP Pacific Centre and with the assistance of the Government of Fiji and the Fiji Red Cross Society – was conducted immediately following the floods. It was intended to provide the government with rapid information on the state of private losses, with a view to reporting at the end of March/early April 2009. This work fills a gap in flood assessment because the government does not conventionally have sufficient resources to assess losses to households. It also estimates losses (detailing type and extent) to the private business sector of Nadi.

The assessment is intended to help improve advocacy, decision making and investment analysis for flood mitigation and warning for Nadi. The information will also help international agencies identify assistance programs for Nadi. Annex 1 contains the broad terms of reference for the assessment.

Structure of this report

Section B of this report contains a brief overview of the method used to assess damage to the Nadi households and business community. Section C presents the estimated household losses sustained by those sampled, while section D presents the business losses among those sampled. Section E presents total losses for the sample; in section F, the estimates are extrapolated to determine total losses to all families and applicable businesses across the survey area. Section G discusses policy issues relating to flooding.

B.

METHOD

The floods

Sample surveys were used to collect information on the costs to households and businesses from the Nadi floods. The purpose of the surveys was to obtain a better understanding of:

- the types of damage that families and businesses experienced as a result of the flooding
- the financial costs of any damage or losses
- how people coped with the floods.

Given some businesses might have incurred losses even if not flooded (interrupted business), interviews were also conducted on Denarau Island.

Scope of work

Sectors covered

The assessment targeted Nadi businesses and households. (Businesses included fixed outlets such as shops, services and manufacturers, but also market stalls and hawkers.) It excluded sectors that are the responsibility of the government to assess (for example, education, health, infrastructure and primary production). However, to the extent that surveyed retail businesses sold fresh produce (for example, supermarkets and stall holders), some agricultural products were covered.

Timing

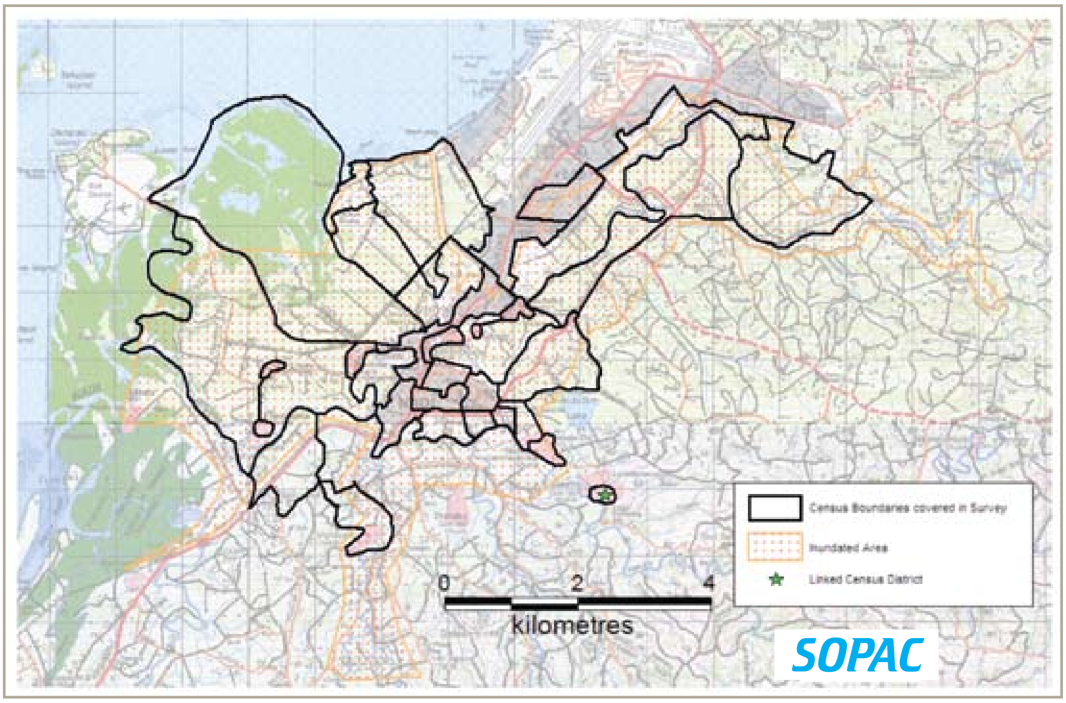
Survey interviews were conducted six weeks after the floods, during 16–20 February 2009. This time gap following the floods was intended to ensure households and businesses were able to recover somewhat from the floods and make some assessment of their losses, but before recall problems arose. (Disaster surveys are subject to recall failure whereby respondents cannot remember the losses sustained or the value of losses—see Holland 2008 for examples).

Area covered

At the time of the survey (mid-February 2009), SOPAC had assessed the inundation from the flood (figure 1).

The sample survey areas were based on the enumeration districts used by the Fiji Islands Bureau of Statistics to conduct the census. Each enumeration district contains around 60–140 households, with an average of 100 households per district nationally. It was not possible to cover the entire flood area of Nadi (given time constraints), although 27 enumeration districts in the inundated area were selected for the Nadi household survey. Additionally, the business survey included Denarau Island, to ensure loss estimates included the valuable tourism operations located there. Figure 1 shows the enumeration districts used for the surveys.

Figure 1: Nadi survey area (inundation and census districts)



Source: SOPAC.

Survey design

All survey questionnaires used closed and open ended questions (annex 2). A total of 63 staff from the Fiji Red Cross, Nadi town (via the Nadi District Office), the Ministry of Youth and Sports, SOPAC and United Nations Development Programme (UNDP) – Pacific Centre conducted the interviews with local residents (table 2). Interviewers were given half a day of training on how to conduct the survey (annex 3). SOPAC staff keyed in and analysed the data.

Table 2: Interviewers for the survey

Agency	Number of interviewers provided
Fiji Red Cross	18
Nadi town (via the Nadi District Office)	31
Ministry of Youth	12
SOPAC	1
UNDP	1
Total	63

Population sizes

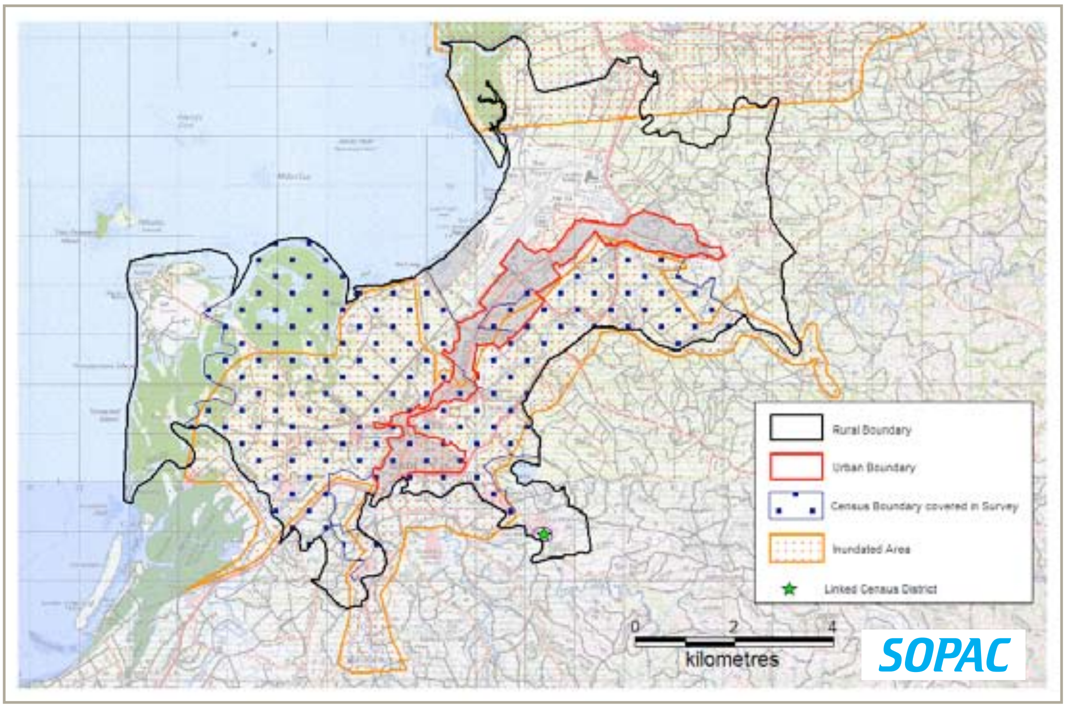
Household surveys

Information on the population in any enumeration district was gathered from the 2007 census by the Fiji Islands Bureau of Statistics. The total population for greater Nadi is around 9624 households (a population of around 44 137 people). Of this group, around 3905 households (41 per cent of households from greater Nadi) were located in the survey area (annex 4).

Business surveys

Annex 5 provides details of the population assessment for the business survey. Briefly, businesses licensed to operate around Nadi were categorised according to whether they operated in Nadi's urban or rural area (figure 2). The Nadi Town Council's licensing section provided data for the urban businesses; the Nadi District Office provided data on businesses from the Nadi rural area. The total number of relevant businesses across greater (urban and rural) Nadi was estimated at 3795 (table 3, annex 5). This number excluded key schools for the area (because the Department of Health assesses damage to the educational sector). The survey covered around 37 per cent of the greater (urban and rural) Nadi area. Gaps in the licensing data made it impossible to discern the actual number of businesses in this survey area (as opposed to the non-surveyed area) (annex 5). Instead with 37 per cent of the greater Nadi area surveyed,[1] it was assumed that the total number of businesses represented in the survey was 1389 (table 3).

Figure 2: Rural and urban Nadi overlaying survey area



Source: SOPAC.

[1] Calculated using geographic information systems (GIS).

Table 3: Commercial enterprises around the Nadi survey area

	Total business population for greater Nadi area	Business population represented in survey
Retail (inc. Petrol)	1431	524
Eateries	337	123
Exporters, manufacturers, wholesalers	165	60
Services	1862	682
Total	3795	1389

Sampling

Surveys were conducted across selected enumeration districts outlined by the Bureau of Statistics (figure 2).

Households

Interviewers were directed to target every third house within assigned enumeration districts, to determine flood losses spatially across the area. Unfortunately, several groups of interviewers strayed outside their assigned districts, so it was ultimately not possible to tell how many of each questionnaire came from one district rather than a neighbouring one. For this reason, losses could not be calculated by enumeration district, but only as a single value for the entire survey area. The total number of household interviews used for survey calculations was 717, around 18 per cent of the 3905 households across the survey area (table 5).

Businesses

Interviewers were directed to target as many businesses per district as possible. The total number of business interviews used for survey calculations was 230, representing roughly 17 per cent of the overall number of businesses in the survey area (although representation within business categories varied) (tables 4 and 5).

Table 4: Sample size of the Nadi business survey, by business type

	Total business population	Business population represented	Number sampled	Sample representation (%)
Retail (inc. Petrol)	1431	524	155	30
Eateries	337	123	13	11
Exporters, manufacturers, wholesalers	165	60	6	10
Services	1862	682	56	8
Total	3795	1389	230	17

* Includes transport (freight, buses, taxis), hotel and non-defined businesses.

Table 5: Sample size of the Nadi surveys

	Sample size	Population represented	Sample representation (%)
Nadi households	717	3905	18
Nadi businesses	230	1389	17

Data cleaning

The majority of households and businesses invited to participate in the survey accepted. A small number of individuals did not participate because they considered the survey would not lead to real changes in flood management. In addition, some families were still cleaning up and/or rebuilding their houses, so could not dedicate time to the survey.

