The adaptive capacity of three Fijian village communities: Bavu, Druadrua and Navukailagi

This report assesses the adaptive capacity of three climate change adaptation pilot project sites in Fiji.

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Acronym list

AOG	Assemblies of God
AusAID	Australian Agency for International Development
CCA	climate change adaptation
CAP	community adaptation plan
CBDMPIC	Capacity Building for the Development of Adaptation Measures in the Pacific Island Countries
CMF	Christian Mission Fellowship
FLMMA	Fiji Locally Managed Marine Areas
IAS	Institute of Applied Science
JW	Jehovah's Witness
NGO	non-government organisation
PACE-SD	Pacific Centre for Environment and Sustainable Development
SDA	Seventh Day Adventist Church
SOPAC	Secretariat of the Pacific Community
SPREP	South Pacific Environment Programme
SPC	Secretariat of the Pacific Community
USP	University of the South Pacific
WHO	World Health Organization
WWF	Worldwide Fund for Nature

1. Introduction

This report describes the outcomes of a community adaptive capacity assessment carried out in three Fijian village communities between March and May 2011. The assessment was conducted by four assessors from the University of the South Pacific (USP) between March and April 2011. The assessment of the sites was based on an adaptive capacity framework designed specifically for Pacific island communities by representatives of the USP, the Secretariat of the Pacific Community (SPC) and the Australian Red Cross Pacific Disaster Management Program in February, 2011. The Fijian village communities that were involved in this community adaptive capacity assessment were three of the six pilot sites of the Fiji Climate Change Adaptation Project funded by Australian Agency for International Development (AusAID). Three of the assessors were involved at various levels of the Climate Change Adaptation (CCA) Project implementation process and therefore had prior knowledge and working relations with the communities.

2. The Fiji Climate Change Adaptation Project

The Fiji CCA Project piloted an integrated approach to climate change adaptation in six rural communities in Fiji from December 2006 to June 2009. The project emphasis was on coastal and water management issues—two of the four most vulnerable sectors identified in Fiji's Climate Change Policy Framework. The project is funded by AusAID via the Fiji Department of Environment, and implemented by the Pacific Centre for Environment and Sustainable Development (PACE-SD), and the Institute of Applied Science (IAS) of the USP, It set out to enhance community climate change awareness, incorporate CCA in community governance processes, and identify and implement appropriate adaptation measures. The project also involved other stakeholders from various government departments, academics, conservation agencies, non-government organisations (NGOs), regional development agencies, other donors, and private water and coastal engineering consultants as project advisory committee members.

The Fiji CCA project followed a six-step process with the first step being site selection. Provincial Offices, local organisations and groups and non-government organisations in Fiji were invited to put forward communities that had previously sought assistance to deal with local water or coastal management problems. Over 20 community names were received and a systematic process of site selection involving project staff and advisory members was undertaken. Of the six selected sites, four also had existing marine conservation ongoing projects and were part of the Fiji Locally Managed Marine Areas (FLMMA) network. These were chosen because they had been involved in developing local environmental management plans and were adaptively managing these over time. Problems with water and coastal erosion were issues that came out during the action planning process. This

demonstrated a bottom-up process of problem identification, and the already existing adaptive management approach and relationship with external partners were indicative of the feasibility and sustainability of the selected FLMMA sites for piloting a CCA project.

The second project implementation step was to conduct a one-day climate change awareness workshop which was designed to assist factoring CCA into community decision-making processes. The workshops involved between 25 and 35 participants, including the *Turaga ni Vanua* (chief), *Turaga ni Koro* (mayor), *Talatala* (church minister) and several women. The workshop was conducted in the Fijian language where general discussions focused on locally observed climatic and environmental changes followed by a brief presentation on the basics of climate change science – particularly on the causes, possible impacts and effects that might be experienced locally. Possible future climate change impacts and adaptation measures on the various sectors of community life were discussed in the areas of coastal management, water management, agriculture, health, housing and spatial planning, and economic activities. During the workshop, a distinction was made between the terms 'climate' and 'weather' as the Fijian vernacular has only one word (*draki*) for both. A two-page climate change handout written in Fijian was developed and distributed at the workshop.

A technical assessment by qualified coastal and water engineers was carried out in each pilot site as the third project step. This ensured that the adaptive measures decided upon would be appropriate and sustainable. For example, concerns were raised about possible measures proposed by the communities to cut areas of mangrove to redirect river flows as a means of dealing with erosion issues. Community members were also upfront about the need for qualified engineers to assist them with setting up a more sustainable communal water system. Hence, water and coastal engineers from government departments and technical agencies were approached by the project team to visit each site to provide a scientific explanation as to the causes of the erosion or water problems and to recommend possible adaptation measures.

Reports by the technical experts were summarised and translated into the Fijian vernacular to inform the fourth project implementation step: developing the community adaptation plan (CAP). This planning stage involved another one-day community workshop in each pilot village where participants planned according to their own understanding of the water or coastal management problem and incorporated new knowledge derived from the technical assessments. Options that had fewer environmental and financial risks and deemed feasible and sustainable were supported; more expensive, engineering-based options were held off until the softer options were trialled.

The fifth step was the implementation of the CAP activities for which the project provided up to US$20 000 for material and fees required to implement the CAP activities. These funds could not cover the cost of all CAP activities so a process of prioritisation and cost–benefit analysis was required in decision-making.

The sixth step was the combined process of implementing ongoing review and adjustment of the CAP and involved a third workshop on community-based monitoring and various follow-up visits that continue to the present day. The

community and implementing organisations continue to talk about progress made regarding the CAP implementation. Annual reviews have also been carried out to keep the process relevant to the existing community needs and concerns. This stage was essentially the beginning of the adaptive management process to be continued by the community.

Time and patience is vital for implementing an effective community-based CCA initiative such as this. The establishment and maintenance of trusting relationships with project communities and a network of locally available technical experts as well as carrying out frequent field visits are processes that do not cost much initially, nor can they be done with haste by people who do not have a full understanding of the local context.

3. Fijian village context

A key element as well as outcome of the CCA project implementation process was the employment of Indigenous Fijians who, while being 'outsiders' to the villages, were nevertheless familiar with the dynamics of village governance structure and the social rules and protocols that operate within this system. Employing Indigenous Fijians who already speak the local language and are familiar with village governance dynamics saves much time and effort in learning about local processes, and enables a more sensitive understanding of and responses to local concerns. For example, it is important for the vulagi *(visitor) to know how and where to sit and the manner of addressing people, particularly when conversing publicly with the chief. Failure to do this correctly can jeopardise communication, whereas the ability to do it correctly can greatly enhance the success of the project. Traditional ties based on kinship, totems, and significant historical events (e.g. warring alliances, migration, and marriage) connect clans, villages, and provinces from various parts of Fiji, and an understanding of and interest in these relationships can help with the bonding process between the 'outsider' and the village. So, hiring local project staff enables a trusting relationship between the village and the project and greatly improves the project's outcome for all parties.*

Over half of Fiji's 900 000 people are Indigenous Fijians—with 40 per cent having Indian heritage and the remaining 10 per cent having Chinese, European, or other Pacific Island ancestry. Indigenous Fijians communally own 85 per cent of the land and make up most of the rural population living in Fijian villages. The Indigenous villages such as the six involved in the Fiji CCA Project are governed by the Fijian Affairs Act *meaning that the* Local Government Act *that sets standards for environmental and health practices in rural areas does not apply. Water shortages, poor water quality, coastal erosion threatening rural homes, and declining shore fish stocks are existing challenges facing most Fijian villages (among other social problems). Furthermore, compared to other rural settlements, Fijian villages are more communal and structured.*

There are around 1170 villages grouped into 187 tikina *or districts in the 14 provinces of Fiji. Typically, a* tikina *has 4 to 12 villages and the population in each village ranges from 100 to 500. A village has a few* mataqali, *sub-clans or land-owning units. Each* mataqali *has a chief; from these a village chief is chosen and from these a* tikina *chief and a provincial chief are chosen, usually along hereditary lines. Each* tikina *usually has a central village where the chief resides. The* Vanua *(people, culture, land and sea),* lotu *(church), and* matanitu *(state) are the three pillars of governance in a Fijian village.*

Generically, each village has a Turaga ni Vanua *or traditional chief, a* Turaga ni Koro *or village administrator, and a* Talatala *or church minister who is usually an outsider appointed by the church. The* Turaga ni Vanua *is usually the most powerful of the three having executive powers over natural resource use in the area and is ultimately responsible for commanding unity and cooperation at the village,* tikina *or provincial level. The* Turaga ni Koro *is chosen by the village members to coordinate the day-to-day village development and operational activities as well as liaise with the state and other external actors, in return for a modest allowance from the Ministry of Indigenous Affairs. However, the balance of power between the* vanua, matanitu,*and* lotu *and the factors that challenge the stability of the Fijian village governance varies according to village. Some factors include the number of church denominations that exist in each village, variation in the educational and economic achievements of each* mataqali*, the character of people in leadership positions, and disputes over land and chiefly title ownership.*

Decisions are made at the (usually) weekly village meetings chaired by the Turaga ni Koro. *At these meetings, the* Turaga ni Vanua*,* Talatala*, and male household heads sit at the more prominent parts of the village meeting house and have greater influence over decisions. Representatives of the women and youth groups are also allowed to speak. Agenda items often include the maintenance of health and hygiene standards, management of the community water or power supply, children's educational needs, agricultural and fisheries management, government initiatives in the area, youth and women's issues, and other current and future village project activities. Most villages have subcommittees to deal with particular issues. Hence, the implementation of decisions is allocated according to the various subcommittees as well as along gender roles. Men usually carry out physically laborious tasks such as construction, agriculture, and artisanal fishing. Women undertake activities that are largely domestic such as food preparation, child rearing and gleaning. It is also important to note that the described gender roles and responsibilities are traditional norms that are susceptible to external influences including market forces and modernisation. At the* tikina *level, a 'bose vanua' (*vanua *meeting) is held as needed to discuss a variety of important issues.*

(From Dumaru P, 2010, 'Community-based adaptation: Enhancing community adaptation in Druadrua Island, Fiji', WIRES Climate Change*, 1(Sept/Oct): 751–763)*

4. The three Fijian village communities assessed

The three communities that participated in this study were Bavu village, Druadrua community (made up of the only two villages on Druadrua island—Salevukoso and Delaivadra villages) and Navukailagi village. The adaptation project in Bavu and Druadrua addressed water management issues, whereas the activities in Navukailagi addressed the coastal erosion problem faced by the community. A fourth community where erosion issues were being addressed by the adaptation project was also originally included in this assessment but had to dropped due to conflicting schedules between the assessment team and the community. The selection of the study sites was largely based on their geographical representation and time availability. An effort was also made to ensure that the study involved a 'water' and 'coastal' adaptation project. As seen in the map of Fijij below, Bavu village is located

inland on Fiji's main island, Viti Levu; Druadrua island lies north-east of Fiji's second largest island, Vanua Levu; and Navukailagi village is located on the north of Gau Island, a large volcanic island east of Viti Levu.

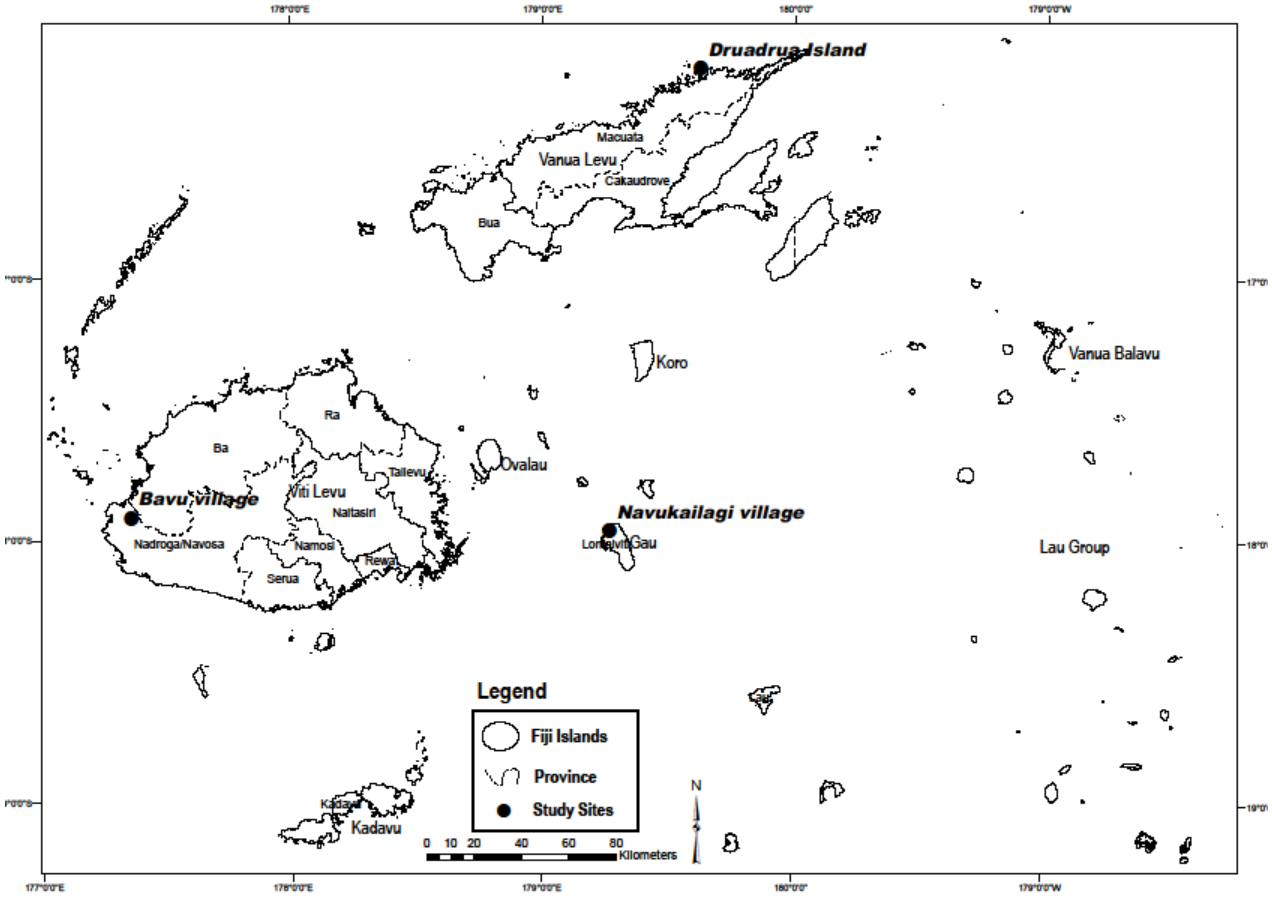


Figure 1 Map of Fiji indicating the three CAA study sites

Bavu Village

Bavu village is located about 10 kilometres inland on the western and drier side of Fiji's main island, Viti Levu, as part of the Nadroga Province. The community population is around 200 with up to 53 households. Located along Fiji's busy Queen's Highway and less than an hour's drive between two of Fiji's main tourism towns—Sigatoka and Nadi—Bavu people have easy access to Fiji's modern economic systems and infrastructural services, such as better resourced schools, hospitals, roads, transportation and markets. The community has access to the electricity grid as well as landline and mobile telecommunication. However, the Bavu community received minimal support from the State and other service providers regarding the community's water needs for which they were largely responsible.