Some questionnaires had to be deleted from the sample survey because:

- the answers appeared unreliable (for example, the answers did not make sense or the person interviewed was inappropriate, being a visitor or a young person not familiar with the value of losses)
- the answers were so extreme that they were either highly questionable or would distort estimates of average values and total estimated losses. In some cases, sample households were considered to have double counted business losses and personal losses so were removed from the survey.

Other changes included the following:

- Selected answers of some questionnaires were omitted because people did not provide accurate responses to questions—for example, when asked 'Before January this year, when did you last suffer flooding here?', the respondent might have answered 'lots', or when asked about the value of losses, they might have answered 'quite a lot'. These answers had to be removed from calculations because the actual values were not clear.
- Some answers were logically impossible—for example, some people suggested the floods had disrupted their businesses for eight weeks, yet the floods had occurred only six weeks previously. In such a case, the figures were rounded down to six weeks or removed from the calculations.
- For any loss estimates given as a range (for example, F$4000–5000), the mathematical average was taken.
- One business working week was assumed to comprise six working days.
- Where certain problems were ongoing (to date as of the survey), they were assumed to last 42 days (six weeks of seven days).

Qualitative data

Because questionnaires are relatively fixed in content (although interviewees were given opportunity to provide more general views on the Nadi floods), focus group sessions were also hosted with the community (business, family and government groups) to obtain a deeper understanding of the nature and scale of the disaster, and of options for mitigation in the future.

Logistics and survey piloting

A business and community briefing session was conducted the week before the survey to advise the local community of the survey's purpose and nature. Representatives from the government and local community attended. The survey targeted the greater Nadi area as well as the Nadi central business district. Up to eight villages were targeted in the survey: Sikituru, Yavusania, Namotomoto, Saunaka, Nakavu, Nawaka, Vunayasi and Narewa. To ensure correct protocols were observed within the villages, the District Officer and Turaga ni Koro conducted a sevusevu on behalf of the survey team on the weekend preceding the survey.

Interviewer training was conducted on the first morning of the survey, covering:

- the purpose of the survey and survey questions
- the scope of the survey
- logistics (the dropping off and collection of interviewers, the constitution of teams etc.).

A pilot of the survey was conducted on the first afternoon to trial questionnaire effectiveness and analysis, and the transport of enumerators to and from interview areas. The questionnaire was not amended, but the precise information sought from questions was emphasised for interviewers where answers during the pilot were weak.

During the survey proper, teams were dropped off and collected in four batches, given the physical breadth of the survey area. After completing their district, teams were re-assigned to other districts to assist other teams. As already indicated, the survey did not cover all of Nadi. One reason was the sheer size of the area to cover. Logistical problems were another reason—for example, some areas had been so destroyed that no-one was left to interview.

C.

HOUSEHOLD SAMPLE IMPACTS

The Nadi River is a focal part of life in the local community. Just under two thirds (63 per cent) of interviewed households stated they relied on the Nadi River for some purpose, whether fishing, clothes washing, recreation and/or irrigation. Most commonly, those who relied on the river stated they did so for fishing purposes, although a relatively large number of people also relied on the river for irrigation or for washing during water cuts. Generally, the households and businesses interviewed considered that the quality of the Nadi River has been changing over time, even without the January floods. Focus group discussions conducted as part of the assessment (annex 6) suggested, where people perceived changes in the river, that the river had become shallower and/or soil erosion had led to increased sedimentation. These changes were considered to result in fishing being more difficult (with boats becoming stuck in the silt). Some residents also perceived the river water as more polluted generally.

Environmental change

Following the January floods, respondents reported a large number of changes in the quality of the Nadi River's water and safety. Common complaints were an increase in unpleasant smells from the river, an increase in river murkiness, a bad taste in the tap water and sometimes no water at all. (In most cases, households were without water or water supplies only for short periods.) The most commonly reported complaint was the loss of safe drinking water, with 70 per cent of respondents stating that the tap water following the floods tasted bad or was too dirty to drink. In some cases, respondents indicated reasons for the increase in smell or pollution (the flooding of pit toilets, for example), but in most cases, no reasons were given.

On average, most householders indicated that water related problems eased after two weeks. However, many respondents observed that the problems persisted for weeks, even to the time of the survey (which was six weeks after the flood). Of householders interviewed, 10 per cent stated that water quality or quantity problems persisted to the time of the survey. Following the floods, some householders resorted to using rain water to avoid the use of polluted tap water.

Health impacts

Health impacts arose either directly from the flooding (injuries) or as a result of subsequent poor environmental quality. Sickness and injuries were reported by 31 per cent of households (table 6), with diarrhoea, skin infections, typhoid and fevers being the most commonly reported effects.

Table 6: Health impacts reported by Nadi households

Diarrhoea / dysentery	Scabies
Eye infections	Cuts, bruises, knocks, dislocations
Fever	Paralysis
Cuts and boils / sores / skin infections	Death
Headaches / body aches	Coughs or asthma
Vomiting	Colds or 'flu
Typhoid	Ringworm
Dengue / malaria	

Many of the health impacts (particularly diarrhoea, fevers and infections) are likely to be linked to the deterioration in water quality following the floods. This relationship is likely to be intensified where litter and waste were concentrated for long periods. Additionally, the incidence of dengue and malaria following the floods is affected by the length of time that water is left standing.

Gross monetary losses

Responses from 717 households across Nadi were used for survey calculations. Total losses reported by the 717 households interviewed were around F$2.7 million gross. Presumably due to variation in inundation and personal wealth, the reported losses per household varied extensively, ranging from nil to over F$60 000 (table 7).

The majority of households (two thirds) reported individual losses of F$3000 or less. Their combined losses, however, accounted for only 16 per cent of total losses sustained by the sample. By comparison, 9 per cent of families reported losses of over F$10 000 each. Their combined losses accounted for almost half of the total sample losses (table 7).

Table 7: Nadi sample household loss, by loss size

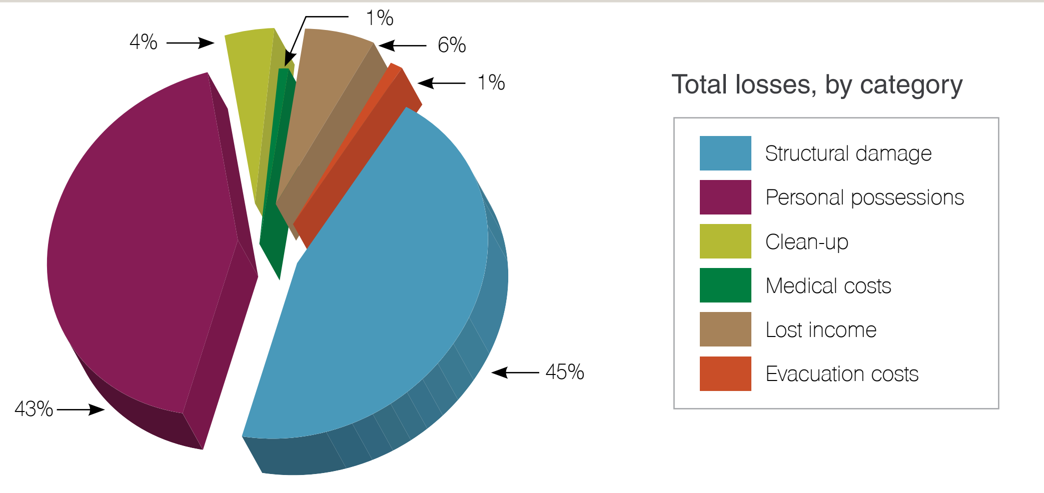
Loss per household (F$)	Number sampled	Share of sample (%)	Total sample loss (F$'000)	Share of total sample loss (%)
Nil	155	22	0	0
1–1000	151	21	97	4
1001–3000	157	22	334	12
3001–6000	119	17	500	19
6001–10 000	65	9	541	20
10 001+	70	10	1198	45
Total	717	100	2670	100

The monetary value of household losses comprised:

- structural damage to the house
- the value of personal possessions lost (the value of the item or the cost of replacement or repair)
- clean-up costs
- medical costs
- lost income
- evacuation costs.

For the sample households as a whole, the losses arising from structural damage and damage to personal possessions constituted almost 90 per cent of losses (figure 3). The values of losses from structural damage and damage to personal possessions were largely equal (table 8).

Figure 3: Nadi sample household losses, by cost category



Medical costs related to expenditure associated with illnesses or injuries incurred during, or as an immediate result of, the floods. Overall, these costs were relatively low as a proportion of total costs, partly because many households received free medical assistance during the disaster, but also because many families were unable to recall the amount they had spent on medicines. Medical costs reflected a high component of travel costs because families frequently had to travel to the hospital or medical centre by taxi. As an alternative to formal medical assistance, many families used traditional therapies to treat injuries and sicknesses resulting from the floods.

Table 8: Nadi sample household losses, by cost category

	F$'000
Structural damage	1201
Personal possessions	1161
Clean-up	105
Medical costs	15
Lost income	166
Evacuation costs	22
Total	2670

Profile of an average survey household

The average householder interviewed in the survey came from Nadi, but members had only a one-in-two chance of being aware of the risk of flooding there. The household was flooded this year and incurred financial losses as a result. Once aware of the flood danger, the household more than likely lifted possessions to higher ground and, although this did not always have the desired effect (because flood levels were frequently higher than anticipated), it did mitigate the damage. For the damage that was sustained, the household most likely had no insurance and would have to rely on charity, family and/or personal savings to replace items. For these reasons, it expected to never replace the items. Half the time, the rising waters forced the household to evacuate.

Intangible losses

Numerous household losses could not be expressed in monetary terms. These included trauma as well as the loss of irreplaceable items.

Given the scale of flooding in Nadi (one of the worst on record in Fiji) and the number of deaths, the resulting level of trauma was high. Some interviewees lost family members to drowning, while others were disabled as a result of the injuries they sustained. One respondent stated:

> My family is in a big loss. We lost a member of our family and it was really traumatic. The water came in quickly … My brother in law could have been saved if the police team have resources to go and rescue him when he was climbing on the tree and the police team responded to the Indian family that called about him on the tree …

Following flood abatement, the grief experienced by many families decreased; for others, it merely changed into the trauma of destitution and starvation. The loss of homes and/or possessions meant many families did not receive help either at all or for a long time (although the government and nongovernment organisations provided humanitarian assistance to some families). Consequently, some respondents stated that their situation, six weeks after the floods, had not been assessed by any agency and that they were on the breadline. Some desperate families resorted to taking rotting food from the waste sites around Nadi. Parks and landfill areas around Nadi became the dumping ground for decomposing food stuff that supermarkets discarded after extensive power outages following the floods. Out of desperation, many families used this food, regardless of the threat of food poisoning. One respondent stated:

> People were scavenging for food. Supermarket owners had dumped them at Prince Charles Park after the flooding … It was shocking to see what poverty makes people do. The people were squatters and were collecting whatever they could get.

For those households that received some help or were trying to recover following the floods, their recovery might have been slowed by alleged looting or price fixing. Several households stated that looting occurred following the floods, such that people stole from the belongings they had left. (There was a call for increased policing of the area following the floods.) One respondent stated:

> Our house was under water for 13 days … It wasn't until the blockage at the main road cleared that water was able to flow freely. The water inside my house was about 6 feet and 8 feet outside. I am a diabetic patient but I have to stay and clean, making my toe more infected and swollen. People stole clothes and livestock from me.

Additionally, some families alleged that some shopkeepers, with the town closed after the floods, 'increased their prices and made a profit'.

In addition to trauma, family families lost irreplaceable items, including items of sentimental value such as photos, masi and wedding tapes. One respondent stated:

> I feel sorry for the neighbour who lost everything and even her daughter's wedding materials. The wedding has been cancelled …

Additionally, financial and educational records were lost (table 9). The loss of educational certificates was sometimes raised with concern about how the loss of this information may affect employment prospects. While educational records and some administrative records may ultimately be replaced at a cost (assuming government copies of these records exist), items of sentimental value will never be replaced.

Table 9: Irreplaceable items lost by Nadi households

Personal records	Birth certificates, marriage certificates, passports, identity cards, health cards
Personal financial records	Land titles, lease documents, bank cards, insurance policies, FNPF cards, microfinance note books
Educational administration	School reports, exam results, school certificates, work certificates, references, CVs
Items of sentimental value	Photos, family journals, wedding attire, wedding tapes/DVDs
Heritage/heirlooms	Masi and mats for/from weddings, items from family history

D.

BUSINESS SAMPLE IMPACTS

Responses from 230 businesses across Nadi were analysed. Total losses reported by the businesses interviewed were around F$32 million gross (table 10). Reported loss per business varied extensively, from nil to over F$2 million worth of losses.

Table 10: Nadi sample business loss, by loss size

Loss per business (F$)	Number sampled	Share of sample (%)	Total sample loss (F$'000)	Share of total sample loss (%)
0	85	37	0	0
1 – 10 000	39	17	177	1
10 001 – 50 000	34	15	835	3
50 001 – 100 000	23	10	1 649	5
100 000 – 1 million	39	17	12 739	40
1 million +	10	4	16 719	52
Total	230	100	32 119	100

Over half (54 per cent) of businesses reported losses of F$10 000 or less (table 9), accounting for only 1 per cent of total sample business losses. The greatest proportion of losses (52 per cent), however, was attributable to a small proportion (4 per cent) of businesses that each sustained losses of over F$1 million.

Given the wide variety of businesses covered and losses reported, losses for the Nadi area were grouped according to the broad type of business:

- retail (including market vendors, travelling vendors and fuel outlets such as petrol bowsers)
- eateries (restaurants, milk bars, takeaways etc.)
- wholesalers and manufacturers (including exporters)
- services (including transport such as freight and buses, accommodation and two 'non-defined' businesses).

Tables 10–14 summarise the business losses across these business types. The range of losses even within these groups still varied extensively. A cut-off of no less than five observations per subgroup was used to maintain data accuracy.

Retail business losses

Retail businesses include shops, market sellers, fuel outlets (garages and bowsers) and mobile vendors. Given the wide variety of retail outlets covered in the sample, the range of losses by Nadi retail businesses was large.

A small proportion of businesses reported no losses because the floods did not reach their business. Others, however, reported losses in the millions. Over half the businesses interviewed reported losses of F$1–10 000, although they accounted for only 1 per cent of total retail losses. By comparison, 6 per cent of businesses each sustained losses of over F$500 000. These few businesses accounted for two thirds of the total losses to the retail sector. Total losses reported by the retail businesses sampled were around F$17.7 million (table 11).

Table 11: Nadi sample retail* losses, by loss size

	Nil	F $1–10 000	F$ 10 000–50 000	F$ 50 000–500 000	F$ 500 000+	Total
Share of retail sample (%)	6	52	19	17	6	100
Total losses (F$000)	0	118	397	5 120	12 049	17 684
Share of total losses (%)	0	1	2	29	68	100
Lost business (F$000)	0	68	136	2202	5 430	7837
Lost business share of total losses (%)		58	34	43	45	44

* Includes petrol outlets.

Interruption to business constituted a significant proportion of retail losses. Many businesses were unable to operate during or after the floods because staff or customers were unable to reach the premises, because assets were damaged or because power or water outages occurred. Interruption to normal business accounted for 44 per cent of losses to the retail sector.

Eatery losses

Eateries include milk bars, restaurants, cafés and takeaways. Losses reported by eateries ranged from F$1500 to F$185 000, with the majority of eateries reporting losses of F$50 000 to F$100 000. This large number of businesses accounted for 95 per cent of total eatery losses. Total losses were around F$0.8 million (table 12).

Table 12: Nadi sample eatery losses, by loss size

	F$0–50 000	F$50 000+	Total
Share of eateries sample (%)	38	62	100
Total losses (F$000)	40	786	825
Share of total losses (%)	5	95	100
Lost business (F$000)	25	180	205
Lost business share of total losses (%)	62	23	25

As with retail businesses, interruption to business constituted a significant proportion of losses to eateries. It accounted for 25 per cent of losses to the eateries sector overall, affecting smaller operators particularly badly (accounting for 62 per cent of their losses).

Wholesaler/manufacturer/exporter losses

This business category included large scale production (manufacturing and wholesale) as well as export. Only a small number of these businesses could be interviewed during the survey period, so losses are reported for the entire sample. None of these businesses interviewed reported zero losses from the floods: losses ranged from F$5000 to F$640 000, with most interviewees reporting losses of over F$100 000. Interruptions to business (from inability to reach clients or premises, or from damage to amenities and/or assets) accounted for 42 per cent of the sector's losses. Total losses reported by the wholesaler/manufacturer/exporter sample were around F$1.8 million (table 13).

Table 13: Nadi sample wholesaler/manufacturer/exporter losses

	Total
Total losses (F$000)	1805
Share of total losses (%)	100
Lost business (F$000)	761
Lost business as share of total losses (%)	42

Service sector losses

The service sector includes legal and consultancy businesses, cleaning businesses, transport (taxis, buses, freight) and accommodation. In addition, the category includes two non-defined businesses. Losses reported by the service industry varied from nil to over F$2 million. The majority of service businesses (46 per cent) sustained losses of up to F$50 000, and their combined loss accounted for 4 per cent of the service sector damage. By comparison, 7 per cent of service businesses sustained individual losses of over F$1 million, and their combined loss accounted for over one third of the sector's total losses. Total losses reported by the service businesses were around F$12 million (table 14).

Interruption to business was a significant issue for smaller operators; almost half the losses suffered by the smaller service sector operators arose because they could not operate properly during the flood. Proportionally, this was less of a problem for large service providers.

Table 14: Nadi sample service sector losses

	Nil	F $0– 50 000	F$ 50 000– 100 000	F$ 100 000– 1 million	F$ 1 million+	Total
Number of business sampled	6	26	6	14	4	56
Share of service sample (%)	11	46	11	25	7	100
Total losses (F$000)	0	452	380	6 685	4 287	11 804
Share of total losses (%)	0	4	3	57	36	100
Lost business (F$000)	0	206	63	1 097	74	1 440
Lost business as share of total losses (%)		46	17	16	2	12

Total business losses, by sample

Total business losses sustained by the sample were around F$32 million gross, with the retail and manufacturer/exporter sectors accounting for 86 per cent of losses (table 15).

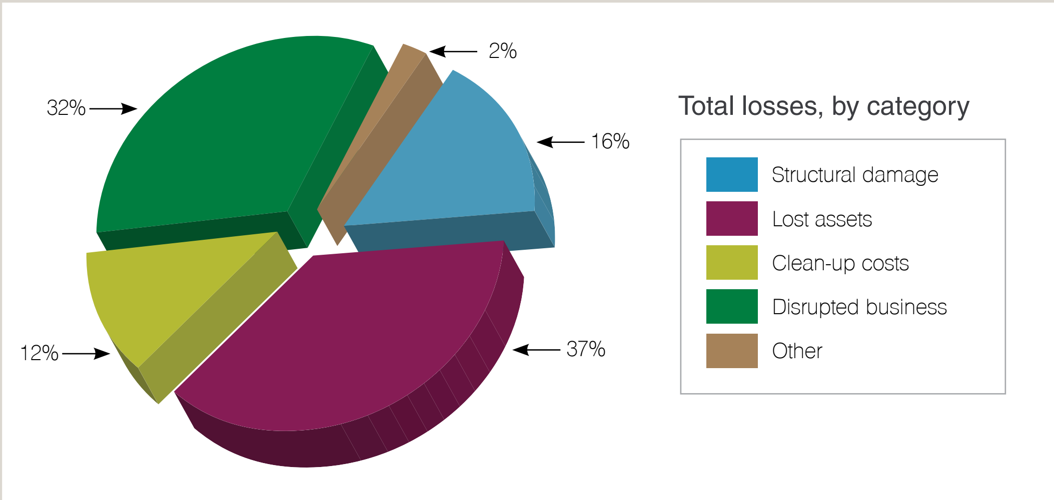
Table 15: Total Nadi sample business losses

	Number sampled	Total sample losses (F$'000)*	Lost business (F$'000)	Lost business as share of total losses (%)
Retail (inc. petrol)	155	17684	7837	44
Eateries	13	825	205	25
Exporters, manufacturers, wholesalers	6	1805	761	42
Services	56	11804	1440	12
Total	230	32 119*	10 243	32

* Figures may vary due to rounding.

The greatest source of loss was the destruction of business assets (products for sale, equipment etc.). Another significant source of loss was businesses' inability to operate normally during the flood period (because staff or customers were unable to access premises, because water and power outages occurred etc.) (figure 4, table 16).

Figure 4: Total Nadi sample business losses, by cost category*



* Figure may not add to 100 due to rounding.

Table 16: Total Nadi sample business losses, by cost category

	Total sample losses (F$'000)	Share of total sample losses (%)
Structural damage	5 175	16
Lost assets	11 994	37
Clean-up costs	4 001	12
Disrupted business	10 242	32
Evacuation costs	25	0
Relocation/storage	147	0
Extra salaries	301	1
Other	232	1
Total	32 119	100*

* Figure equals 100 with rounding.

Profile of an average business operator

Despite originating from Nadi, the average business operator in the survey had only a one-in-two chance of being aware of the risk of flooding there. The business was flooded this year and incurred financial losses as a result.

Once aware of the flood danger, the average business operator did not commonly prepare for flooding by moving items to higher ground. Even when they did act to protect possessions, this had a positive impact only one third of the time. Moving assets to higher ground mostly had no positive effect because the flood levels were higher than anticipated. Stall holders were particularly hard hit. The main marketplace in Nadi was up to 3 metres deep in flood water, such that not one stall holder interviewed benefited from having lifted their property to higher ground—the goods were inundated regardless.

For damage that was sustained, the business most likely had no insurance and would have to rely on personal savings to replace items. Some businesses were faced with having to restart their businesses from nothing.

Intangible losses

Numerous losses could not be expressed in monetary terms. These included the loss of business permits, records of goods, staff records, financial records and church records. The loss of formal records is likely to affect the recovery of businesses, especially where client contacts and/or payment records are lost (because it will take time to re-establish the client base and/or recoup debts).

E.

TOTAL SAMPLE IMPACTS

Gross total losses for the survey sample of Nadi households and businesses were around F$35 million, of which businesses accounted for over 90 per cent (table 17).

Table 17: Total Nadi community losses, by sample

	F$000	Share (%)
Household	2 670	8
Business	32 119	92
Total	34 789	100

In addition to monetary losses and lost items that could be replaced, extensive trauma arose from the flood. Further, there were extensive losses of irreplaceable items or items that have important but intangible benefits, including business and personal records and items of sentimental and cultural value (see table 9).

Interpretation of sample losses

Loss estimates are provisional because the data are imperfect:

- Some respondents might have overstated their losses in the hope that the survey would affect compensation payments. In these cases, losses would be overestimated.
- Some respondents who stated they incurred losses were unable to estimate, even broadly, the scale of their losses. In other cases, businesses were not prepared to divulge losses. These cases would underreport losses.