The community's existing challenge with securing and maintaining a basic water supply was seen to be the community's main vulnerability to climate change and the

Fiji CCA Project sought to address this problem. A combination of factors were linked to the water problems experienced in Bavu village and they included: a general decline in the 10-year average rainfall over the past 30 years; rainwater harvesting potential not fully utilised; inadequately maintained water infrastructure (borehole); poor project history with a previous water adaptation project; and significant land-use change in the area over the past 30 years with the mass pine planting and harvesting and road construction cutting through natural waterways.

The Fiji CCA Project activities that directly affected the community water supply included the following:

- development of a community adaptation plan
- establishment of a new water committee
- community water management monitoring development
- borehole cleaned and tested and now in use
- new borehole pump installed
- rainwater harvesting system installed
- enhanced community water storage capacity (3x 10 000 L and 2x 5000 L)
- each house now has a running tap.

Druadrua Island

Druadrua Island is 3.91 km^2 in size and comprises two villages. Salevukoso, the main village has about 150 people, and about 50 people reside in Delaivadra village. The local primary school is in Salevukoso village. The nearest health centre, local shops, fisheries station and bus stop to the nearest urban centre (Labasa) is accessed by a 20-minute fibre boat ride to the main island of Vanua Levu. Labasa Town can also be accessed by a two-hour boat ride along the coast. Fish and harvesting of other marine resources are the sole income source for most of the households.

The Fiji CCA Project responded to Druadrua's most immediate climate risk concerns which relate to the increasingly scarce availability of freshwater for the island population. General vulnerability assessments carried out at the beginning of the project found that the water problems faced were due to a combination of factors including: increasing island population reducing per capita water availability; forest clearing and bush burning for house building and subsistence farming; goat grazing and pine planting; poorly designed and maintained communal water infrastructure; not fully taking advantage of rainwater; cost of moving heavy equipment to drill a borehole due to the islands generally relative isolation; and limited capacity of the community members to properly manage the community's water supply. The Fiji Meteorological Service data also showed that the 10-year average rainfall in the areas reduced significantly from the 1970s.

The Fiji CCA activities that had a direct effect on the community water situation were as follows:

- development of a CAP
- formation and operation of a community water management committee
- community water management monitoring development
- upgrade works of the old unused dam
- improved piping (dam to village)
- increased water storage capacity
- village water reticulation from the communal tank
- water outlet/tap in each house.

Navukailagi Village

Navukailagi village is located on the north of Gau Island, Fiji's fifth largest island. Gau is about 300 km^2 in size and divided into three main districts sharing up to 17 villages and 11 settlements. Navukailagi village has a population of just over 100 people and 39 households. Due to high rate of migration from the village, some houses have only one or two occupants. There is a local primary school located near Navukailagi village and students and there is one major secondary school for the entire island that provides boarding facilities. A health centre and provincial office is located in the nearby village of Qarani and there are a few shops that sell basic food items. Ferry transportation to Suva's capital takes up to six hours and occurs once a month. However, several people own open fibre boats and can transport people to the main island at a cost. This transportation option is often risky and can take from two to five hours in the open sea depending on weather conditions. Copra remains the island's major source of income and the boat visits the island on a more regular basis to buy directly from the island's copra farmers.

Navukailagi village leaders had approached several organisations regarding the problem of coastal erosion occurring on the island and this issue was addressed through the Fiji CCA Project. Although sea-level rise is an immediate climate risk for a low-lying coastal community such as Navukailagi, several other factors contribute to its vulnerability including: its location between two river mouths; half the 1980s foreshore and village elevation is less than one metre; exposure to incoming waves; and limited mangrove and coastal vegetation protection. Several houses located on the shoreline were located between one and five metres from the shoreline and the community was facing increasing inundation, flooding and drainage problems.

The Fiji CCA Project has a direct impact the community coastal erosion problems in the following ways:

- development of a CAP
- enhancement of community coastal management committee activities

- planting of mangrove, vetiver grass and other coastal plants along the coast
- construction of four large groynes to reduce wave impact on village foreshore
- piling of gabian baskets along the river banks to stabilise the eroding soil along the village boundaries

The activities in all three sites were completed around June 2009 and so this community adaptive capacity assessment was an opportunity to assess how the Fiji CCA Project may have affected the communities' adaptive capacity.

5. Data gathering

Data gathered for each site were derived via various sources including those in Table 1:

Table 1 Data gathered for each site and its source

Site	Date surveyed	Data sources
Bavu village	29–31 March 2011	i. 40 of the village's 53 houses were surveyed using the Pacific Adaptive Capacity Analysis Frameworkhousehold questionnaire ii. Focus group discussions whereby there were separate sessions for the men and women iii. Interview with the village lay nurses, village headman and two water committee members iv. Interview with the (external) water engineer that assisted the community in setting up its improved water system v. Personal observations by the assessors during the field visits
Druadrua island	5-7 April 2011	i. 23 of the two villages' 30 houses were surveyed using the Pacific Adaptive Capacity Analysis Framework household questionnaire ii. Focus group discussions whereby there were separate sessions for the elderly men, youth and women iii. Interview with the chiefly clan, a representative of the community water committee and village headman iv. Interview with the (external) water engineer that assisted the community in setting up its improved water system as well as the local primary school teacher v. Personal observations by the assessors during the field visits

Site	Date surveyed	Data sources
Navukailagi	18–20 April 2011	i. 22 of the village's 39 houses were surveyed using the Pacific Adaptive Capacity Analysis Framework household questionnaire ii. Focus group discussions whereby there were separate sessions for the men and women iii. Interview with the village lay nurses, village headman, church minister iv. Personal observations by the assessors during the field visits

6. Bavu results

6.1 Factor 1: Human capital

Factor 1A Traditional and modern skill

Bavu villagers use a combination of traditional and modern skills to operate internally as well as in managing relationships with neighbouring communities (e.g the people of the nearby Tau village of the same *Yavusa*) with kinship ties and external individuals and organisations with whom they are in contact. Most, if not all, of the adult population is literate and has experienced formal education. About 80 per cent of the community members under the age of 40 had reached secondary school level education and so are able to articulate modern development issues faced by the village and to take advantage of the modern/urban economy through selling natural resources harvests, engaging in casual labour and working in offices in the nearby urban centres of Nadi and Sigatoka. A few community members have also attained tertiary or vocational level qualifications and have some computer knowledge, although none of the households we visited owned a computer. The younger community members are also technologically savvy and use mobile phones and are exposed to modern media, although their use is controlled by access to cash. Most of the houses in the village are modern cement, corrugated iron or wooden and built mainly by community members. The community also has a water committee which is largely in charge of the plumbing and maintenance of the communal water system.

The community's traditional knowledge and skills pertain mainly to managing social relations within and outside the village and on the basic needs of community life. The community continues to practice traditional welcome (*i sevusevu*) and farewell (*i tatau*) kava ceremonies with visitors and this activity usually ends with a Christian spiritual prayer. These formal and respectful ceremonies are meant to assist with the bonding process between the visitor and community. This traditional system is also used for other internal events such as births, marriage, circumcision and deaths although the incorporation of modern goods and materials into this system can be burdensome to community members who have limited cash to access them.

The community has three large thatched bure owned by each of the three *mataqali*. These thatched 'bures' have been designed according to traditional knowledge and

are made from locally available bamboo reeds or *gasau*. All three bures were constructed in the 1980s and due to the flexibility and strength of their structure, they are often used as communal shelters during cyclones. According to the village elders the key part of the bure structure was the centre post referred to as *Nabou*. Additionally. the tying of the horizontal posts to hold the thatched roof means that during strong winds the bure might sway but not collapse. The bure construction knowledge is held by certain community members and they are currently in the process of choosing the lead carpenter or *matai* to lead the community in the construction of another large bure.

Food consumed during the field visits was primarily breadfruit, cassava, purchased fish and chicken and wild pig indicating that the assimilation of traditional and modern lifestyles may have eroded some traditional food production and harvesting systems.

Overall subjective rating of AC factor 1a: 3

1	2	3	4	5
Very low traditional and modern relevant skills	Low traditional and modern relevant skills	Some traditional and modern relevant skills	Abundance of traditional and modern relevant skills	High abundance of traditional and modern relevant skills

Factor 1B Health security

Based on the interview with the two village nurses and village headman in the most recent visit as well as previous visits during adaptation project implementation, the community was generally healthy. Cases brought to village nurses occurred when people caught the flu, were feverish or had skin diseases. Children were often brought in for skin infections and nurses said ointments would be given to remove them. The community had been consuming water well below World Health Organization (WHO) standards prior to the adaptation project and water quality had improved after the installation of the new water system. However, according to the village nurses, the improvements in the community water quality did not seem to affect the general health of the community.

The community daily diet consists mainly of cassava, breadfruit, *rourou, bele, ota* with canned fish, with meats and fish included in the diet for between three and five days a week. Such a diet may have contributed to the general health status of the community. Over 20 people in the 33 households surveyed in 2008 had passed the age of 60, of which seven were in their 70s and one in their 80s.

Overall subjective rating of AC factor 1b: 4

1	2	3	4	5
Very low health security	Little health security	Some health security	Good health security	Excellent health security

Factor 1C Change agents

Bavu community has several change agents who have positively influenced the implementation of the water adaptation project as well as leading the community development committee. The most visible change agents apparent in our short visits appear to be males and females between the age of 28 and 45 of which two stood out in terms of communicating community development issues with the visiting project implementers/researchers. These change agents also recognise the social and cultural system of operating in the village and work through them. The general support of the community to the leadership of the change agents is indicated by the level of meeting attendance during the visits and continued satisfactory operation and maintenance of the community water system. One of these change agents has been liaising between the community non-state organisations such as Worldwide Fund for Nature (WWF) and Rustic Pathways, an overseas investor that resourced the construction of five flush toilets in the village. This same person also actively communicates to follow up on past decisions with the USP project personnel.

Resource people of this study gave a high score of 4 out of 5 when rating vision and implementation in carrying out community activities (as per questionnaire Likert rating).

Overall subjective rating of AC factor 1c: 4

1	2	3	4	5
None	Some but not listened to	Some and somewhat effective	Good ideas are often implemented	Ideas flow freely at meetings and are analysed and implemented

6.2 Factor 2: Social capital/Community cohesiveness

2A Community diversity

Bavu villagers are all ethnically indigenous Fijians, share Christian beliefs and are mostly literate and having had some formal education. The community speaks the Nadroga dialect and can generally communicate in the widely spoke Bau dialect and in English. Some variation in the community is as follows:

- Most of the household in Bavu are paternally linked to the village guaranteeing their listing in the Fijian registration of kin or more commonly known as *volanikawabula*. About 5 of the 55 households are maternally linked to the village and referred to as *vasu*.

- A majority of the community, over 70 per cent, belong to the Methodist Church denomination with less than one-fifth belonging the Seventh Day Adventist Church (SDA). The other church denominations include Jehovah's Witness (JW), Assemblies of God (AOG) and Evangelist.

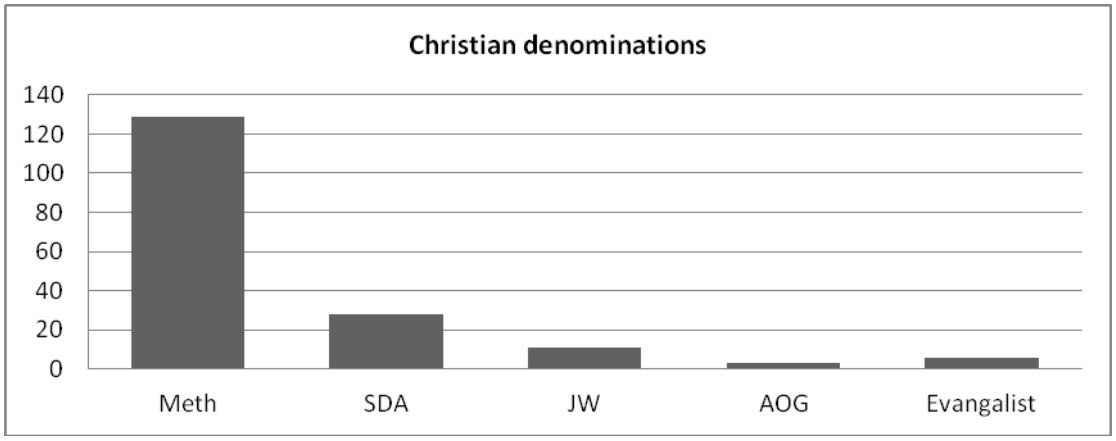


Figure 2 Households classified according to Christian denomination

- The community would generally belong within the same socioeconomic bracket, although some variation can be seen in the types of houses—there were about six concrete or finished timber houses whereas the rest were mainly corrugated iron. Most of the villagers who attained higher education or secured paid employment left the village to live in urban centres or overseas. Those who left for economic reasons may return upon retirement.
- The community is generally divided into three landowning units or *mataqali* with access to extensive amounts of land in the area.

Factor 2B Leadership; Factor 2C Strength of the *Vanua* collective action; Factor 2E Good governance; Factor 3B Willingness to accept change

Bavu as a village has had the same village headman or *Turaga ni Koro* for over ten years. The community shares the same *Yavusa* or kin with the neighbouring village of Tau where the clan chief resides. However, there is a *mataqali* (sub-clan) within Bavu that is recognised as the traditional leaders, so the elders from that clan are respected as such. The *Turaga ni koro* also belongs to this *matagali* so he has both traditional as well as administrational leadership status. The village has its own church and therefore its own pastor who is also accorded leadership status. The village has several other committees—mainly the water committee, development committee, women's committee, health committee and youth committee who are consulted on decisions relating to them. Decisions are made at the weekly Monday meetings. The key change agents of the community are actively involved in the water and development committees in particular. There seems to be a generally open relationship among the community members—bantering occurs once formal ceremonies are covered.

In light of the variation in religion and lineage, the elders stated that there have not been any problems with running the village as all who stay in Bavu follow the governance and operational structures of the village. Therefore the differences have not caused any major problems with the community's internal social relations.

Community decisions are made at the weekly village meetings where the various community sub-groups such as the women and youth are given a chance to talk. This is also where the various committees (e.g. health, water, development) make known issues relating to their plans and encourage community support for their agenda. The weekly village meetings is also a time to confirm the community's schedule for a specified future period. Based on household surveys and individual interviews, it seems that this approach to decision-making is working well.

Survey outcomes showed that most favour their leaders. The highest proportion of respondents stated that their leaders were very often important in solving problems.

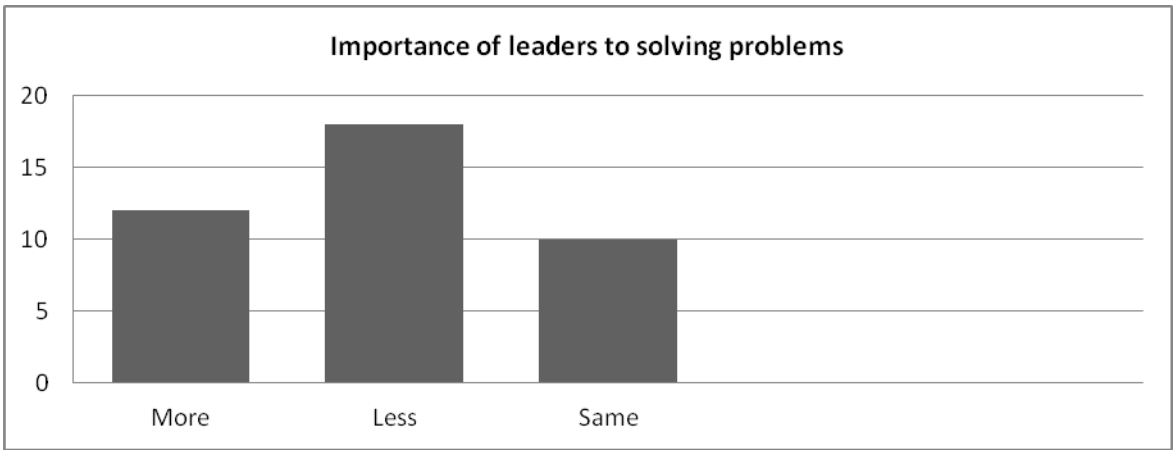


Figure 3 The importance of leaders in solving problems

The Fiji CCA Project may have had an impact on the well-regarded leadership capacity of the respondents as well as visiting researchers. Nearly all of the 40 surveyed participants (90 per cent) stated that the Fiji CCA Project affected community leadership. Some participants made reference to the project implementation process—which included visioning, awareness raising, developing the community work plan and the provision of project funds to pay for experts and resources—enabling the leaders to implement decisions and solve the community's water problem. In general, participants stated that the process of decision-making was done in stages and incorporated the views of external water experts and that of the community and the gradual implementation of the various stages of the project encouraged the villagers to cooperate. According to the water committee, the community elders have also played a significant role in supporting a generally younger water committee from a distance by commanding the cooperation of the rest of the village.

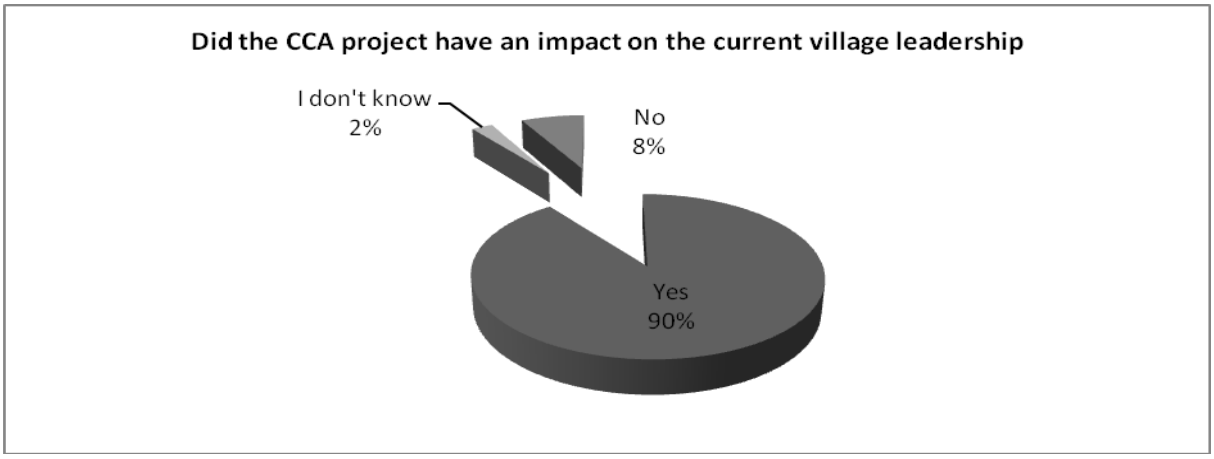


Figure 4 The impact of the CCA Project on current village leadership

The community decision-makers' competence was also demonstrated by their ability to incorporate new ideas while remaining sensitive to social relationships within the village. This was consistent with the respondents' view that the community usually accepted new ways of solving problems, although some specifically point out that is 'as long as [provided] these new ideas are discussed and accepted at the community meeting'. The village nurse particularly referred to the filiarisis vaccination program as an example; after awareness- raising community and consent, the community fully cooperated with the vaccination program. Some respondents made reference to the leaders' ability to work effectively with and accept new ideas from external organisations as a key factor to solving the community water problem. According to the external water engineer, while the community accommodated his technical views on pipe laying and other water upgrading plans, traditional processes of seeking permission from landowners where construction would take place was carried out before implementation of decisions. The formal acceptance of the landowning clan further harnessed to support community members in committing to the activities. This is evident in participant response frequency for a community working together to solve problems as shown below.

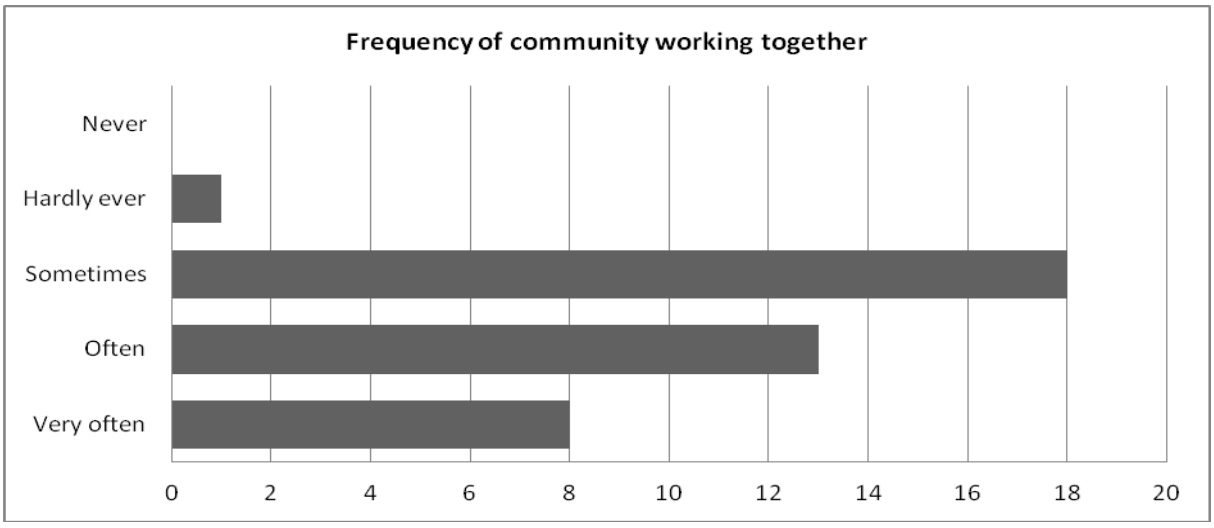


Figure 5 The extent to which the community works together

Several respondents pointed out how the improvement of the communal water system enhanced internal community relations. Prior to the project, each household had to look for its own water. However, the project engaged more community members as the problem was being dealt with at a communal level through the community leadership structure. The project also required the involvement of various community members (e.g. men were involved in construction, whereas women prepared their food) which also demonstrated cohesiveness. The serious need for water in Bavu was also a motivating factor for community collaboration.

Overall subjective rating of AC factor 2B

1	2	3	4	5
No vision, little collective action	Little vision, some collective action	Some vision and implementation	One visionary with good implementation	Several people with vision and implementation skills

Overall subjective rating of AC factor 2C

1	2	3	4	5
Little group feeling, people seldom work together	Some group feeling, people sometimes work together	Moderate group feeling, people sometimes work together	Good group feeling, people frequently work together	Excellent group feeling, people frequently work together effectively
1	**2**	**3**	**4**	**5**
Few committees, not very effective	Some committees, produce some results	Some areas done well, others not	Generally good but improvements possible	Appropriate number of committees, very effective

Overall subjective rating of AC factor 2E

1	2	3	4	5
Poor decision - making processes, limited information sharing	Mostly poor decision-making processes, mostly limited information sharing	Some good decision-making processes, some information sharing	Good decision-making processes, good information sharing	Excellent decision-making processes, excellent info sharing

Factor 2D Support services and networks; Factor 3E Dependence (government, aid, remittances) vs independence

Bavu village is located along the main Suva–Nadi Highway. Nadi town is about 40 minutes drive away and the community is located around Fiji's tourism belt. Its accessibility by road and distance means that various external organisations such as government departments, NGOs and private business are able to exploit the community's resources and vice versa. However, these opportunities do not appear to be fully utilised. Nearly half of the respondents stated that external assistance was not easy to access, with 38 per cent saying this was 'sometimes' accessible, particularly when relating to scholarships or food after a national level natural disaster. One respondent said localised disasters don't usually receive much attention. Based on interviews with internal and external key informants and some questionnaire responses, it appears that the community is generally not proactive in seeking assistance from external organisations. Part of the reason is because requests take a long time to process so community members don't really bother themselves with asking.

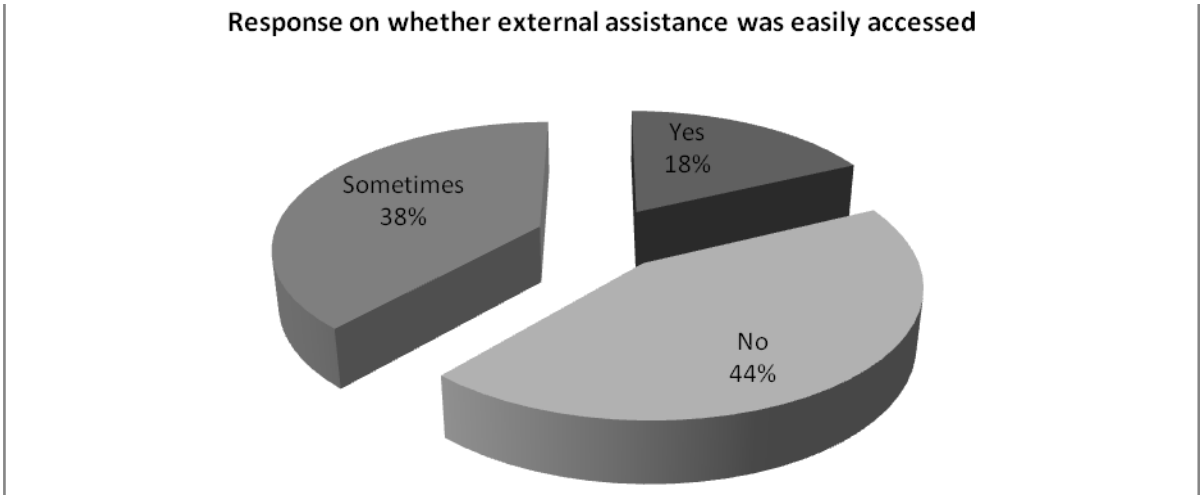
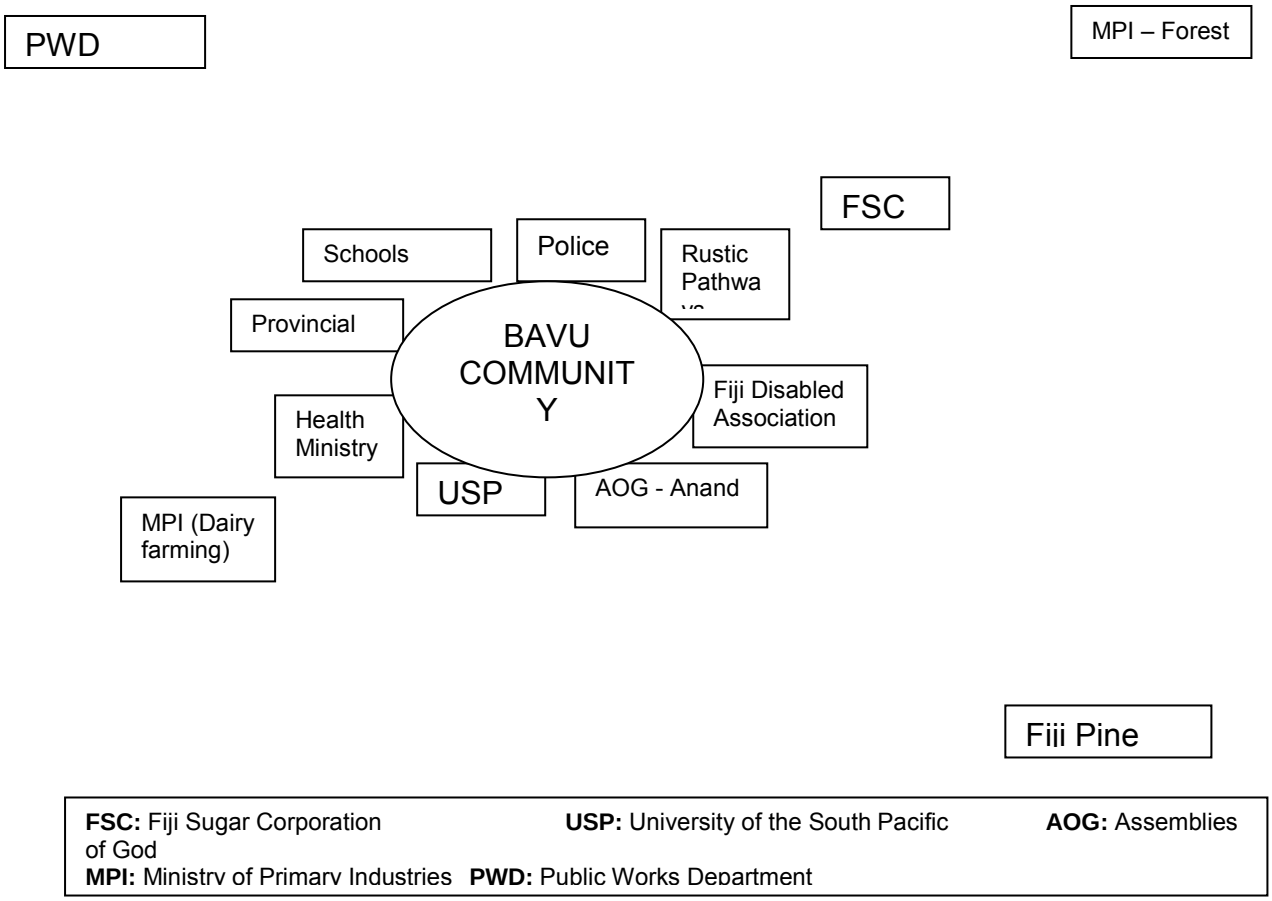