Ultimately, analysis was based on cleaned data (including data where unreliable or potentially inflated answers were removed) and estimates were based only on values recorded. Estimates are thus likely to be an underestimate, especially given that the analysis did not include losses to Denarau Island hotels (see below).

Hotels on Denarau Island

Denarau Island is a reclaimed area of land located 3 kilometres to the west of Nadi town. The island hosts international hotel resorts as well as shopping complexes, tourist activities and housing developments. Denarau Island was not flooded by river rise during the January 2009 floods, but some businesses were affected by high tides, leading to salt water flooding of premises and associated problems (damaged carpets, blocked pipes etc.). Further, a number of hotels suffered financially from the flood related tourist cancellations and from the island being cut off as a result of flooded roads.

The business survey covered losses to businesses operating on Denarau Island, (see loss estimates reported in tables 12–16). However, the estimates ultimately did not include losses to the Denarau hotels because those businesses presented as outliers that could skew damage estimates. (Generally, the island targets higher income tourists, with most hotels being five star quality.) Nevertheless, general observations can be made:

- All hotels experienced cancellations of tourist visits. Some hotels even advised their clients to reconsider their booking in light of the floods. One set of four hotels estimated having lost a combined value of F$3 million from just the cancellation of two international conferences.
- Most hotels lost furniture, fittings and/or appliances (ovens, computers, televisions, refrigerators) due to coastal flooding. One experienced damage to railings and concrete steps as well.
- Some hotels had to make extra salary payments to staff to cover the clean-up and overtime.
- Several hotels experienced disruption to business because tourists and/or staff were unable to reach the premises along flooded roads.
- Some hotels continued to lose earnings following the floods because they ran discounted accommodation rates to re-attract overseas and local tourists.

F.

ESTIMATED LOSSES FROM THE 2009 FLOOD

Information on losses sustained during the 2009 floods was extrapolated to estimate total household and business losses for the survey area (figure 1). Sample values were not extrapolated for the entire greater Nadi area because:

- it was not possible to sample all census areas in greater Nadi. Survey scope was limited by time (being necessary to provide the government with feedback on losses as soon as was practical) and resources (money and access to staff time). Extrapolation of losses to areas outside the survey area could generate unreliable results.
- more importantly, most survey areas were specially targeted because they were flooded, and the intention was to obtain an impression of flood impacts. Because flooding did not occur evenly across the greater Nadi area, extrapolation of sample results to greater Nadi would most likely overstate losses.

Estimates of losses sustained across the survey are to be treated with caution, given the varying data quality:

- Some respondents might have overstated the value of losses in the hope that they would receive compensation. This could lead to an overestimate.
- Some respondents were unable to estimate the value of their losses at all. This could lead to an underestimate.

The estimates supplied indicate only the magnitude of the community losses; they should not be used to determine compensation. They should, however, provide planners with sufficient data to assess likely development needs for future flood mitigation.

Total losses over the survey area

If the sample of households interviewed was representative of households across the survey area, then gross household losses across the survey area could be expected to be around F$14.5 million, of which almost F$13 million arose from structural damage and the loss of personal possessions (table 18).

If the sample of businesses interviewed was representative of businesses across the survey area, then gross business losses across the survey area could be expected to be around F$229 million (tables 19 and 20).

Table 18: Provisional total household losses over survey area, by cost category

	F$'000
Structural damage	6 539
Personal possessions	6 325
Clean-up	571
Medical costs	84
Lost income	903
Evacuation costs	118
Total	14 540

Table 19: Provisional total business losses over survey area, by business type

	Loss over survey area (F$'000)
Retail	59 765
Eateries	7 833
Exporters	18 174
Services	143 678
Total	229 450

Table 20: Provisional total business losses over survey area, by cost category

	Loss over survey area (F$'000)
Structural damage	36 972
Lost assets	85 684
Clean-up costs	28 585
Disrupted business	73 169
Evacuation costs	180
Relocation/storage	1 049
Extra salaries	2 152
Other	1 661
Total	229 450

Gross total losses for the survey region would then be expected to be around F$244 million (table 21).

Table 21: Total Nadi community losses over survey area[2]

	F$'000	Share (%)
Household	14 540	6
Business	229 450	94
Total	243 990	100

[2] Values should not be extended to the entire Nadi area because the survey targeted flooded areas only (as far as time, resources and logistics would permit) and did not necessarily represent non-flooded areas. Extrapolation beyond the survey area could thus overestimate values.

By comparison, the gross domestic product (GDP) for Fiji in 2007 was reported to be F$4447.3 million (Fiji Islands Bureau of Statistics 2006). Estimated losses in the survey area alone, therefore, represent around 5 per cent of the GDP, which is a significant loss of wealth to Fiji. The loss to the business community is a particular concern because businesses form an important part of Fiji's tax base.

Other losses

Aside from monetary losses and items that could be replaced, extensive trauma arose from the flood. Additionally, there were extensive losses of irreplaceable items or items that have important but intangible benefits. As noted earlier, intangibles lost included business and personal records as well as items of sentimental and or cultural value (see table 9).

In the survey, businesses frequently mentioned they had lost formal records. This is likely to affect business recovery (especially where client contacts or payment records are lost, because it will take time to re-establish the client base and/or recoup debts). For families, the loss of educational certificates used to secure employment was also frequently noted, along with occasional concern about how the loss of this information may affect employment prospects.

Most commonly, families lamented the loss of items that held sentimental value, such as photos, masi and wedding tapes. These items can never be replaced, while educational records and some administrative records may ultimately be replaced at a cost (assuming government copies of these records exist).

Interpretation of the estimates

Total monetary losses to the Nadi community of the January floods were estimated to be around F$244 million gross (table 21). Despite this value being based on sample responses that could contain some exaggerated losses, estimated losses are likely to underestimate total losses, for the following reasons:

- The survey results ultimately did not include the Denarau Island hotels, and these businesses are likely to represent a substantial loss to the Nadi business community.
- Many stakeholders were unable (or unwilling) to divulge the extent of some losses, and nil values were assigned in these cases.
- Medical costs to families were understated because many medical costs were free during the emergency.
- No values have been assigned to the loss of irreplaceable items such as business records, or to the trauma experienced by families.
- Estimates of household and business losses were extrapolated within the survey area only. Areas of Nadi outside this area were also flooded and sustained losses. Because the survey area was more heavily damaged, however, average losses from the survey area could not be extrapolated to the greater Nadi area (because this would exaggerate losses).

Despite these limitations, the figures indicate the magnitude of private losses in Nadi.

G.

POLICY ISSUES

Community perceptions and expectations

Several businesses and community members suggested the cause of the flood and/or how it should be addressed. The most common perceived cause of the floods was poor drainage in the Nadi area, which relates to many residents blaming the floods on the fact that no dredging had been undertaken recently (table 22). Additionally, some residents considered that poor planning controls had enabled some inappropriate developments to occur in the Nadi area, affecting the ability of the environment to safely channel water to the sea.

Given the perceived causes of the flooding, much of the community considered numerous responses should be undertaken, including improving the draining/culvert system and dredging or widening the Nadi River (table 22).

Table 22: Perceived flood causes / needed responses

Perceived cause/ needed response	Number of respondents raising issue
Need to address poor drainage system/ improve culverts	46
Need to dredge/widen river	15
Need to improve disaster warnings	5
Need to improve infrastructure (build higher bridges, upgrade roads to reduce flooding, build retaining walls etc.)	4
Need to extend the Nadi Bridge	3
Need to improve development processes/planning*	3
New Qeleloa bridge**	3
Need to relocate town (Nadi)	2
Need to improve flood management system	1

* Perception that housing schemes in villages or housing developments generally do not consider flood risk when location is decided.

** Perception from some residents that this was inappropriately designed/located and impedes the natural flow of water.

In addition to flood management generally, community members made requests or recommendations that they considered would speed recovery the floods. Aside from requests for financial assistance from the government, the most common requests related to improving the litter and waste situation around Nadi. This was perceived by Some residents perceived that the waste was contributing to dengue outbreaks following the flood. The following were other suggestions:

- Improve the immediate response:
  - —Identify all evacuation centres in Nadi and communicate that information to the community.
  - —Improve evacuation procedures.
  - —Provide wider immediate assessment and help to families/businesses (including crop rehabilitation).
  - —Continue food rations for at least three months.
  - —Increase communications and transparency across representatives of the Red Cross, DISMAC, nongovernment organisations etc. to ensure more widespread assistance and fewer gaps in assistance.
  - —Provide assistance to clean up houses, businesses and farms.
- Improve response planning over the medium term:
  - —Upgrade the weather station in Nadi to improve flood warnings.
  - —Improve warning dissemination.
  - —Build more community halls in case needed for an emergency evacuation centre.
  - —Keep water supply always ready in case of emergency.
  - —Locate DISMAC and Red Cross teams in different places so they can be contacted by affected areas.
  - —Introduce a crop insurance scheme for households and businesses.
- Improve recovery:
  - —Hire private contractors to help clean up following a flood.
  - —Spray blocked drains to control mosquitoes during floods.
  - —Landlords give a grace period for rent payment because not much profit is gained.
  - —Conduct dialogue with the consumer council to lower food prices to meet needs.
  - —Make Nadi a tax free zone for at least five years. Cut the rate over the years.
  - —Improve access to insurance, by either the government establishing its own insurance or it forcing insurance agencies to agree to insure operators in Nadi.
  - —Improve security following floods to minimise looting.
  - —Improve access to funds through loans.
- Reduce risk:
  - —Assess flood risks (that is, calculate the risk of flooding, assess the causes of changes to river flow etc.).
  - —Ensure development plans incorporate disaster risk.
  - —Improve the regulation of dams.
  - —Improve dredging and drainage.

Given the frequency with which community members made observations or recommendations on how to prevent or mitigate flood risk, the Government of Fiji will need to manage public expectations. The community consider that the government should invest substantially in technical measures (dredging etc.) to mitigate future floods, and that it needs to better assist the community in the future. Community suggestions need to be technically assessed, however, to determine their appropriateness. If community expectations are appropriate, then the government will need to assess how and when to address them and communicate that information to the community. If the perceived causes and solutions are not relevant, however, then the government risks being viewed as ineffective or irresponsible when it does not pursue them.

Additionally, some businesses and families blamed specific developments as the cause of flooding. In the interest of social harmony during a time of heightened sensitivity, there may be benefit in the government making an informed statement on these issues to allay concerns or address realities.

Awareness and response

Only around half the respondents interviewed stated they were aware of any risk of flooding in Nadi town (table 23), despite the majority of households and business operators claiming to originate from Nadi. Households were marginally more informed than businesses.

Table 23: Prior knowledge of flood risk

	Aware	Total	Share aware of risk (%)*
Households	373	717	52
Businesses	108	230	47
Total	481	947	

* May not add to 100 due to rounding.

To minimise damage from future floods, it would seem useful to raise awareness of flood risks in Nadi. Few people recognised that floods are a natural occurrence around Nadi, and only half of those interviewed noted even being aware that they lived and/or operated in a flood risk area. Once the flood occurred, many people did not know how to react. Focus group discussions revealed that many people focused on the timing of the tides during the floods, expecting the flooding would abate once the tide went out. Yet heavy rains continued while the tide receded, so flood levels continued to rise regardless of the tide. Many people were thus caught unprepared during 'low' tides; some were not at all prepared by the time the flood was at its worst. Some respondents were thus unable to reach their homes or businesses at all when the floods hit, or could reach them only when it was too late. When asked if he took any measures to protect his business once he realised a flood was happened, one business operator responded, 'I swam across the street to lift possessions up'.