Figure 6 The results of how respondents reported on accessibility of external assistance

A focus group consultation with the women showed a variety of organisations that had visited or serviced the community in some way. Some of these visits were a one-off such as the AOG church group that distributed water filters to the community. Others had a longer history of interacting with the community such as the Fiji Pine Ltd (since 1972), schools and the health ministry. There are also mid-range relationships of over several years such as that with USP (water project) and the newly developed link with Rustic Pathways, an American Company that recently bought land for tourism development in the area. Most of the links with external organisations may have been externally initiated. The women were also asked to discuss the closeness of these relationships and the venn diagram (Figure 7) summarises the outcomes of these discussions. Boxes placed closer to the Bavu community circle represent a close relationship, whereas those placed at a distant reflected otherwise. It is worth noting that the organisation with the longest relationship with the community (Fiji Pine Ltd) was placed far from the community circle.

Figure 7 Venn diagram of women's focus group about community relations



FSC: Fiji Sugar Corporation **USP:** University of the South Pacific **AOG:** Assemblies of God
MPI: Ministry of Primary Industries **PWD:** Public Works Department

More than half of the survey respondents stated that they did not think that the CCA Project facilitated new relationships with other organisations. A similar proportion did not think that the CCA Project facilitated community relations with other external organisations and individuals. Those who said 'yes' made reference to the assistance provided by Rustic Pathway's flush toilet project because this would not have been possible without the availability of water. Key informants also mentioned that provincial office representatives only came to the village during the CCA Project visit. Part of this was due to the overall project implementation approach that emphasised the involvement of the local provincial administration.

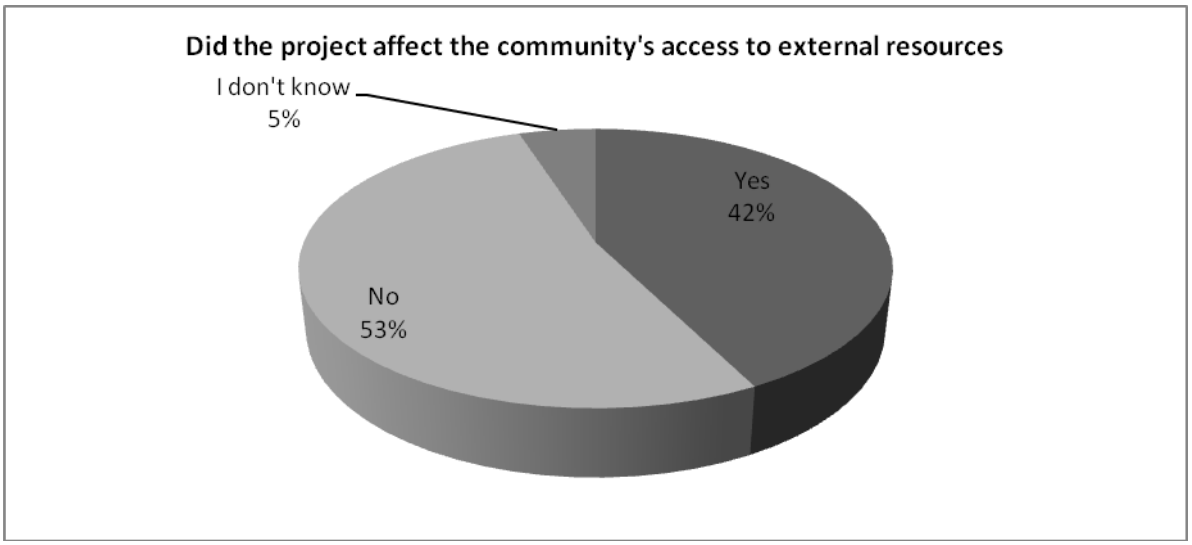


Figure 8 How respondents regarded the CCA Project's affect on external resources

Overall, although the community networking relationships with other organisations could be expanded and improved further to the advantage of the community, the generally limited emphasis by the Bavu community on seeking assistance from outsiders also shows that there is some level self-reliance.

Subjective rating of Factor 2D

1	2	3	4	5
Few support groups available, ineffective relationship	Some support groups available, ineffective relationships	Fair number of support groups available, some have effective relationships	Good number of support groups available, most have effective relationships	Many support groups available, all have effective relationships

6.3 Factor 3: Belief systems/World views/Values

Factor 3A Traditional values, systems and knowledge ('Mana')/Modern, western and church value systems

The community rated itself highly in terms of the value it currently places on traditional knowledge and ways of life. As Figure 9 shows, about 76 per cent of the 40 household representatives stated that the community values traditional knowledge a lot or quite a lot.

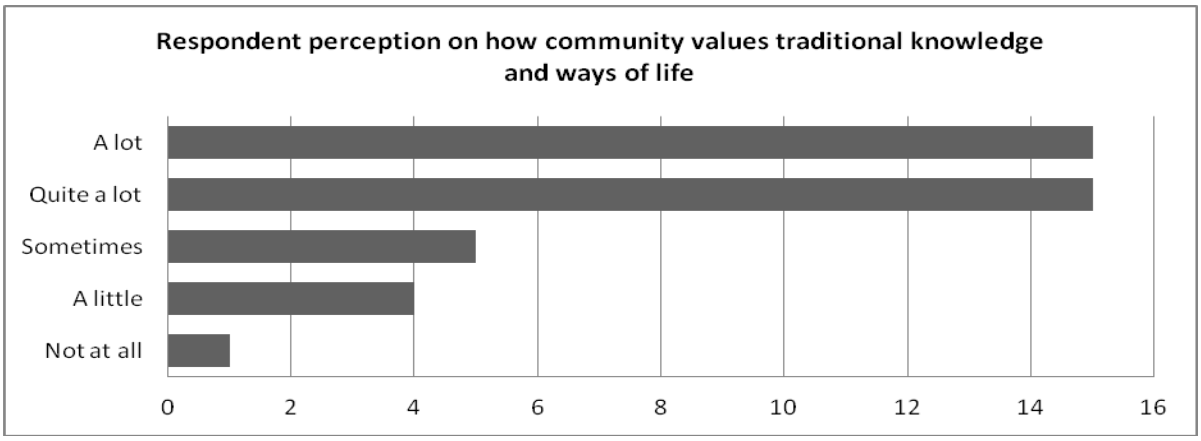


Figure 9 Respondent perception of how community values traditional knowledge and ways of life

However, most of the participant thought that the community's value of traditional knowledge and ways of life had lessened compared to 20 years ago. Most of those that said traditional values had increased from two decades ago attributed the change to the enforcement and additions to the village by-laws by the current government—particularly those pertaining to village lifestyle rules such as the restrictions placed on dress codes, noise levels, alcohol consumption and 'family time'. However, some of the participants that indicated 'more' also said that the new by-law enforcements were starting to slacken and that people may soon go back to their old ways.

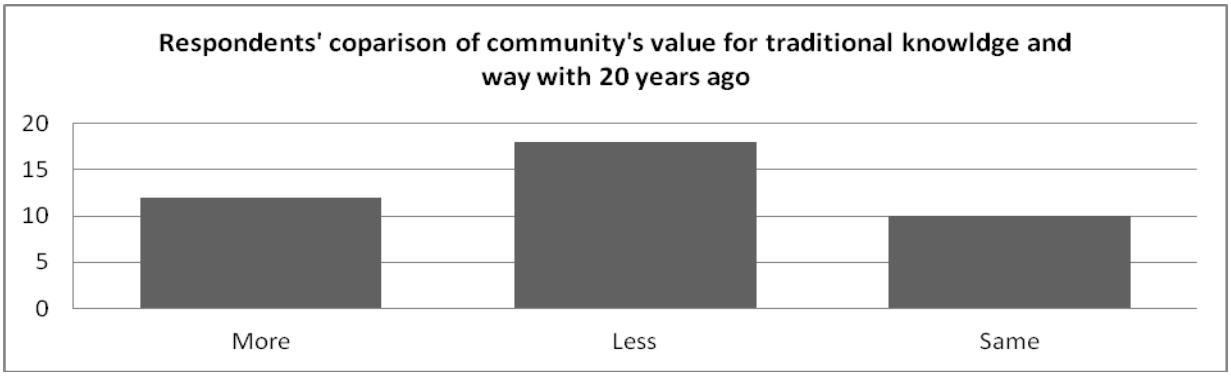


Figure 10 Respondents' comparison of the community's value for traditional knowledge and way of life now compared with 20 years ago

Subjective rating of Factor 3A

1	2	3	4	5
Very low abundance of traditional values	Low abundance of traditional values	Fair abundance of traditional values	High abundance of traditional values	Very high abundance of traditional values

Factor 3C Self agency vs determinism; Factor 3D Here and now/future thinking

As figures 11 and 12 show, most Bavu people think that they do not have control over the future and also believe that planning and acting now for the future can prevent problems later. At the beginning of the CCA Project in 2007, the community sat together to map out the current situation with regards to water, and then later to envision what they would like it to be in future. An adaptive water management plan designed to reach the community's vision of having a consistent water supply to each house was developed out of this process. Today, four years later, most of the activities have been completed and the community is still interested in increasing storage capacity and developing a new dam to increase supply.

Another case exemplifying future thinking is the encouragement and support a young single mother was getting from her parents. Mindful that she was an only child who dropped out of school to have the baby, her parents decided to take care of the baby and arranged for her to take a computer course in Nadi so that she might be able to secure future employment. They believed that their daughter needed to become economically independent so she could support her child later—especially given that she did not have siblings.

At the same time the community is very religious and during formal ceremonies and prayers much reference is made to 'God's will'.

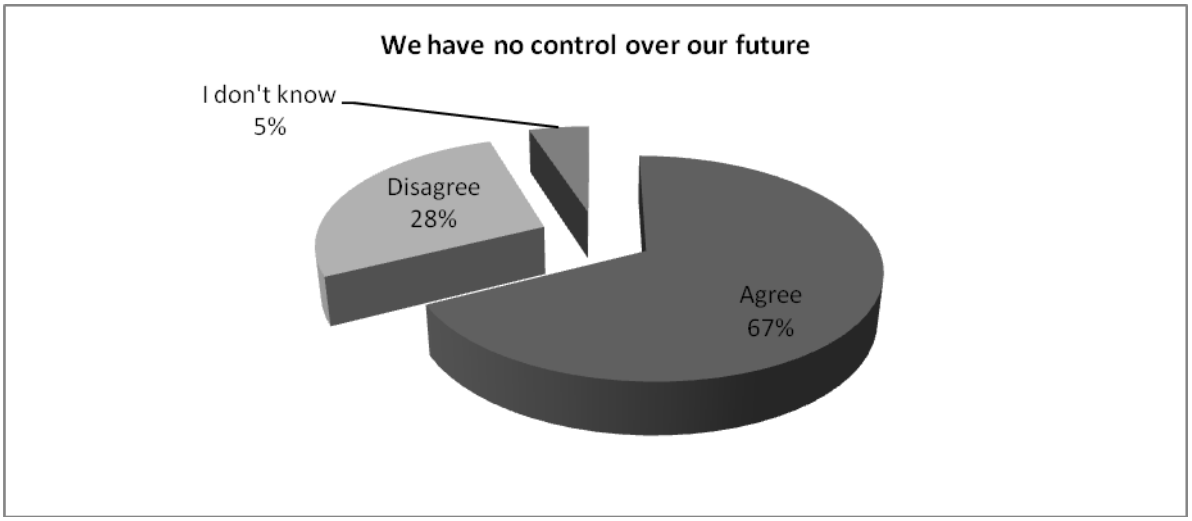


Figure 11 How community members regard their control over their future

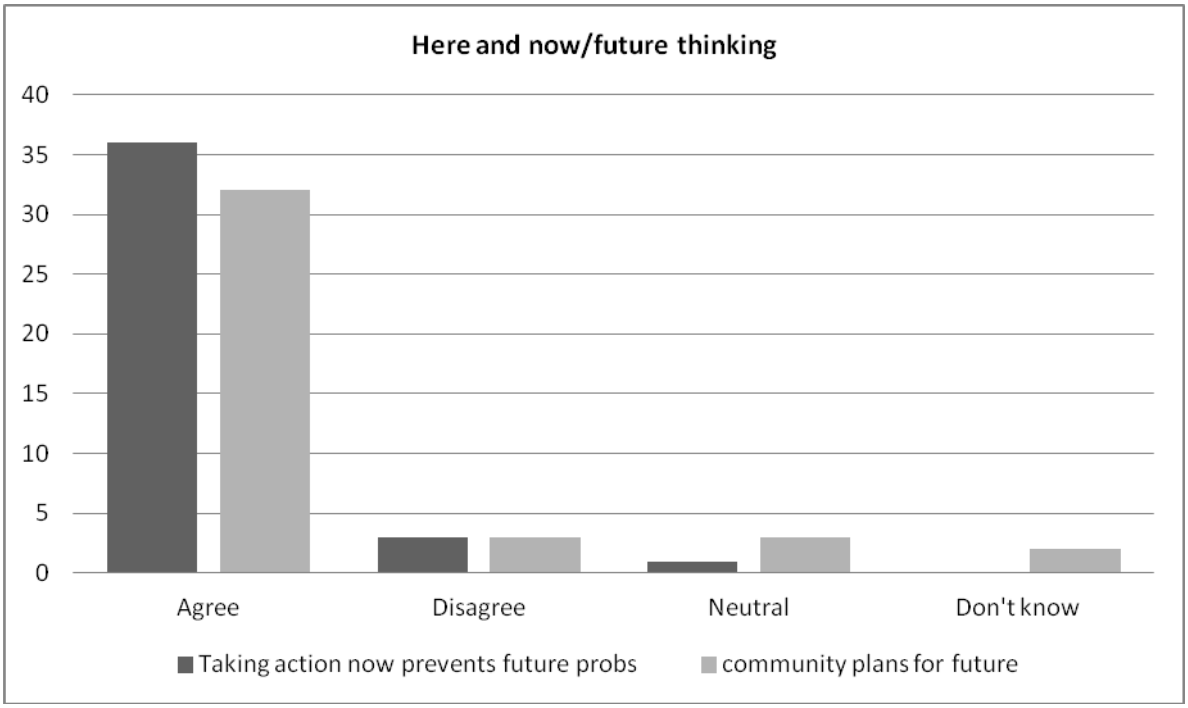


Figure 12 How community members regard 'here and now' vs 'future' thinking and its impact on the community