Some practices during the floods were disturbing. One respondent from the focus groups stated that she did not evacuate her house while it was flooding because it was her job to stir the water to prevent the mud settling on the floor. This practice would appear to present a substantial health risk during flash floods.

Given these issues, improving community awareness of flood risks around Nadi—for example, distributing materials on flood awareness and preparedness—will be important to improve community understanding of both the risk and what to do during a flood. Awareness raising may include, for example, school and community meetings (especially during cyclone season), the distribution of posters and pamphlets, and advertising on local radio.

The majority of interviewees stated that they took action to minimise flood damage once they became aware of the oncoming flood. Most commonly, they lifted personal belongings or items to higher ground (table 24). This action did not prevent damage to all goods, but it had some positive effect for some households and businesses. Businesses were less proactive than households in protecting their assets, possibly because business operators were unable to reach their premises while protecting their families and homes. Other reasons are unclear.

Table 24: Taking measures to protect property and assets

	Took measures	Total sample	Proportion who took measures (%)
Households	580	717	81
Businesses	97	230	42
Total	677	947	71

As part of general awareness raising, therefore, revised education may be needed on how to prepare in response to a flood alert or warning.

Dissemination of information, alerts and warnings

Awareness raising and preparedness for flooding (and other disaster types) will rely on an appropriate means of information dissemination. Survey findings indicate that 52 per cent of households and 63 per cent of business operators are actively involved with a community or religious group. Some of these groups may provide valuable conduits for disseminating messages and awareness materials. The groups most commonly attended by households were Christian churches, with the Methodist Church being the most popular. Sanatans and the Assembly of God churches too were frequently mentioned. Youth and rugby groups were also important locally for sharing information (tables 25–28).

Table 25: Household membership of organisations

Organisation	Share of households overall (%)*
Christian church	16
Other religion	6
Community group	3

* Includes households that were not affiliated with any group.

Table 26: Household membership of Christian groups

	Methodist	Assembly of God	Catholic	Christian Mission Fellowship	Other
Share of households sampled (%)	8	3	1	1	3

Table 27: Household membership of other religions

	Sanatan	Nadi Muslim League	Other
Share of households sampled (%)	4	2	0

Table 28: Household membership of community groups

	Rugby team	Youth group	Red Cross	Chamber of Commerce
Share of households sampled (%)	1	1	1	1

Business operators also stated that they were actively involved in a number of religious groups (tables 29 and 30), with Sanatans by far the most frequently mentioned (reflecting the large proportion of the Nadi business community that is IndoFijian). They were also actively involved in a number of community groups, such as the Chamber of Commerce and the Rotary Club (table 31). Targeting awareness activity through these religious and community organisations may be useful for raising awareness in the Nadi business community.

Table 29: Business membership of Christian groups

	Bethany Methodist	Methodist	Catholic	Latter Day Saints	Christian Mission Fellowship	Other
Share of businesses sampled (%)	1	1	1	1	1	2

Table 30: Business membership of other religions

	Sanatan	Unspecified church/ temple	Fiji Muslim League	Sangam
Share of businesses sampled (%)	11	3	5	2

Table 31: Business membership of community groups

	Chamber of Commerce	Youth group	Rotary Club	Other
Share of businesses sampled (%)	2	1	1	4

To disseminate warnings or alerts in the future, the use of the mobile phone is likely to be critical. Eight and nine out of 10 households and businesses respectively had access to at least one mobile phone. By comparison, only one third of households and just over half of businesses had access to landlines (table 32). Some businesses also noted that landlines were unavailable to them when the business was closed, so this form of communication would have limited value in passing on warnings. The majority of households also had access to radios to receive messages, although this medium held value only during the day when the radio was on. Just over half the businesses (54 per cent) also had access to the radio to hear warnings.

Table 32: Access to phones and radios

	Landlines	Mobile phones	Radios
Share of households (%)	38	93	81
Share of businesses (%)	56	86	54

Given the widespread use of mobile phones by the business and household community (table 32), the majority of households and businesses stated that the mobile phone is the best option for contacting them in an emergency (table 33), especially at night when businesses are closed and business operators are away from the landline (table 34).

Table 33: Best means of emergency contact (day time)

	Mobile phone	Landline	Both mobile phone and landline	Other	Total
Share of households (%)	69	24	2	5*	100
Share of businesses (%)	60	36	3	1**	100

* Shouting, personal contact, neighbours/neighbour's phone, village Head Man, government officers, Turaga ni Koro, police, local priest etc.

** Personal contact, radio.

Table 34: Best means of emergency contact (night time)

	Mobile phone	Landline	Both mobile phone and land line	Other *	Total
Share of households (%)	73	21	2	4*	100
Share of businesses (%)	82	14	2	1**	100***

* Shouting, personal contact, neighbours/neighbour's phone, village Head Man, government officers, Turaga ni Koro, police, local priest etc.

** Personal contact, radio.

*** May not add to 100 due to rounding.

There may be value in the Government of Fiji meeting with mobile phone companies to share alerts and warnings through these media, as well as through more conventional media (such as the radio). This approach would also have advantages for:

- night time warnings when media such as the radio are switched off
- warning during power cuts.

Insurance

Insurance coverage of Nadi households and businesses is very low. Only 1 per cent of households reported having any insurance to recover from flood losses, while 88 per cent of business operators reported having no insurance (table 35). Of this latter group, not one market vendor had any insurance, yet immediate damage to market vendors was frequently thousands of dollars. (Damage to market stalls and produce was reported in the range of nil to F$20 000.[3]) Some business operators stated that insurance was not an option because private insurers would not cover businesses for floods around Nadi. Of those that did report having some insurance, over half were located on Denarau Island, targeting the high end of the tourist market.

Table 35: Insurance coverage

	Number of observations	Number with some insurance coverage	Share with some insurance (%)
Households	717	7	1
Businesses	230	27	12

Households and businesses that had no insurance would have to absorb all losses. When asked how they would recover from the floods, many considered their losses were so severe that they might never recover, and many would have to start again. Others stated they would rely on assistance from families, the government and/or their savings. In February 2009, the Government of Fiji's (2009) final flood assessment report noted the government's intent to review the insurance industry to better support developments in the country. This review is likely to be critical for speeding recovery in the future.

Benefits from the flood

A small proportion of businesses reported a business benefit from the flood, having received customers diverted from elsewhere or experienced increased demand for repair services. Data on the increased income for these businesses were limited, however, so it was not possible to estimate the increase in incomes generally.

[3] One stall holder reportedly lost up to F$65 000. This total loss included damage to machinery and pipes, so this interviewee was counted with businesses instead.

REFERENCES

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ANNEX 1

TERMS OF REFERENCE

SUPPORT TO FIJI FOR POST-FLOODING TECHNICAL ASSESSMENTS, JANUARY 2009

PHASE 2—SOCIOECONOMIC ASSESSMENT

Objective:

Conduct an economic assessment of flooding to households and private businesses (plus an economic valuation of damage to infrastructure, where possible).

Outcomes:

Improved advocacy for flood mitigation and warning, improved decision making and investment analysis for flood management and mitigation. The output will be a technical report with plain English summary/policy brief.

Activities:

Previous economic assessments of the economic costs of flooding (Holland 2008, Woodruff 2008) indicate that the potential monetary costs include losses to households, businesses (local and international) and government (offices, material, infrastructure), as well as the cost of humanitarian assistance. Non-monetary costs include interruption to schooling, the loss of irreplaceable items (including records) and trauma. In Nadi, tourism is a focal aspect of the economy, and the impact of flooding on the hotel industry and services that support and rely on it (tours, shops, airlines) will also be critical.

Data to assess the economic cost of the floods will be sourced from government records, consultation with agencies, media and sample surveys. SOPAC assistance in economic assessment will focus on the last three items. The single largest activity will be sample surveys of:

- international tourist operations (hotels, tours, international and domestic flights)—these businesses will be assessed rapidly through a random sample survey, stratified by business type if possible (as yet unclear)
- local businesses (shops and stalls)—these local businesses will be assessed using a random sample initially but stratified after the fact if necessary

- households—these will be sampled using random sampling on the basis of census enumeration districts. Information on the enumeration districts for towns and greater areas would need to be accessed from the Department of Statistics.

Government of Fiji counterpart support:

- Information on the enumeration districts in the area as the basis for household surveys
- Government data on the number, size category and type of businesses operating in the affected Nadi area (necessary for stratifying samples)
- Enumerators (people to conduct interviews with businesses and householders in both Fijian and Hindustani. Must also be fluent in English and literate.)

SOPAC support:

- Funding (possible co-funding with other partners)
- Facilitation/coordination of surveys
- Training for enumerators
- Support for processing of survey results and report development

Potential partners

- United Nations Development Programme (UNDP) – Pacific Centre
- Fiji Red Cross
- Non-government organisations / community service organisations

Nadi schedule

Activity	Date	Duration
Preparation (questionnaires drafting, media releases, preparatory reading, planning)	2–8 February	One week
Nadi		
Briefing to Nadi stakeholders	12 February	One day
Nadi survey training and Nadi survey	16–24 February	1.5 weeks
Data entry and analysis of Nadi economic losses	23 February – 20 March	Four weeks
Reporting of preliminary findings on Nadi economic losses	March/April	One day
Drafting of report, policy briefs		As time permits

ANNEX 2

QUESTIONNAIRES

FIJI FLOOD HOUSEHOLD SURVEY FOR HOUSEHOLDS

Questionnaire # (data entry, e.g. hh1, hh2 etc.)

Date	
Interviewer's name	

Survey district:..

A PERSONAL BACKGROUND

The purpose in this section is to get an understanding of the number of people affected by floods, how frequently they experience flooding in the area and how they came to rely on Nadi/ Ba to begin with.

A1 Name of interviewee..

A2 Position in the household (head of household etc.)..

A3 Male or female person being interviewed? (circle) Male Female

A4 Street address..

A5 How many people normally live in this house?

	Age	Highest education level
Person 1		
Person 2		
Person 3		
Person 4		
Person 5		
Person 6		
Person 7		
Person 8		
Person 9		
Person 10		

A6 When did you come to Nadi/Ba to live? (circle/complete)

(i) Always lived here

(ii) Moved here from (town, island)..in (year)..........................

A7 If you came here to live from elsewhere, why did you move here to begin with?

....

A8 Do you rely on the river for any particular purposes? (circle)

Fishing Irrigation Transport of produce by boat

Transport of self by boat Disposal of water/sewerage Recreation

Other (specify)..

A9 Do you own a business here in Nadi/Ba? If YES, would you also participate in a business survey after this interview too?..

If YES, interviewer please attach business questionnaire to this household questionnaire.

B FLOOD WARNINGS

The purpose in this section is to get an understanding of whether or not a short term warning system (1–3 hours) would make any difference to people in reducing losses in the future. This will determine whether or not a warning system could be developed or not. It also gives us information on how people find out about and cope with floods so that we could work out how to reach them using an early warning system.

B1 Were you aware of the risk of flooding in this area before the floods hit this year? (circle) Y N

B2 How many floods have you experienced here before?...

B3 Before January this year, when did you last suffer from flooding here?.........................

....

....

B4 When the 2009 flood happened, how did you first find out about it? (circle)

(i) Water entering the building (ii) Radio (iii) Television

(iv) Phone call from friend/colleague (v) Text message (vi) Saw heavy rain

(vii) Saw river rise (viii) Contacted in person by friends/neighbours

(ix) Other (specify) ....

.. ..

B5 Did you get flooded this year? If NO, go to section C. If YES, how much warning did you get before water came in?

....

....

B6 Did you take any other measures to protect your property (lift/move possessions etc.)? Y N

If YES, what did you do?

....

....

B7 What effect did it have (how did it help)?

....

....

....

C WATER QUALITY

The purpose in this section is to understand the scale of flooding and its impact on water quality. This information can be used to predict future flood impacts in the future.

C1 What changes in the river did you notice during the flood (if any)?

Increase in unpleasant smells   Increased murkiness

Bad taste in tap water   Other (specify)...

....

....

C2 How many days after the flood was it before those changes went away?

....

....

....

D PERSONAL LOSSES

The purpose in this section is to get an understanding of how much householders lost as a result of the flood.

D1 Did the people from your household lose any personal possessions, suffer physically or get disadvantaged personally in any other way as a result of this flood?

Y N

If NO, go section E.

D2 If YES, what were the types of item lost? (SHOW DISPLAY CARD TO INTERVIEWEE. Circle all that apply.)

Electrical appliances (TV, radio, telephone, refrigerator etc.) Livestock/animals

Furniture Cash crops that you are producing

Purchased food items Subsistence crops

Transport (car, tractor, etc.) Structural damage to house

Other (broadly)..

....

....

D2a If YES, what was the total value of structural damage to the house?

$..

D3 What would you say was the approximate total value of the personal possessions your household lost (value of item or cost of replacement or repair)? SHOW DISPLAY CARD TO INTERVIEWEE.

....

....

....

D4 How did/will you replace the lost items?

(i) Won't replace (ii) Insurance (iii) Private savings

(iv) Extended family (v) Charity donations (vi) Government assistance

(vii) Other (specify)...

....

....

D5 Did you lose any items that are irreplaceable and difficult to value (photos, records, heirlooms etc.)? If YES, which items?

D6 What were the approximate total clean-up costs? (purchase of detergents etc.)

....

....

....

....

D7 Did you or other members of your household suffer any sickness or injury during the flood? Y N

If NO, go to question D11.

D8 If YES, how many household members were affected and what were the sicknesses/ injuries? (e.g., cuts, injuries and infections from slipping in floods etc.)

....

....

....

....

D9 Did you have to pay for any medical treatment? If no, why (free service for emergency, other)?

....

....

....

....

If YES, go to question D10. If NO, go to question D11.

D10 If you had to pay for medical treatment, how much roughly did it cost to treat the sicknesses/injuries?

	FJ$
Doctors visits	
Medicine (painkillers, creams, antibiotics etc.) Dressings (purchase of bandages etc.)	
Days in hospital	
Other (specify)	

D11 Up till now, have you or other members of your household suffered any sickness later on because of the effects of the flood (e.g., cuts and infections from slipping in floods, diarrhea, severe diarrhea, dysentery, respiratory infection, measles, malaria, dengue, high fever etc.)? Y N

If NO, go to question D15.

D12 If YES, please provide details (what sicknesses? how many persons affected?):

....

....

D13 Did you have to pay for any medical treatment? If NO, why (free service for emergency, other)?

....

....

If NO, go to question D15..

D14 If YES, how much roughly did it cost to treat these subsequent illnesses?

	Type of illness			
	#1	#2	#3	#4
Doctors visits				
Medicine (painkillers, creams, antibiotics etc.) Dressings (purchase of bandages etc.)				
Days in hospital				
Other (specify)				

D15 Did your household lose any employee wages because of the flood?
Y N

If NO, go to question D19.

D16 If YES, how many members of your household were unable to work?.. people

D17 How many days were they unable to work?..days

D18 Approximately how much did the household lose in wages due to missed days? $..

D19 How many days did it take to clean up your house and land after the flood? ....days

D20 Did you experience disruption in basic services?

If YES, what services were disrupted? (Circle all that apply.)

Transport	Water supply
Electricity	Telephone

D21 On average, how long did you have to wait for these services to resume?

....

D22 Did you have to evacuate your home? Y N

If NO, go to question D28.

D23 If YES, how did you evacuate? (circle)

(i) On foot	(ii) Own vehicle	(iii) Taxi
(iv) Bus	(v) Used family/friend's vehicle	(vi) Boat
(vii) Evacuation team	(viii) Other (specify)	

....

....

D24 For how long did you evacuate?..days

D25 Where did you go (evacuation centre, house of family/friend etc.)?

....

....

D26 Did evacuating your home cost you anything? If NO, go to question D28. If YES, what did you have to pay for?

....

....

....

....

D27 How much did evacuating cost you?..

D28 Did any children in the household miss any days of school as a result of the flood?

If NO, go to section E. If YES, why?

....

....

D29 How many children missed school? ....children

D30 How many days did they miss each? ....days

E ACCESS TO COMMUNICATIONS

The purpose in this section is to get an understanding of how we might be able to advise people of an oncoming flood in the future.

E1 Does your household/business have any of the following items operating daily?

	Tick if 'yes'
Electricity	
Phone land line	
Mobile phone	
Electricity powered radio	
Battery powered radio	
Television	
Computer with access to the internet	
Fiji Times newspaper	
The Sun newspaper	
Daily Post newspaper	
Fax	

E2 Are you an active member of a community or church group where you obtain information about this town? Y N

E3 If YES, which one(s)?

....

....

E4 How do you get information on the latest developments in town? (circle)

(i) Family (ii) Friends (iii) Church (iv) Community group

(v) Public notice board (vi) Newspaper (vii) Radio (viii) District Officer

(ix) Other (specify)

....

....

E5 Generally speaking, what is the best way to contact you in an emergency (phone, neighbours etc.):

During the day?

....

At night?

....

E6 How would you contact others in the event of an emergency?

....

....

J FINAL COMMENTS

Explain that this is the end of questionnaire.

Thank the respondent for their time and effort.

J1 Would you like to add any comments about the flooding?

....

....

....

....

Explain that the results of the survey will be made available to the government around March to April and that these will be released to the public after verification. The results of the survey will be produced in a report that goes to the government later in the year.

If respondents would like to find out more about the survey, they should in the first instance contact:

Mosese Sikivou
SOPAC
Ph. 338-1377 x.252

THANK YOU FOR HELPING US IN THIS WORK

FIJI FLOOD FIXED BUSINESS AND TOURIST OPERATOR SURVEY

Questionnaire # (data entry, e.g., fb, fb2 etc.)

Date	
Interviewer's name	

Survey district:..

F BACKGROUND

The purpose in this section is to get an understanding of the number and types of businesses affected by floods.

F1 Name of interviewee

....

F2 Position of interviewee (owner, director, manager etc.)

....

F3 Kind of business

....

....

F4 Street address of business

....

F5 When was the business established?

....

F6 When did you join the business?

....

F7 Are you yourself from Nadi/Ba?

....

B FLOOD WARNINGS

The purpose in this section is to get an understanding of whether or not a short term warning system (1–3 hours) would make any difference to people in reducing losses in the future. This will determine whether or not a warning system could be developed or not. It also gives us information on how people find out about and cope with floods so that we could work out how to reach them using an early warning system.

B1 Were you aware of the risk of flooding in this area before the floods hit this year? (circle) Y N

B2 How many floods have you experienced here before?...

B3 Before January this year, when did you last suffer from flooding here?.......................

....

....

B4 When the 2009 flood happened, how did you first find out about it? (circle)

(i) Water entering the building (ii) Radio (iii) Television

(iv) Phone call from friend/colleague (v) Text message (vi) Saw heavy rain

(vii) Saw river rise (viii) Contacted in person by friends/neighbours

(ix) Other (specify) ....

....

B5 Did you get flooded this year? If NO, go to section C. If YES, how much warning did you get before water came in?

....

....

B6 Did you take any other measures to protect your property (lift/move possessions etc.)? Y N

If YES, what did you do?

....

....

B7 What effect did it have (how did it help)?

....

....

....

C WATER QUALITY

The purpose in this section is to understand the scale of flooding and its impact on water quality. This information can be used to predict future flood impacts in the future.

C1 What changes in the river did you notice during the flood (if any)?

Increase in unpleasant smells Increased murkiness

Bad taste in tap water Other (specify)...

....

....

C2 How many days after the flood was it before those changes went away?

....

....

....

G COMMERCIAL LOSSES

The purpose in this section is to get an understanding of how much businesses lost as a result of the flood.

G1 Was your business affected by the floods? If NO, go to section E. If YES, what damage occurred generally? (circle)

Business totally destroyed Assets lost Building damage

Businesses/clientele lost Produce lost

Other (specify)

....

....

G2 SHOW DISPLAY CARD TO INTERVIEWEE. If some of your business assets were damaged or lost because of the flood, which ones were damaged or lost? (circle)

Structural damage to buildings Appliances

Office furniture Furnishings

Assets (store stock, perishable food, cars etc.) Administration (files, records)

Other (please specify) ....

....

G2a What would say was the total value of structural damage to the buildings?

$..

....

G3 What would you say was the total value of the business assets lost (value of item or cost of replacement or repair)? $..

G4 What do you estimate to have been the total clean-up cost? $..............................

G5 Did you lose any items that are irreplaceable to your business (records etc.) If YES, which items?

....

....

G6 If your business was disrupted because of the floods, what was the specific reason? (circle)

Premises/assets flooded	Staff unable to reach premises
Unable to operate because of poor weather	Power outages
Water cuts	Unable to access provisions/shops

Customers/clients/tourists unable to reach businesses

Other (specify)

....

....

G7 How many days business did you lose due to this flood disruption?

....

....

G8 Roughly how much did your business lose due to this flood disruption?

Either Estimated total $...

Or Average revenue lost per day $...

G9 During the flood, did you have to evacuate the business premises? Y N

If NO, go to question G15.

G10 If YES, how did you evacuate? (circle)

(i) on foot (ii) own vehicle (iii) taxi

(iv) bus (v) used family/friend's vehicle (vi) boat

(vii) evacuation team (viii) other (specify)

....

....

G11 Where did you go (evacuation centre, house of family/friend etc.)?

....

....

G12 For how long did you evacuate?..days

G13 Did evacuating your business cost anything? If YES, what did you have to pay for? (e.g., fuel, use of vehicles etc.)

....

....

....

....

G14 How much did evacuating cost you?

....

....

G15 Did you relocate your business to somewhere else? Y N

If NO, go to question G18.

G16 If YES, where did you go?

....

....

....

G17 Did you have to pay for any temporary quarters, additional transportation, communications or storage expenses? Y N

If YES, how much did this cost?

....

....

G18 Following the flood, did you have to use any paid staff to clean up premises rather than producing or selling for you? Y N

If NO, go to question G20.

G19 If YES, how much would it have cost you in salaries to get them to do this work?

Either	Estimated total cost	....
Or	No. of paid staff	....
	No. of days paid to clean up	....
	Average salary cost	....

G20 Were there any other business costs that you incurred because of the floods? What and how much?

....

....

....

....

G21 Did you experience disruption in basic services? If YES, what services were disrupted? (circle all that apply)

Transport Water supply

Electricity Telephone

G22 On average, how long did you have to wait for these services to start again?

....

....

G23 Is your business (property and assets) currently covered by insurance? If NO, go to question G26.

If YES (circle):

None Some All

G24 If only some are covered, which ones are covered?

Building Assets for sale Furnishings

Other (specify)

....

....

G25 Would you say that the insurance you have covers the full value of your losses? Why?

....

....

G26 Did your business increase in any way because of the floods? If NO, go to section E. If YES, say how it increased (customers diverted from elsewhere etc.).

....

....

G27 Would you be able to say by how much your income increased?

....

....