6.4 Factor 4: Resources and distribution

Factor 4A Access to land

All respondents said that they had access to enough land to provide for the household needs. The landowning units of Bavu village own extensive areas of land with large portions leased to pine plantations. Many of the community's agricultural activities occur in the immediate area surrounding the village boundary. However, significant portions of land continue to be unused and the community leaders are exploring ways to lease them out for residential purposes as well as to plant trees with high economic returnsl, such as sandalwood or teak.

Subjective rating of Factor 4a:

1	2	3	4	5
Limited land available	Some land made available to some	Adequate land made available to some	Adequate land made available to most	Unlimited land made available to most

Factor 4B Access to fishing grounds

All respondents said that they had access to enough fishing areas to provide for the household needs. The Bavu's people traditional fishing areas extend from the freshwater surrounding their village locale as well as in coastal waters around 10 km from the village. However, due to their cash access, people also tend to buy fish from Indo-Fijian settlers in the area and for whom fishing is a source of income.

Subjective rating of Factor 4b:

1	2	3	4	5
No fishing grounds available/no catch present	Some fishing grounds available with limited catch available to some	Adequate fishing grounds with catch present available to some	Adequate fishing grounds with catch made available to most	Rich fishing grounds made available to most

Factor 4C Access to income

More than half of the respondents stated that their household income was less than FJD100 a month, the researchers estimated that in reality this might be up to FJD200. Even so, this figure is questionable given that the Bavu development committee was expecting each adult in the community to contribute FJD100 for the community fund. This community is relatively better off than many villages in rural Fiji as they are located next to a major highway, close to an urban centre with a variety livelihood options. Although the indicated household income level of Bavu is significantly lower than the national basic needs poverty line of FJD6000–8000 per annum per household of four adults equivalent, villagers do not have to pay for staple foods, rent or mortgages or land leases for agricultural production.

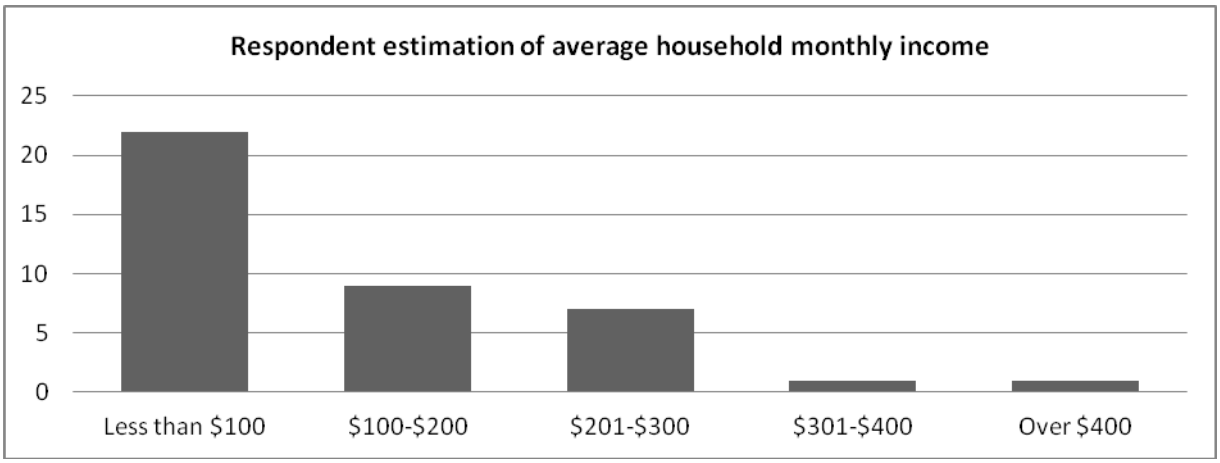


Figure 13 Respondent estimation of average household monthly income

Subjective rating of factor 4C

1	2	3	4	5
Disposable income earned is less than $100 a month	Disposable income earned is between $100 and $200 per month	Disposable income earned is between $201 and $300 per month	Disposable income earned is between $301 and $400 per month	Disposable income earned is over $400 per month

Factor 4D Infrastructure and services

Bavu is located along a frequently used highway, Queens Road, in Fiji's tourism and cane belt, so access to most standard services should be within reach. The community has electricity access, which is handy for operating a water pump and telecommunications is easily accessible via a landline and three mobile phone service providers. There is local health centre in the area or villagers can go to the main hospital in Nadi Town about 30 minutes drive away. There are several local primary and secondary schools within walking distance and some students go to secondary school in Nadi. The community has radio and television access, although only a few households own a television. Fiji has a local rural water authority, but communities such as Bavu receive minimal services and so are expected to make their own arrangements. However, the community has received support from other external actors to help them secure a sustainable water supply.

Subjective rating of Factor 4D

1	2	3	4	5
Limited infrastructure made available to all	Some infrastructure made available to some	Adequate infrastructure made available to some	Adequate infrastructure made available to most	Unrestricted infrastructure made available to most

Factor 4E Drinking water

The community water system had significantly improved since the completion of the project but still could be developed further. Eighty per cent of respondents agreed that the current water supply was accessible and good enough for drinking, a few said that sometimes the rainwater from the church roof would discolour the water from the community tank. However smaller rainwater tanks shared among two to three households are a cleaner source of drinking water. A 2006 test of the water from the borehole that supplies the community water showed traces of coliform and the same water source continues to supply the communal tank which is largely used for washing, bathing and cleaning. The rainwater tank provides drinking and cooking water.

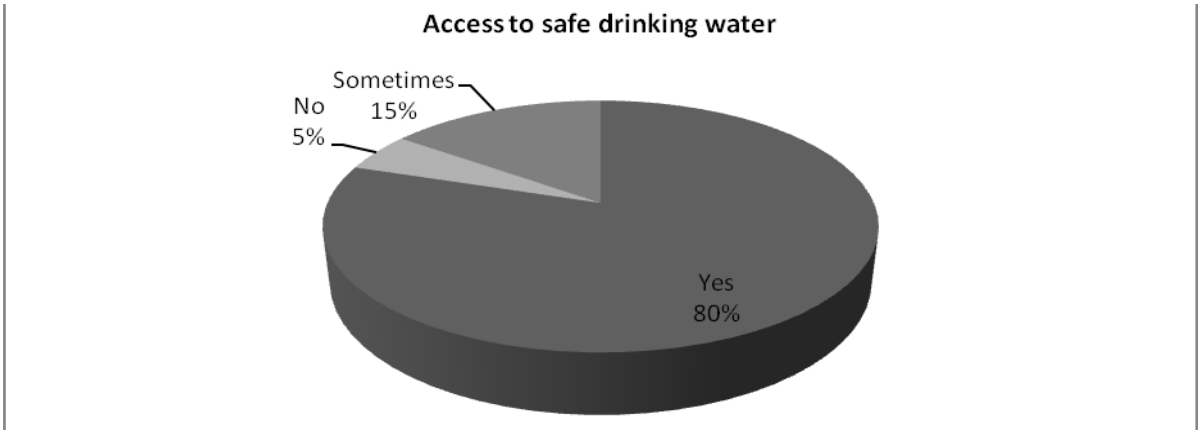


Figure 14 Respondents' access to safe drinking water

The community storage 20 000-litre storage tanks receive water from recently upgraded borehole and from the community's large church rooftop. This water runs through the community reticulation where each house has a tap outlet. This water is largely used for bathing, washing and laundry and the meter is open every second day. There are also several 1000-litre tanks located in various parts of the village that collect rainwater. Each tank catches rainwater direct from the roofs of two to three houses each. The community has access to these at all times, although this water is mainly used for drinking and cooking.

The community borehole is located at a lower elevation than most of the village. Water tests from the upgraded borehole in 2006 found traces of coliform, although this would have been much less than the community's previous water source—a dug-up spring downhill. Some respondents also stated that the tank water is usually dirty during heavy rains and that this is due to the water from the church roof.

All the project respondents stated that the CCA Project had an impact on the ability of the community to access water—explanations are summarised below.

Before	**Now**
One tap for five households	Each household has own tap
Each household had to seek own water	Water supply addressed communally
Not much water storage	More tanks in village for storage
Water harder to find in dry season	Water available during dry season
Water consumed was dirty	Water is cleaner
More time and effort to accessing water	Water supply consistent and readily available from home

Subjective rating of Factor 4e:

1	**2**	**3**	**4**	**5**
Limited safe drinking water available	Some safe drinking water available	Adequate safe drinking water available to some	Adequate safe drinking water available to most	Unlimited supply of safe drinking water available to most

6.5 Factor 5: Options

Factor 5A Adaptation possibilities (sector specific); Factor 6B Ability to analyse information/options

According to the community elders, water was not a problem for Bavu prior to the large-scale pine planting and highway construction in the 1980s. Bavu's growing water need has been addressed with support from external agencies. The South Pacific Commission and the Fiji Mineral Resources Department drilled a borehole in the village in 1987 and in 2002 Bavu was chose as a pilot project for the Capacity

Building for the Development of Adaptation Measures in the Pacific Island Countries (CBDMPIC) Project implemented by the South Pacific Environment Programme (SPREP) through the Fiji Department of Environment. Although well intended, the latter was unable to address the community water need despite significant investment of money and time by the community due to poor design and implementation.

As a project of the Fiji Department of Environment, the Fiji CCA Project was tasked to follow up on CBDMPIC activities. Although more time was required (compared to other Fiji project sites) to gain community trust, several options were assessed and the most appropriate within the project budget of FJD30 000 was implemented. These included:

- cleaning and testing the borehole that was drilled in 1987
- installation of a new pump into the upgraded borehole
- increase in community water storage capacity to receive water from the borehole and from the already established rainwater catchment from the church roof
- setting up water reticulation so that each house had its own outlet
- installation of guttering in village houses to feed directly into strategically placed 1000-litre tanks (three houses per tank).

The above activities were carried out in a manner that ensured active involvement by community members.

During the project other longer term options were determined and the Bavu Water Committee are working towards this with the aim of securing a 24-hour water supply for the community. These include:

- restoring an old dam
- establishing a new dam with reliable water flow
- drilling a new borehole that is uphill from the village
- increasing community water storage capacity

These are some long-term plans that have been assessed with the local water engineer that was involved in the project and the community has put together a draft proposal to be submitted to Rotary Water for Life Foundation—an organisation that has provided assistance to hundreds of local rural communities in securing a sustainable water supply. Bavu has yet to receive water assistance from this group so they have a good chance of further improving their water supply.

Subjective rating of Factor 5A

1	2	3	4	5
No technological adaptation implemented in the last decade/5 years	Limited technological adaptation implemented in the last decade/5 years	Some technological adaptation in the last decade/5 years	Successful adoption of one or two technological options in the last decade/5 years	Successful adoption of more than two technological options in the last decade/5 years

Factor 5B Livelihood options

Bavu community has several livelihood options and the most exploited are the sale of agricultural and wild plant crops and the sale of fishery products. Some community members engage in seasonal casual labour cutting sugar cane and a few engage in mere permanent employment in Nadi town. Surprisingly, only one household had someone working in a nearby hotel and only two made reference to money received from land leases (for pine plantations). Other sources of income include small business from the sale of kava and cigarettes, remittance from family members overseas, pension and sale of hunted wild pigs.

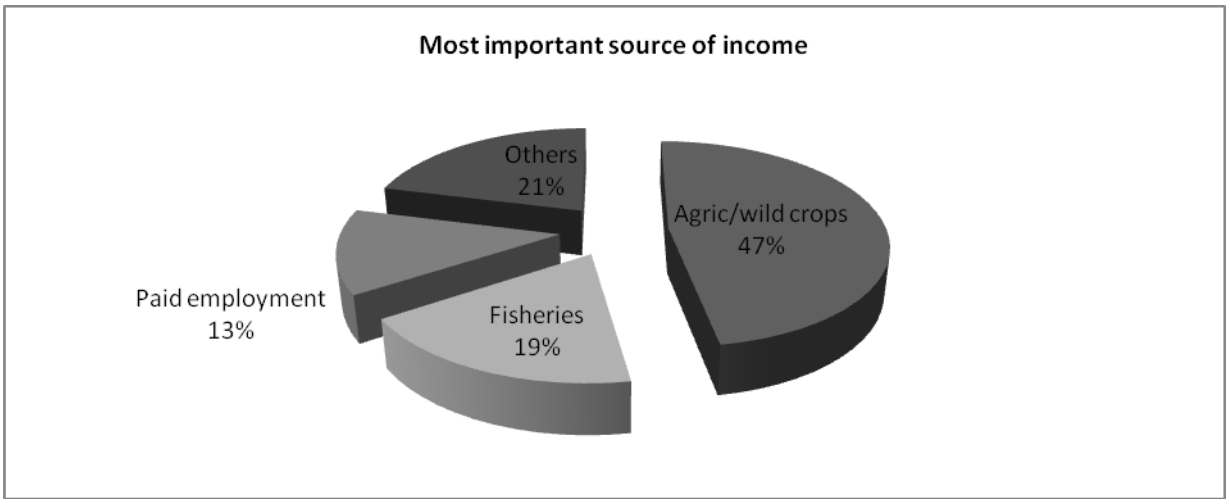


Figure 15 The Bavu community's most important sources of income

A significant portion of respondents (38 per cent) rely only on agricultural and fisheries harvests for income, making them highly reliant on environmental conditions and, hence, vulnerable.