E ACCESS TO COMMUNICATIONS

The purpose in this section is to get an understanding of how we might be able to advise people of an oncoming flood in the future.

E1 Does your household/business have any of the following items operating daily?

	Tick if 'yes'
Electricity	
Phone land line	
Mobile phone	
Electricity powered radio	
Battery powered radio	
Television	
Computer with access to the internet	
Fiji Times newspaper	
The Sun newspaper	
Daily Post newspaper	
Fax	

E2 Are you an active member of a community or church group where you obtain information about this town? Y N

E3 If YES, which one(s)?

....

....

E4 How do you get information on the latest developments in town? (circle)

(i) Family	(ii) Friends	(iii) Church	(iv) Community group
(v) Public notice board	(vi) Newspaper	(vii) Radio	(viii) District Officer

(ix) Other (specify) ....

....

E5 Generally speaking, what is the best way to contact you in an emergency (phone, neighbours etc.):

During the day?

....

At night?

....

E6 How would you contact others in the event of an emergency?

....

....

J FINAL COMMENTS

Explain that this is the end of questionnaire.

Thank the respondent for their time and effort.

J1 Would you like to add any comments about the flooding?

....

....

....

Explain that the results of the survey will be made available to the government around March to April and that these will be released to the public after verification. The results of the survey will be produced in a report that goes to the government later in the year.

If respondents would like to find out more about the survey, they should in the first instance contact:

Mosese Sikivou
SOPAC
Ph. 338-1377 x.252

THANK YOU FOR HELPING US IN THIS WORK

FIJI FLOOD MARKET/HAWKER SURVEY

Questionnaire # (data entry, e.g., m1, m2 etc.)

Date	
Interviewer's name	

Survey district:..

H BACKGROUND

The purpose in this section is to get an understanding of the number and types of market vendors affected by floods.

H1 Name of interviewee..

H2 Kind of market business..

H3 How long have you been operating?..

H4 Do you sell at the market every day? If so, for how many hours usually?

....

H5 Are you yourself from Nadi/Ba?..

B FLOOD WARNINGS

The purpose in this section is to get an understanding of whether or not a short term warning system (1–3 hours) would make any difference to people in reducing losses in the future. This will determine whether or not a warning system could be developed or not. It also gives us information on how people find out about and cope with floods so that we could work out how to reach them using an early warning system.

B1 Were you aware of the risk of flooding in this area before the floods hit this year? (circle) Y N

B2 How many floods have you experienced here before?..

B3 Before January this year, when did you last suffer from flooding here?..

....

....

B4 When the 2009 flood happened, how did you first find out about it? (circle)

(i) Water entering the building (ii) Radio (iii) Television

(iv) Phone call from friend/colleague (v) Text message (vi) Saw heavy rain

(vii) Saw river rise (viii) Contacted in person by friends/neighbours

(ix) Other (specify) ....

....

B5 Did you get flooded this year? If NO, go to section C. If YES, how much warning did you get before water came in?

....

....

B6 Did you take any other measures to protect your property (lift/move possessions etc.)? Y N

If YES, what did you do?

....

....

B7 What effect did it have (how did it help)?

....

....

....

C WATER QUALITY

The purpose in this section is to understand the scale of flooding and its impact on water quality. This information can be used to predict future flood impacts in the future.

C1 What changes in the river did you notice during the flood (if any)?

Increase in unpleasant smells Increased murkiness

Bad taste in tap water Other (specify)..

....

....

C2 How many days after the flood was it before those changes went away?

....

....

I MARKET/HAWKER LOSSES

The purpose in this section is to get an understanding of how much market vendors lost as a result of the flood.

I1 If you suffered any damage to your business because of the 2009 floods, what types of damage did you suffer?

Loss of produce that you grew for sale   Destroyed tables

Loss of items that you purchased   Destroyed bags

Other (please specify)..

....

I2 SHOW DISPLAY CARD TO INTERVIEWEE. What would you say was the total value of those losses?

$ ....

I3 Did you lose any items that were irreplaceable to your business and are difficult to put a value on (records, permits etc.)? If YES, which items?

....

....

I4 During the flood, did you have to evacuate the market/street?   Y   N

If NO, go to question I9.

I5 If YES, how did you evacuate? (circle)

(i) Own vehicle   (ii) Taxi   (iii) Bus

(iv) Used family/friend's vehicle   (v) Boat   (vi) Evacuation team

(vii) Other (specify)..

I6 For how long did you evacuate? ....days

I7 Did you relocate your business to somewhere else?   Y   N

If NO, go to question I9.

I8 If YES, where did you go?

....

....

I9 Did you experience disruption in basic services affecting your business?

If YES, what services were disrupted? (circle all that apply)

Transport Water supply

Electricity Telephone

I10 On average, how long did you have to wait for these services to start again?

....

....

I11 If your business was disrupted because of the floods, what was the specific reason? (circle)

Market flooded Unable to reach market/place of sale/town

Unable to operate due to poor weather Unable to access provisions/shops

Other (specify)..

....

I12 To date, how many days business did you lose due to this flood disruption?

....days

I13 Roughly how much did your business lose due to this disruption?

Either Estimated total $......................... Or Average revenue lost per day $..............................

I14 Is your business (property and assets) currently covered by insurance? If NO, go to question I16. If YES (circle):

None Some All

I15 If only some items are covered, which ones are covered?

Building Assets for sale Furnishings

Other (specify) ....

....

I16 Would you say that the insurance you have covers the full value of your losses? Why?

....

....

I17 Did your business benefit in any way because of the floods? If NO, go to section E.

If YES, how did it benefit (customers diverted from elsewhere etc.)?

....

....

I18 Would you be able to say by how much your income increased?

....

E ACCESS TO COMMUNICATIONS

The purpose in this section is to get an understanding of how we might be able to advise people of an oncoming flood in the future.

E1 Does your household/business have any of the following items operating daily?

	Tick if 'yes'
Electricity	
Phone land line	
Mobile phone	
Electricity powered radio	
Battery powered radio	
Television	
Computer with access to the internet	
Fiji Times newspaper	
The Sun newspaper	
Daily Post newspaper	
Fax	

E2 Are you an active member of a community or church group where you obtain information about this town? Y N

E3 If YES, which one(s)?

....

....

E4 How do you get information on the latest developments in town? (circle)

(i) Family	(ii) Friends	(iii) Church	(iv) Community group
(v) Public notice board	(vi) Newspaper	(vii) Radio	(viii) District Officer

(ix) Other (specify) ....

....

E5 Generally speaking, what is the best way to contact you in an emergency (phone, neighbours etc.):

During the day?

....

At night?

....

E6 How would you contact others in the event of an emergency?

....

....

J FINAL COMMENTS

Explain that this is the end of questionnaire.

Thank the respondent for their time and effort.

J1 Would you like to add any comments about the flooding?

....

....

....

Explain that the results of the survey will be made available to the government around March to April and that these will be released to the public after verification. The results of the survey will be produced in a report that goes to the government later in the year.

If respondents would like to find out more about the survey, they should in the first instance contact:

Mosese Sikivou
SOPAC
Ph. 338-1377 x.252

THANK YOU FOR HELPING US IN THIS WORK

ANNEX 3

FIJI FLOOD IMPACT ASSESSMENT: TRAINING NOTES

1 BACKGROUND

The Government of Fiji has requested help to assess the impact of the floods that occurred across Fiji in early 2009. To address this, SOPAC and the UNDP are conducting surveys in Nadi and Ba to estimate the losses to families and local businesses. The information generated will be used to lobby for greater investment in flood mitigation and warning systems (for example, designing better warning systems) as well as to support the Government of Fiji to better manage the Nadi and Ba catchments in the future.

1.1 The surveys

The surveys will collect information on:

- the types of damage families and businesses experienced because of flooding
- the financial costs of any damage or losses
- how people might avoid flood damage in the future.

Interviewers will be asked to interview key household members or business operators to find out about their experiences and views of the flood situation. They will log the answers in English on questionnaires. Data analysis will be conducted by SOPAC. Once the data have been analysed, a policy brief will be given to the government to explain how much people lost. This information will be made public. A technical report with more details will also be published later on but this will take some time before it is ready.

Household and business surveys will be conducted as follows:

Nadi: 16–20 February (plus two days of discussions with groups but you will not be required for this)
Ba: 23–27 February.

It is possible that the household and business surveys may need to be extended for a few more days than currently planned. If this occurs, we may invite you to stay on with us to assist in the survey for a few more days.

2 INFORMATION FOR NADI INTERVIEWERS: HOW THE SURVEY WILL OPERATE

There are up to three sets of questionnaires, as follows:

- householders
- businesses, including market stall operators and hawkers (people who travel from place to place selling)
- hotels.

You will use the questionnaires to find out about people's experiences and losses. You will write down the answers on the questionnaire during the interview. Later on, you will pass the completed forms to a data person.

2.1 Piloting the survey

The first day of the survey will involve checking to see that the questionnaire actually works. This means conducting the surveys to see if the questions make sense or if people get confused. If people get confused, please mark down which questions are the problem, what's happening and, if you have an opinion, why you think it may be happening. Tell SOPAC when you get back at the end of the day. SOPAC will change the question to make it easier for people to understand

2.2 Who to target

You will be asking people whether they suffered any financial losses during the flood (and how much). You will conduct the survey with households and businesses that were flooded and those that were not.

To get the information we need, you must only interview adults who are based permanently at the address of the household or business. You cannot interview any children, students, extended family or employees because they may not know about the financial costs or insurance. Likewise, you cannot interview the elderly members of households such as Grandma or Granddad. Although these people may be the senior heads of the household, they may not be in charge of the purse strings. Finally, you cannot interview visiting guests who are not permanently residing in houses because the early warning flood system is not intended to target them so their views are not the most critical.

Households

Once you have introduced yourself to whoever answers the door, ask to speak to the head of the house who looks after finances and who lives at the house permanently. (This person may be male or female.)

Who to interview in household surveys

- Target the active head of household for information on losses.
- Don't interview children or students.
- Don't interview the elderly.
- Make sure the person lives there permanently (no temporary guests).

Businesses

Once you have introduced yourself to whoever answers, ask to speak to the owner of the business or whoever looks after finances or the office. The owner, accountant or office manager would be the best person to speak to (unless he or she refers you to someone else).

Who to interview in business surveys

- Target the owner for information on insurance, finances.
- Don't interview employees unless directed to by the boss.

2.3 Daily routine for the survey

Interviewers will:

- assemble at a meeting/briefing point each morning before setting off. The reason to meet is to:
    - sign in. This is a rare occasion in that you will be paid for assisting in the survey. This is not usual and is unlikely to happen again. You will only be paid for those days where you have signed in.
    - debrief. The team can exchange any views on how the surveys are going generally, what aspects of the survey need to be changed and whether there are any other problems we need to know about.
    - get access to the SOPAC driver who will take people working in more distant areas to key drop-off/pick-up points
- conduct interviews throughout the day
- submit completed questionnaire forms to SOPAC.

Daily schedule

- Meet each morning at District Office Ba at 8.30 am; sign in.
- Discuss survey/plans for the day (who is going where etc.).
- Go off and do interviews.
- Return to District Office Ba each afternoon between 4.30 and 5 pm. Submit completed questionnaires to SOPAC. Explain any problems with the survey or questionnaires that you may be having.

3 TRAINING SESSION ISSUES

3.1 What each question means and why it is needed

We will take you through the meaning of each of the questions during the training session itself. It is critical that you understand why we need each set of information as you may need to clarify the question for people who are confused. (The chances are you will need to do this clarification in either Fijian or Hindustani.)