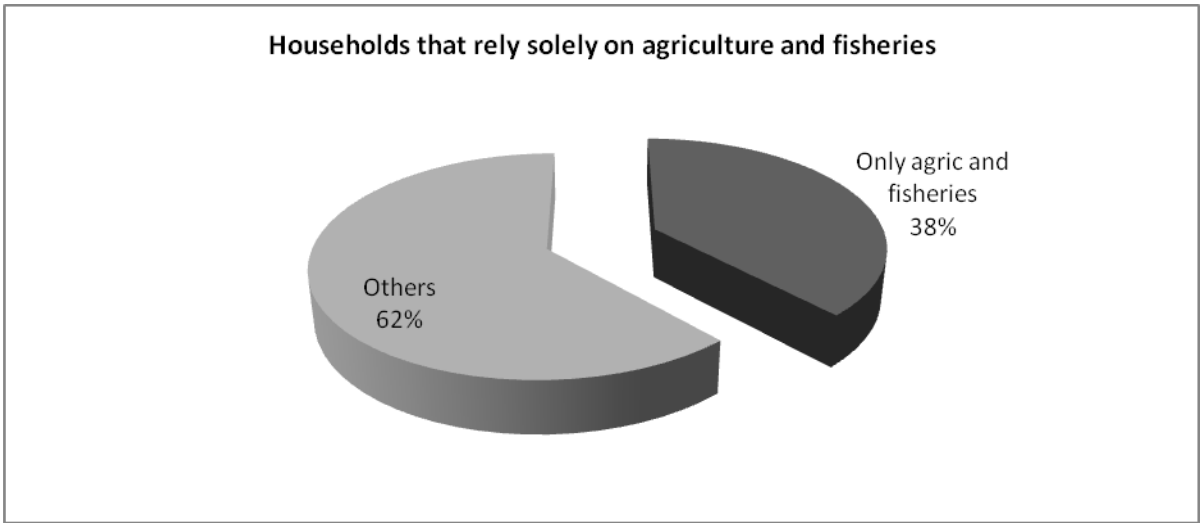


Figure 16 The proportion of Bavu households that rely solely on agriculture and fisheries

The few respondents who linked the Fiji CCA Project to their household income gave factors such as:

- the significant decrease in money spent to cart water or to travel to the nearest river to do their laundry
- money provided by the project to pay for catering costs for workshops as well as during student visits arranged by USP
- money from improved crops (because able to water gardens).

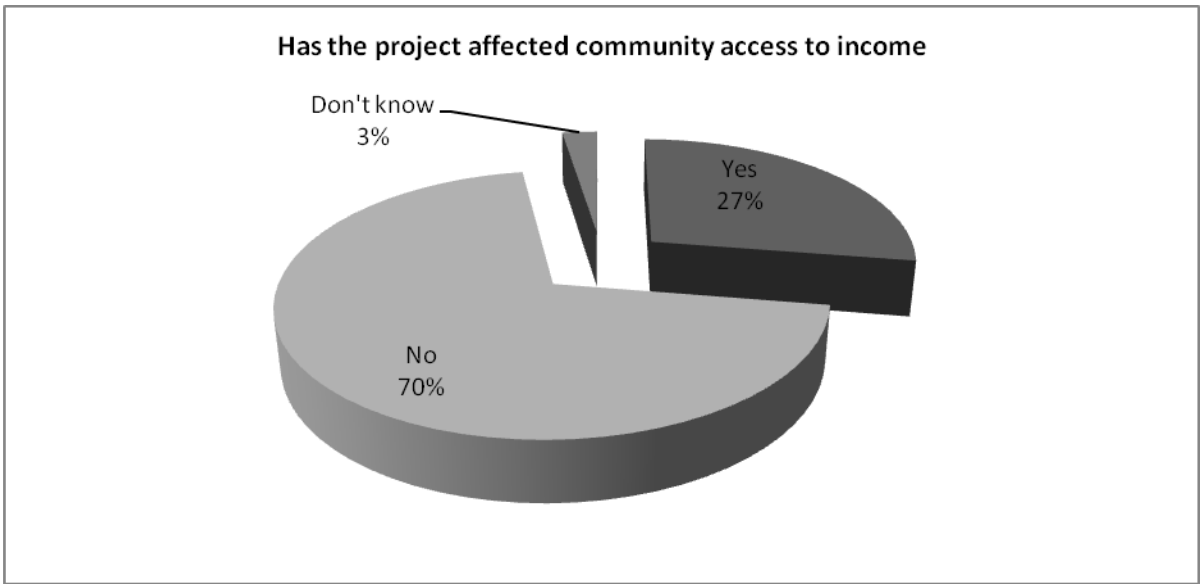


Figure 17 The effect of the CCA Project on Bavu community's access to income

Subjective rating of Factor 5B

1	2	3	4	5
No income-generating options available within the community	One income-generating options available within the community	Some income-generating options available within the community	Income-generating options available within and outside the community	Readily available income-generating options within and outside the community

Factor 5C Food acquisition options

Bavu community's staple foods are very accessible in Bavu. Villagers communally own extensive areas of land but they farm mainly within the vicinity of their villages. There are also many seasonal food and fruit trees such as breadfruit (*uto*), Tahitian chestnuts (*ivi*), mandarin, various mango species and local oranges. There also wild yams available and wild pigs that the villagers hunt for food and for income. The community has accessible fishing areas—both freshwater and marine. Cultivated food mainly include dalo, cassava, *rourou*, *bele*, eggplant and pumpkin which are grown for subsistence as well as income. Several households have their own livestock and raise chickens. Consumer foods from shops are accessible from the local stores or from Nadi town and those usually purchased include flour, sugar, canned fish, cooking oil and frozen meat. Since the village has access to electricity, food can be stored in refrigerators for relatively longer periods of time.

Survey respondents were asked to rank their food sources according to importance. All stated that agriculture and wild tree and plant foods were the most important food source. Shop food was the second most important source of food with fisheries as third (Figure 18). This shows that Bavu community relies on a combination of locally grown as well as purchased food.

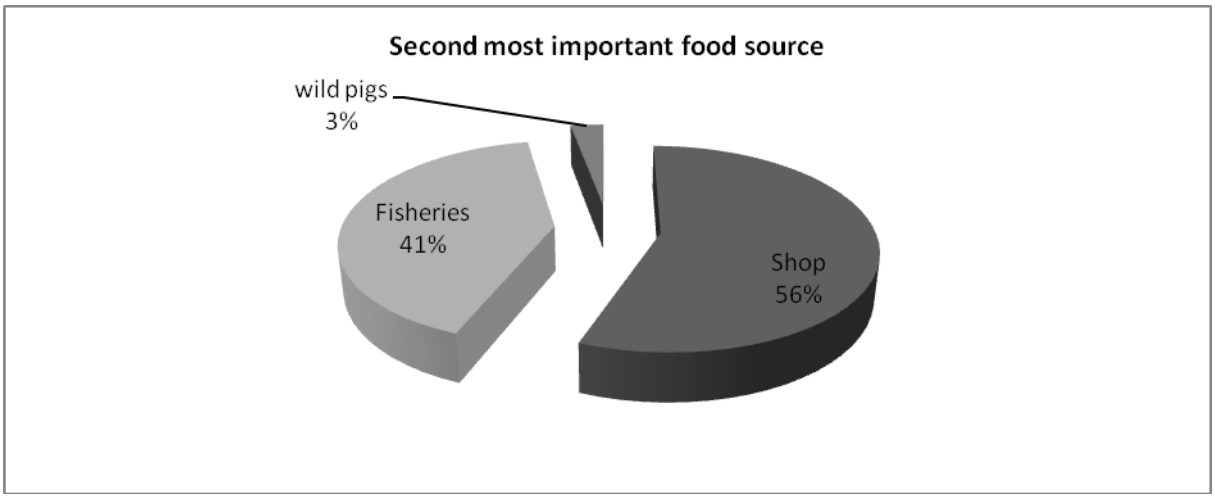


Figure 18 The Bavu community's second most important sources of income

Most respondents thought that the CCA Project had an impact on the community's access to food. Impacts according to respondents related to improvements in food preparation (use of more clean and accessible water) and improved crops as the community was able to water gardens.

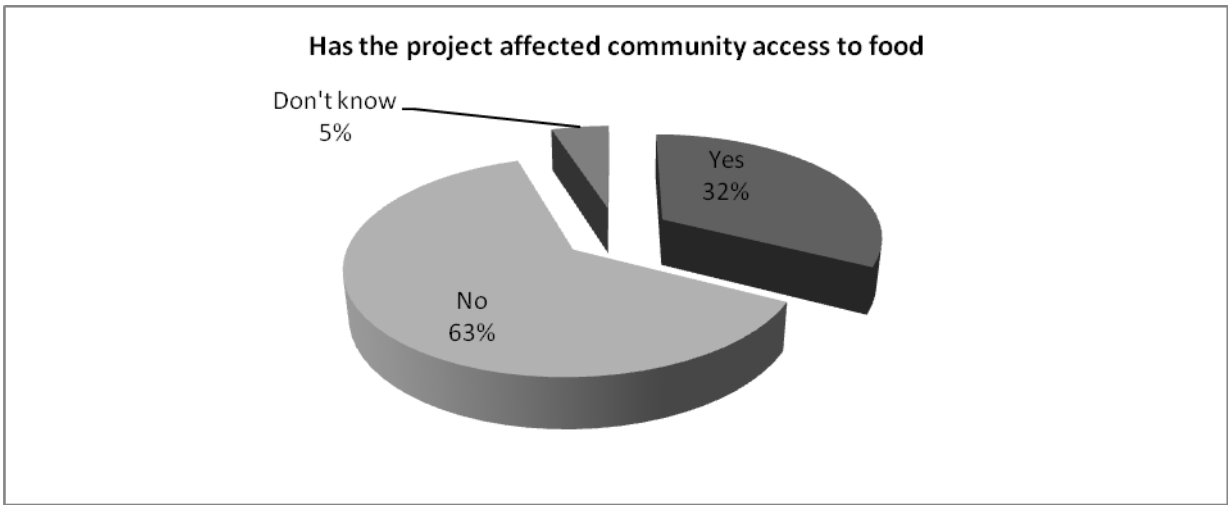


Figure 19 The effect of the CCA Project on Bavu community's access to food

Subjective rating of Factor 5C

1	2	3	4	5
Very limited subsistence and no access to imports	No famine food, limited subsistence, extremely limited access to imports	Little famine food, some subsistence, limited access to imports	Some famine food, some subsistence, food imports available	Famine food, abundant subsistence and abundant food imports available

6.6 Factor 6: Information/Awareness

Factor 6A Access/Level of access to relevant information+ Factor 6C Communicated risks and importance

The community had a general awareness of climate change and made specific reference to the confusion in fruit tree seasonality being not as defined as it used to be. There is also an awareness of how the changes in weather affect daily activities and livelihoods. For example, respondents said that during heavy rains they are unable to work in their gardens and drinking water gets dirty and during droughts there is less drinking water available and streams for fishing and washing dry up. Community knowledge on the basic science of climate change can be linked to the two CCA projects that the community has experienced— CBDMPIC in 2002 and the Fiji CCA in 2006. Climate change is also part of the high school curriculum. As a climate change pilot project site, USP has taken several field visits to the community.

Further to this, Bavu has access to various forms of media which increases exposure to national climate change awareness campaigns.

Because they are located on a relatively elevated and inland area, the community's main sense of vulnerability is in relation to rainfall changes as this affects their drinking water as well as food and income production. However, the community's perception of the threats to their water supply as caused mainly by the pine plantations and highway construction and not so much as a result of climate change. However, this may also be due to the fact that the area has been receiving good rainfall over the past few years.

Subjective rating of Factor 6A

1	2	3	4	5
No knowledge	Very limited knowledge	Limited knowledge	Good level of knowledge	Very good level of knowledge

6.7 Factor 7: History of dealing with climate stresses

When asked about the significant events that affected community life during a focus group discussion with the male elders, those events mentioned reflected a combination of natural and man-made occurrences. There was limited knowledge of history of natural disasters prior to the 1970s, so community memory post-disaster includes government assistance and community collaboration in rebuilding homes and gardens. Government assistance, however, seems limited to cyclones with no mention of government assistance during times of drought. The impacts of cyclones have declined with more secure housing.

Table 2 Historical profiling with the elderly men's focus group

Year and event	Activities
1972 Cyclone Bebe	Village had 10 houses then and only 1 house was left standing which was a bure. Government assisted with providing food and water and community also had own food. Houses were rebuilt through own means.
1972–1974 Construction of Suva–Nadi Highway and Planting of Pine plantations on community-owned land	Streams started to dry up and community started to face water problems.
1982 Cyclone Meli	Plantations were destroyed but houses remained intact. Only a few outdoor kitchens were destroyed as houses where stronger. Government assisted to supply food. Community worked together to restore plantations, collapsed kitchens and damaged houses.

Year and event	Activities
1987 Drought	Plantations were damaged. Streams dried up. Community spent money to cart water to the village. Pine trees burnt, further enhancing the dryness of soil. Job losses However, during this time more trees were also harvested which provided income for the community.
1987 Fiji Coup	Retirement age decreased from 60 to 50 years. Transportation and food supplies were affected. The community started planting more food.
1994 Drought	The village had no access to water and some waterborne diseases were present. The community planted more food after the drought.

It seems that the impacts of human activities have a more profound impact on community life. The community believes that the water problem in the area is linked to the large-scale pine plantations and road building that cut across streams and waterways. Given that the community had sustained itself satisfactorily during droughts and dry seasons shows that there is some level of resilience, particularly when there were no reported serious water-related illnesses prior to the projects (according to the village nurse before and after the Fiji CCA Project).

Some measures for dealing with climate-related stresses relayed by survey respondents are as follows:

Table 3 Measures for dealing with climate-related stresses relayed by survey respondents

Community	Village announcement by head man to prepare (e.g. cyclone warning). Usually each household has to prepare for own food and water. Village sits together to plan how to fix damage to houses and gardens.
Water issues	Dig wells (for bathing and washing) Store water During droughts/dry season and water sources (river, borehole, community tanks) are critically low and their use is strictly monitored to ensure that there is no wastage. To maximise efficiency, some re-use 'grey water' (i.e. water from washing dishes/clothes, cleaning vegetables) to water their gardens etc.
Food issues	The villagers often plan ahead to raise money (*soli*) to have funds ready in times of need. Replanting of trees (e.g. *ivi*, coconut, *vutu*, *rara*) to reduce/prevent riverbank erosion. Gather wild foodstuffs (e.g. wild yams or *yakeli*). Relocation of farm to higher areas

	Proper irrigation during drought During droughts crops that can withstand dry seasons are planted (v*ia, uvi*) Flood causes *tavioka* plants to be uprooted so plant on hill. Planted trees to stop erosion Relocate gardens from flat lands to slopes. Collect horses and cows to keep them safe keeping
Health issues	As the health centre is far away they opt for traditional remedies.
Money	When faced with problems the community tries to deal with what they can and when all efforts are exhausted they opt for external assistance. There is a community financial contribution or *soli* that is kept for times of need.
External assistance	People in bavu don't usually ask for assistance from external agencies but look to their own food production, unless there is a major disaster such as a cyclone. Seek assistance form Red Cross for food supplies, clothes etc. Seek assistance from the District Office (e.g. Sigatoka Water Supply had serviced the area before the water project was implemented).

Nearly all respondents agreed that the Fiji CCA Project had helped the community deal with weather-related stresses as shown in Figure 20. Respondents said that main contribution of the project in helping the community with weather-related stresses was to help them secure a more consistent supply of water, particularly in the dry season. However, the effectiveness of the water project during a drought season is yet to be seen.

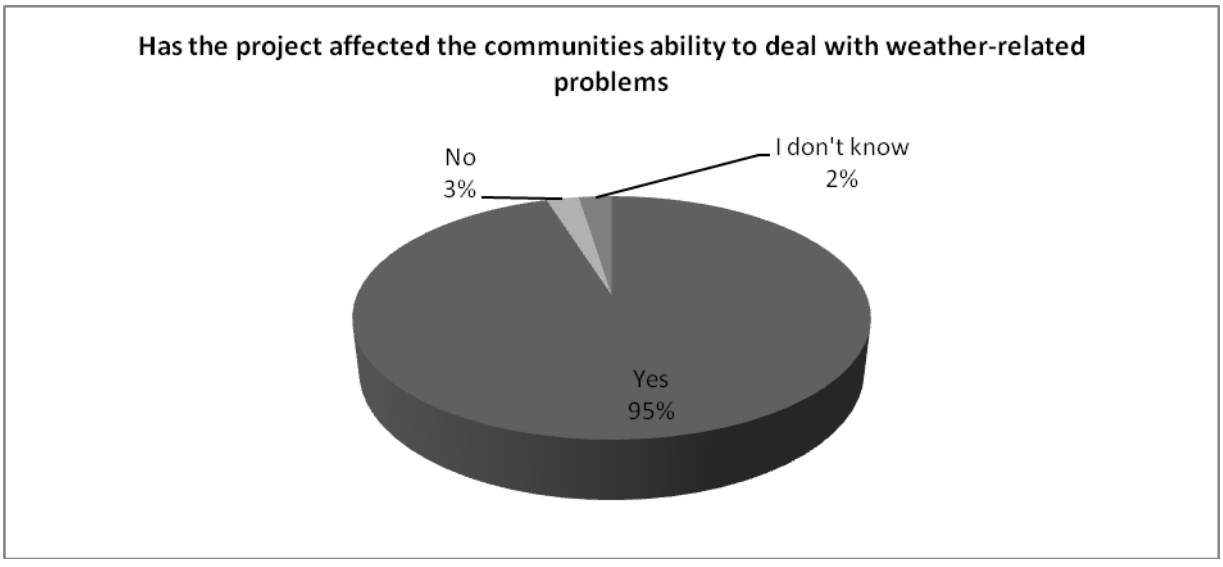


Figure 20 How the CCA Project affected the community's ability to deal with weather-related problems

Subjective rating of Factor 7A

1	2	3	4	5
Very poor ability. Community is heavily reliant on external assistance to recover. Community has few internal preparation, coping and recovery measures in place.	Fairly poor ability. Community is reliant on external assistance to recover but has a few preparation, coping and recovery measures in place.	Fair ability. Community has a number of preparation, coping and recovery mechanisms in place. External assistance is usually required for effective recovery.	Good ability. Community has a number of effective preparation, coping and recovery mechanisms in place. External assistance is sometimes required for effective recovery.	Excellently. Community has a number of highly effective preparation, coping and recovery mechanisms in place and is largely self-reliant. External assistance is seldom required for effective recovery.

6.8 Overall adaptive capacity of Bavu community

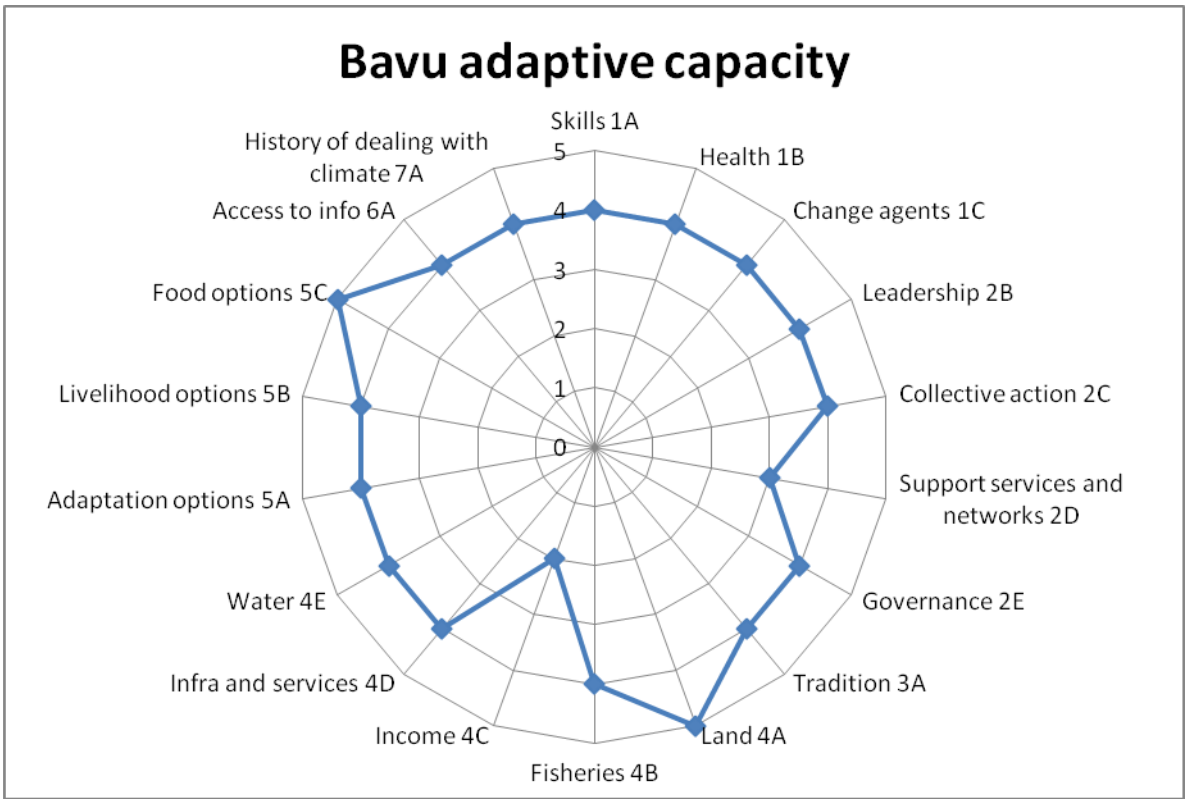


Figure 21 Adaptive capacity of the Bavu community

7. Druadrua results

7.1 Factor 1: Human capital

Factor 1A Traditional and modern skills

The daily lives of the people of Drudrua Island—made up Salevukoso village and Delaivadra village—is shaped by both modern and traditional skills. About half of the adult population had reached (at least) the first two years of secondary school education and all had primary education, therefore all adults are essentially literate. Those who had attained higher levels of education and/or secured employment in other parts of Fiji have left the island and visits are relatively minimal due to the distance from the main population centres. Nevertheless, a significant number of adults had attended vocational training provided by the government and so have basic skills in carpentry, mechanics, cooking, sewing and computing. These skills are important for a community such as Druadrua due to its relative isolation and limited access to cash. For example, children's school uniforms are usually sewn by a few skilled women on the island. The water committee have also received training on how to operate and maintain the current water system through the recent CCA Project. Although according to the project water engineer, there was already a good level of existing knowledge on the subject. The culinary skills of several women, particularly with seafood, is quite impressive and represents a fusion of traditional and modern food preparation techniques. There is also a group of women who bake bread and buns (in open fire) for sale on the island. Although Druadrua Island is a fair distance from Fiji's main tourism areas, plans are underway to build a backpacker accommodation lodge on the island, possibly the first in the north-eastern districts of Vanua Levu. The community has had some experience hosting guests from tourist cruise boats as well as researchers.

The community's traditional knowledge and skills are mainly evident in the fisheries sector— their main source of food and income. Most of the fishing methods are traditional and enhanced with the use of more modern equipment such as fibreglass boats, spearfishing gear, goggles, nylon lines and nets. Women are more skilled in gleaning, although they are not excluded from fishing in deeper inshore waters. Some younger men are skilled divers and able to fish for seacucumber which gets high economic returns. Five years ago, the community joined the FLMMA network whereby they have committed to restore pre-colonial methods of sustainable fish management methods. This includes the setting up of restricted fishing areas for certain periods, locally referred to as *Tabu* areas. The community also plants its own staple foods which are a combination of traditional crops such as yams and *bele* (spinach like), and introduced crops such as cassava, eggplant, cabbage and corn. The community continues to demonstrate skills in managing social relations with the village and with outside agents by observing and practising traditional ceremonies of welcome, farewell, marriage, funerals and other socially significant events.

Overall subjective rating of AC factor 1A

1	2	3	4	5
Very low traditional and modern relevant skills	Low traditional and modern relevant skills	Some traditional and modern relevant skills	Abundance of traditional and modern relevant skills	High abundance of traditional and modern relevant skills

Factor 1B Health security

The community members are generally in good health and able bodied, of which the diet and lifestyle have an influence on. The lifestyle in Druadrua is generally a healthy one. The community diet is made up of locally produced and harvested foods such as fish, crabs and other seafood, root crops such as cassava, yams and sweet potatoes and green vegetables that include *bele, rourou* and *nama* (sea grapes). The use of confectionary food is minimal due to the distance from the nearest town and larger stores. Therefore the community's daily diet is healthy and having to produce their own food ensures people are active. The nearest health centre is on the main land and can be accessed by a 30 minute boat ride away and the main hospital in Labasa Town and is about 2 hours away. Women who are about to deliver their babies have to find a place in Labasa to stay two weeks prior their due date – usually there is a relative in the town to accommodate such cases. There were very few adults over the age of 70 years on the island.

Overall subjective rating of AC factor 1B

1	2	3	4	5
Very low health security	Little health security	Some health security	Good health security	Excellent health security

Factor 1C Change agents

The community change agents are mainly men over 45 years who play a direct role in community decision-making. The two sons of the recently deceased traditional leader have played a key role liaising between the community and external agents involved in improving the island's water infrastructure. One of them is also running a church denomination-based (Christian Mission Fellowship – CMF) business that buys fish from the people of Druadrua and the neighbouring island and sell them to a contact in Labasa. Another community male, in his 60s, has facilitated the process of getting a piece of land owned by his clan surveyed so as to start building tourism accommodation. Notably, the obvious change agents are the more senior men who have a direct influence on community governance, while the younger community members are not very visible in the running of community activities. When this issue was brought up during a focus group meeting with senior males, one of the group members said that the younger people seemed to spend too much time drinking *yaqona* and were not very open or communicative. This very limited communication from the younger group was also experienced by the assessment group during the community meeting the previous night during a community consultation over *yaqona*.

This distance between the generations may have been a limitation in successfully running a community water supply as the key members of the group were under 30 years and did not seem comfortable to call meetings, make decisions and communicate them.

Overall subjective rating of AC factor 1C

1	2	3	4	5
None	Some but not listened to	Some and somewhat effective	Good ideas are often implemented	Ideas flow freely at meetings and are analysed and implemented

7.2 Factor 2: Social capital/Community cohesiveness

Factor 2A Community diversity

The people of Druadrua Island are all ethnically Indigenous Fijians or *i Taukei*, share Christian beliefs and mostly literate having all received primary education at least. The community speaks the local Macuata dialect and can generally communicate in the more widely spoken Bau dialect. A few variations in the community are as follows:

- Twenty-eight of the 30 households in the village have paternal links to the village guaranteeing them the community's kinship registration or *vola ni kawa bula.* The remaining two households are maternally linked to the community although the community leaders say that they are regarded as part of the community with access to the clan land and fishery rights.
- As shown in the data below there are two major religions—the Methodists and the CMF followers. Two households have formed their own church called Free Worship and seemed to have consciously chosen to be autonomous.