3.2 Teams

Interviewers will work in pairs, preferably one each of indigenous Fijian and IndoFijian background. This is to ensure that we have coverage of English, Fijian and Hindustani for all interviews but we will have to be flexible. We will organise teams at morning tea on the day of training.

3.3 Who is going where

Each team will be given a map marked with specific districts to target.

Target households first and, when these are done, target businesses. Take houses/businesses one at a time. Note each house/business as you approach it. Note any houses/businesses where no one is home so that you know to come back again and try later. Note any houses/businesses where people say they don't want to participate in the survey. Note times to return to houses/businesses when people ask you to try again later.

When you have finished your assigned districts, come back to SOPAC for new districts or further instructions.

Vili's houses

Household 1 …..✔
Household 2 ….. no one home
Household 3 ….. said 'no'
Household 4 …..✔
Household 5 ….. try again at 5 pm
…..
…..

4 PRACTICAL ISSUES

4.1 Number of questionnaires to fill

Households

Please aim to interview every sixth house in your districts. Try to get 20 household questionnaires completed per district. This will include households that were affected by the flooding and those that were not. Where households were not affected by flooding, it just means that the interview will be very short.

Businesses

Please aim to interview every fifth business in your district. Please include surveys by businesses that got flooded as well as completed surveys for those that did not.

4.2 Greeting householders

Please introduce yourself by name.

Explain that the government is trying to understand how much the floods have cost the community (families and businesses). Explain that this survey is being undertaken to do this. Explain that you are helping collect this information by interviewing families and businesses.

Ask whether it would be convenient to speak to the male or female head of the house to conduct the survey. Note that you would need a permanent resident of the household and that the person would need to know about finances etc.

4.3 Greeting prospective interviewees

Thank the person for coming out. Introduce yourself as before.

Ask whether the person would be available to conduct the survey. Explain that the questionnaire would take between half an hour and an hour to complete. If the person is not available then, ask when might you able to come back to interview them. If they agree, mark down the time to return on your address list and make sure you return at that time. If they will not participate, thank the person for their time and move onto the next house. Make sure you write down immediately on your address list which houses declined to participate in the survey.

When interviewing families, always remember to ask whether the household also runs a business. If YES, ask if they will participate in the business survey too.

4.4 During the interview

Please conduct your interview in whichever language is easiest for you and the person being interviewed. However, you must write all answers on the questionnaire in English only.

Ask the question and let the respondent answer it themselves. If people take a while to answer the question, do not prompt them. Under no circumstances can you answer the question on behalf of the person. If you prompt the person, you may influence their answer and we may end up with the wrong data. If you answer the question yourself, the answer will be invalid.

If people look like they are having difficulty with a question, ask whether they would like you to repeat the question or ask if they understand what you mean.

If you need more space to give an answer:

- use the sheets on the note pad provided
- mark the name of the person being interviewed on the top of the note pad paper
- attach these to the questionnaire.

5 LOGISTICS

5.1 What we will provide to you

- Training
- Pens
- Questionnaires
- Name badges
- Extra note paper for notes/emergencies
- Interview district maps
- Payment for complete days worked. (You will need to provide your own lunch.)
- Transport to and from remote interview districts. For those interviewing in downtown Nadi, you will be expected to walk.

5.2 What you will need to carry with you

- Your maps of districts to target to interview
- Pen and questionnaire forms
- Extra paper

You may also want to carry around some personal effects such as something to drink, some repellent or sun screen etc.

You are responsible for your own transport to and from the meeting/briefing point each morning. You are also responsible for bringing your own wet weather gear if it rains during the survey.

5.3 Meeting/ briefing point

This is located at the District Office Nadi.

ANNEX 4

CALCULATING HOUSEHOLD POPULATION SIZE

Data on the number of households and their location by enumeration district within the greater (urban and rural) Nadi area were sourced from the Fiji Islands Bureau of Statistics census data for 2008. Boundaries for the Nadi urban and rural areas were mapped digitally and linked to the census data for each district. The number of enumeration districts and accompanying households falling within the greater Nadi boundaries were then calculated using a geographic information system (GIS) (table 4A).

Table 4A: Greater Nadi household population

	Physical area total (ha)	Number of households	Number of people
Urban	494	1 525	2 283
Rural	10 750	8 099	16 887
Total	11 244	9 624	19 170

Similarly, the enumeration districts used for the survey Nadi areas were mapped digitally. The total number of households and population falling within the survey enumeration districts were calculated using GIS (table 4B).

Table 4B: Survey area's household population

	Number of households in survey area	Share of survey households in Nadi (%)	Number of people in survey area	Share of people covered in survey area (%)
Urban	557	37	2 283	40
Rural	3 348	41	16 887	44
Total	3 905	41		

ANNEX 5

CALCULATING BUSINESS POPULATION SIZE

Data on urban Nadi businesses were provided in an Excel spreadsheet. Data on rural Nadi businesses were provided as photocopies of the licensing book.

Number of businesses in greater Nadi

Licensing information provided by the two administrations was different, with one set providing more detail on the type of business. Both data sets contained some gaps (for example, sometimes only a person's name was provided, or the broad area in which the business operated) so it was not always possible to determine the location of the business. It was thus not practical in the time available for the survey to determine the total number of businesses across enumeration district. It was also not possible to determine the total number of businesses by size. Given the purpose of licensing data is not to describe the size of the business (only its existence), the data seldom provided sufficient information to, for example, consistently distinguish between market vendors and shops. This issue is important for extrapolating the business losses calculated from the survey sample to the overall population.

The number of businesses was calculated by type: retail, eatery, exporter/wholesaler/manufacturer, accommodation, petrol outlet, service, buses and taxis, and 'other' (for businesses that could not be defined due to lack of information). Entries reflecting schools were removed because flood assessment of education losses is the remit of the Department of Education and not part of this flood assessment. Businesses were then manually classified, including a calculation of the number of each type of business. (Businesses from the urban data set were counted using Excel. Entries for rural Nadi were counted manually.) Table 5A shows the number of observed businesses for the greater (rural and urban) Nadi area in each category.

Table 5A: Greater Nadi businesses, by category

	Total business population	Business population represented in survey
Retail (inc. petrol)	1431	524
Eateries	337	123
Exporters, manufacturers, wholesalers	165	60
Services*	1862	682
Total	3795	1389

* Including accommodation, buses and taxis, and 'other'.

Number of businesses across survey area

GIS was used to determine the area covered by the survey. Boundaries for the Nadi urban and rural areas were mapped digitally, as were enumeration districts used for surveying. The total area of greater Nadi and the total area covered by the survey enumeration districts were calculated and compared: the survey area was estimated to cover around 37 per cent of greater Nadi (table 5B). Total businesses for greater Nadi were then estimated to be around 37 per cent of greater Nadi totals (table 5C).

Table 5B: Total area surveyed

	Physical area total (ha)	Physical area surveyed (ha)	Share of land area surveyed (%)
Urban	494	247	50
Rural	10750	3869	36
Total	11244	4116	37

Table 5C: Commercial enterprises around the Nadi survey area

	Retail (inc. petrol outlets)	Eateries (restaurants, milk bars, takeaways etc.)	Wholesalers, manufacturers and exporters	Services (inc. transport, buses and taxis, hotel and non-defined)	Total
Licensed urban population*	906	257	139	1533	2835
Licensed rural population**	525	80	26	329	960
Population represented in survey	529	125	61	689	1404
Total	1431	337	165	1862	3795

Source: * Nadi Town Council,** Nadi District Office.

ANNEX 6

SUMMARY OUTCOMES OF FOCUS GROUP DISCUSSIONS

Following the sample survey of businesses and families across Nadi, focus group sessions were conducted with respondents who were keen to discuss the floods further, and with government representatives. The purpose of the focus group sessions was to provide depth to community perceptions of the floods (for example, flood causes and problems with the disaster response). The government focus group was intended to provide government representatives with an opportunity to consider the views of the community and share their own views.

1. Community focus group summary

Section i—likelihood and impact of flooding

1 What differences have you noticed regarding the river and its quality? Are there changes over time?

- River becoming shallower
- River expansion due to soil erosion, thus affecting houses
- Soil erosion and increase of sedimentation

2 How are these problems affecting your business or quality of life and the environment?

- Boats get stuck and have problems passing the river to go fishing.
- Soil erosion. The consequences are less space for livestock and farming.
- People rely on river water for washing. But water cuts mean they now also use river for drinking etc., even though river water is polluted.

3 Do you think that any members of the community suffered particularly badly because of the flood? If so, what are the reasons?

- Housing schemes in villages don't assess buildings or work out the best places to build houses.
- Housing regulations don't incorporate flood risk.
- There is no assessment looking at the risk and vulnerability of the place where the houses are supposed to be built.
- Mostly women are badly affected by the floods because women are the ones taking care of the family and they are the ones losing jobs
- Freshwater mussels are destroyed because of the floods. These provide income to families. Also, freshwater fish and green leafy vegetables are destroyed. Women are more concerned about this than are the men.

Section ii—assistance/response/mitigation/ recovery

1 What did you do when your house got flooded? What would have helped you to better cope with the flood?

- Contacted family.
- People focused more on the weather forecast and the tides, thinking that the water would go down when the tides went out. However, the flood level got higher anyway.
- Received no immediate assistance.
- DISMAC and the Red Cross team should be stationed/used in different places so they can be contacted by affected areas.
- Police should be present during and after the floods to avoid looting and to make houses safe.
- The Health Department needs to be on time with cleaning materials (gloves, masks etc.).
- Spraying insect controllers need to be on time.

2 What are your three highest priorities to recover from the damages caused by the flood?

- Access funds (loans). People have lost everything and start from nothing. Most have no money to pay bills, to buy food, to send kids to school etc. They would find it helpful if they would have access to funds/loans to take care of those financial burdens.
- Undertake dialogue with the consumer council to lower prices of food to meet needs
- Repair houses.
- Seek assistance from experts.
- Conduct more awareness programs.

Section iii—responsibilities

1 What do you think would be responsibilities of the government and the community to better respond and be prepared for future scenarios?

Key action	Responsibility		
	Government	Community	Private sector
Proper plan	✓	✓	✓
Immediate assessment and help, with all evacuation centres in Nadi to be identified	✓	✓	✓
Better communication from local to national level	✓	✓	✓
More transparency among representatives of the Red Cross, DISMAC and non-government organisations	✓	✓	✓
Turanga ni koro	✓	✓	✓
Awareness raising workshops, programs etc.	✓	✓	✓
Training of local resource people	✓	✓	More community services

2. Government stakeholder focus group summary

Key actions	Government	Non-government organisations/ international development agencies	Community	Private Sector
Proper plans that incorporate disaster risk	SOPAC for preparation, response, relief	✓	People	✓
Immediate assessment/help	✓	✓	✓	✓
Risk sensitive development	✓	✓	✓	
Improved dredging and drainage	✓		Landowners, chiefs	
Calculation of the risk of flooding	✓	✓	✓	
Assessment of why the river flow and size changed	✓	✓	✓	
Regulation of dams	✓	✓		
Better transport for evacuation (e.g. boats)	✓		✓	
Identification of safe evacuation centres in all communities	✓	✓	✓	
Development activities that do not increase the flood risk	✓	✓	✓	✓
Awareness programs in villages	✓	✓		
Improvement of warning dissemination	✓	✓	✓	✓
A crop insurance scheme for households and businesses	✓	✓		✓
Prompt crop rehabilitation (seeds, fertiliser, farm implements)	✓	✓		✓
Food rations for at least three months	✓	✓		✓
Assistance in cleaning up houses, business, farms	✓	✓	✓	✓