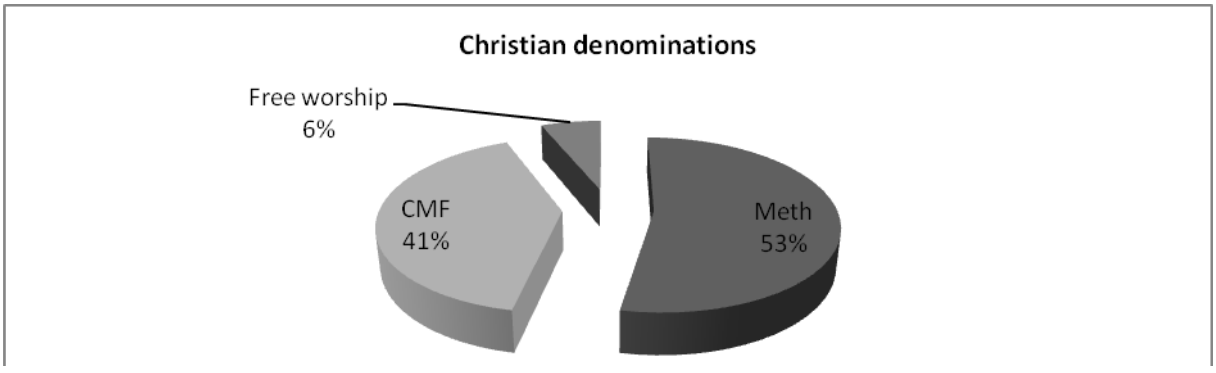


Figure 22 Proportions of Christian denominations among the people of Druadrua Island

- All households would have the same access to fisheries and agricultural areas although the economic returns from this would be significantly better for those who owned boats. Those with fibre boats are able to access deeper waters and can venture outside the reef. There are about four fibre boat owners in Druadrua.
- All the children in Druadrua attend the island's primary school which goes up to Class 8. They then move onto a boarding school on the main island for secondary education. It seems that those who complete secondary school don't return to the island.

Factor 2B Leadership; Factor 2C Strength of the *Vanua* collective action; Factor 2E Good governance; Factor 3B Willingness to accept change

The headman or *Turaga ni koro* for Druadrua's main village, Salevukoso, has changed three times over the past three years. The last one was relieved of his duties by the community leadership for his involvement in lighting a fire in his plantation that caused a major fire on the island where several houses were at risk of being destroyed. The lighting of fires, particularly in agriculture, is prohibited on the island according to the community's own rule making and supported by the national Forestry Decree. The current *Turaga ni koro* belongs to the traditional leading clan and is one of the community's change agents. He is also a member of the island's water committee. He confided that the group had not met in the preceding 12 months and that he found himself largely responsible for maintaining the community water problem. The current *Turaga ni Koro* was also in charge of weighing and buying fish from fishers from Druadrua and the neighbouring island for sale in Labasa. Although he plays a significant role in the management of the community's water and economic wellbeing, he does not feature prominently in village meetings and is hardly heard. He is the son of the recently deceased traditional leader and his older brother is one of the more influential decision-makers.

A new traditional leader is now established and seems to be still developing his influence given that he only retired to the island several years ago after having worked on the mainland. He is well supported by the household of the past traditional leaders given that they are part of an extended family.

The two main churches have their own church leaders who also reside on the island and have significant influence.

Compared to Bavu village (Section 6), community members have less confidence in the current leadership whereby a significant portion of respondents stated that leaders only sometimes play a significant role in solving community problems.

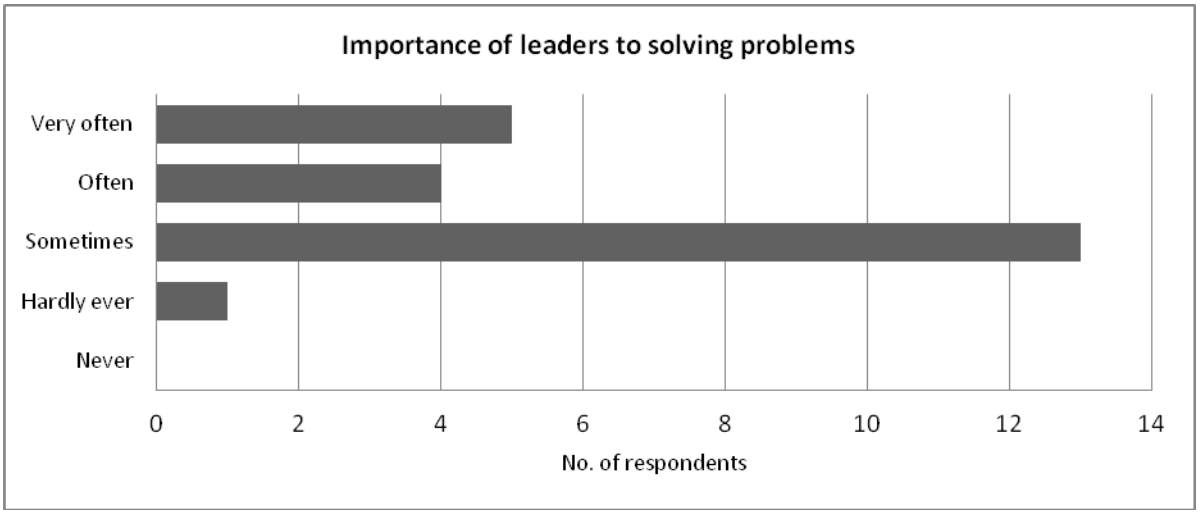


Figure 23 The importance of leaders in solving community problems according to respondents on Druadrua Island

Most respondents thought that the CCA Project affected community leadership as shown in Figure 24 although only few were able to specify how. Some explanations were that the leaders proved their ability to engage effectively with external agents and by maintaining the community's focus on the aim of the water project. Other respondents stated that they had more time to attend community meetings and commit to traditional gatherings given that they had saved time in accessing water.

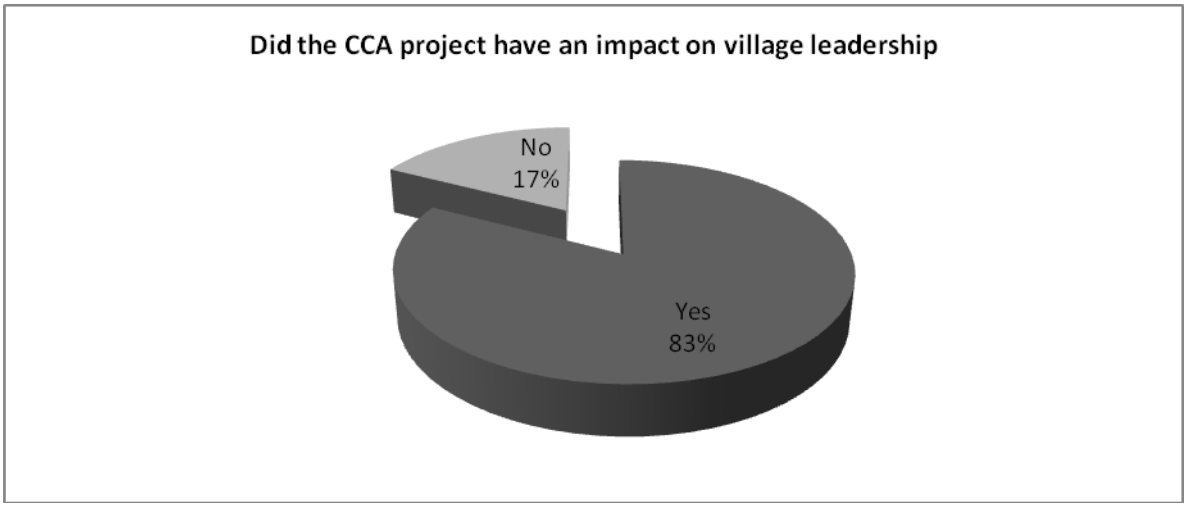


Figure 24 The impact of the CCA Project on village leadership on Druadrua Island

While the community does well in showing a united front when hosting visitors and when the island participates in *Tikina* (district) level functions, a certain level of fragmentation exists, some of which can be linked to religious differences that involved violence, banishment and returning to the island over that past two decades. Druadrua Island, like most Fijian villages, was predominantly Methodist until the growing influence of evangelical groups such as CMF in the late 1980s. The significant difference between the Methodist and evangelical approach is that the

former is woven into the indigenous culture (and vice versa) and observes a conservative approach to worship, whereas the latter shuns indigenous traditions and totems as pagan-like and the style of worship is usually loud and dramatic involving modern musical instruments, loud sermons and sound systems when possible. Like other parts of Fiji, a CMF group was formed using the loud dramatic worship approach that openly condemned traditional values and practices and caused disturbance and annoyance to the wider community and traditional leadership. When several requests to tone down the noise levels by the leaders (who were mainly Methodists) went unheeded, physical violence against the CMF followers broke out and the later were banished in the early 1990s. Most of them moved to CMF communes within the same province of Macuata on the main island, only to return 10 years later after traditional approaches of reconciliation were initiated by those that stayed on the island. The CMF community were still settling in when the CCA Project commenced in 2007 and one of their elders was appointed as the village headman for Salevukoso, the more significant of the two villages in Druadrua where most of the CMF followers reside. Only one of the ten households in the second village of Delaivadra are CMF followers.

It is possible that this confrontational history may have somewhat shaped the way the community relates to each other. Apart from the limited communication from the youth members, some difficulty was also experienced when trying to facilitate a group discussion among the women. There are three women's groups on the island defined by *mataqali*. The focus group session with the women was combined and it soon became apparent that while there was a good turnout, only a few people were doing most of the talking despite several attempts to engage the quieter ones.

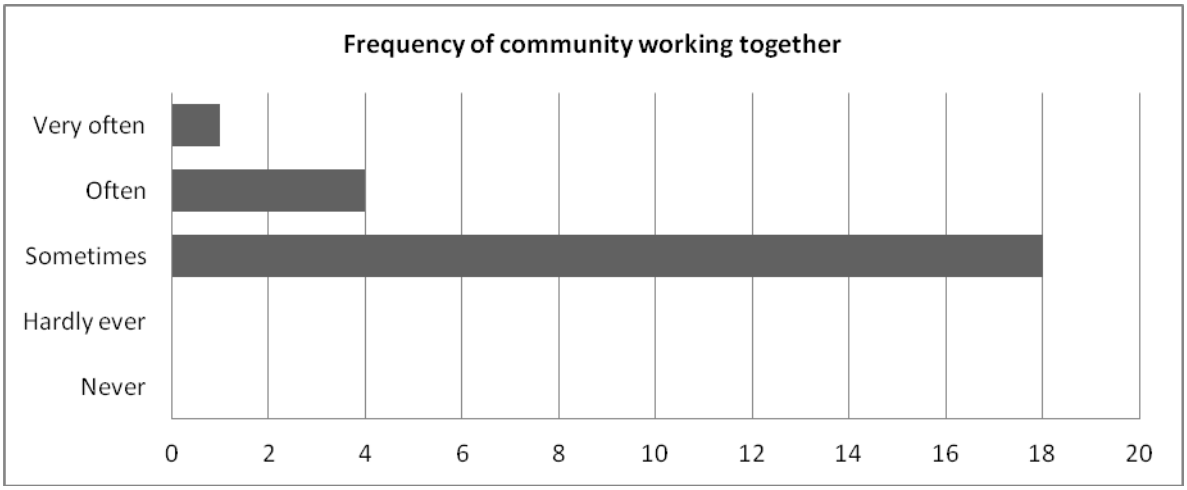


Figure 25 The ability of the community to work together on Druadrua Island

Respondent views on ability of the community to work together shows a generally moderate level of community cohesiveness.

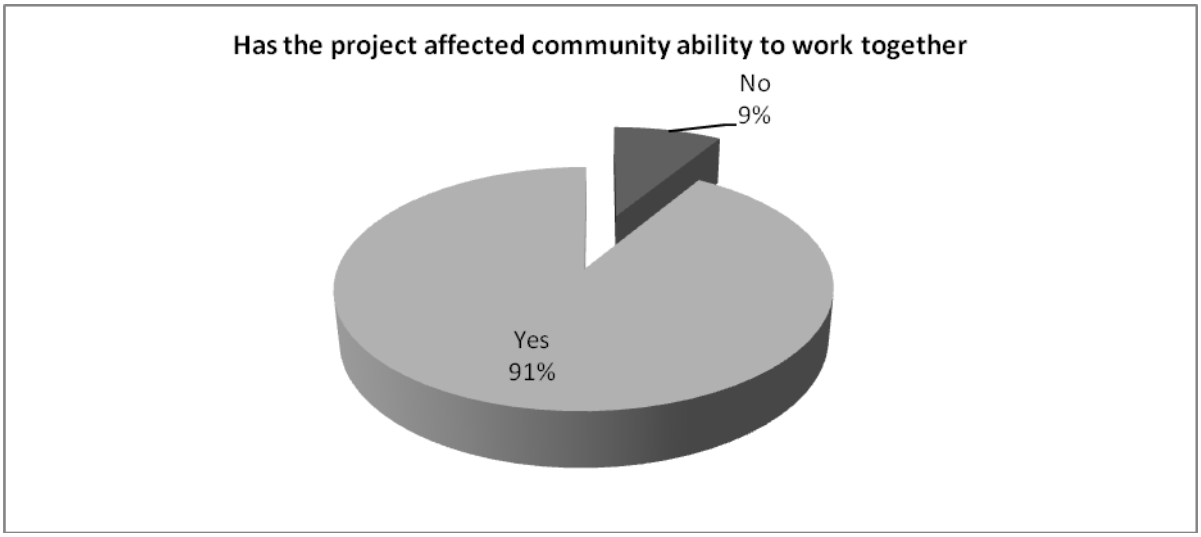


Figure 26 The effect of the project on community ability to work together on Druadrua Island

Most respondents agreed that the CCA Project affected the community's ability to work together. The key points are summarised as follows:

- The community worked together because accessing water was a key concern shared by everyone in the village.
- People participate more in traditional functions or *soqo* since water is more accessible.
- Everyone participated during the project implementation—men did the heavy labour and the women were involved in food preparation.
- Working together has always been a part of village life (i.e. *solesolevaki*) and the project reinforced this.
- People participate in more *soqo* (social gathering) since water has become accessible.
- With less time spent looking for water, community members have no time to attend village meeting and participate in community activities.

Overall subjective rating of AC factor 2B

1	2	3	4	5
No vision, little collective action	Little vision, some collective action	Some vision and implementation	One visionary with good implementation	Several people with vision and implementation skills

Overall subjective rating of AC factor 2C

1	2	3	4	5
Little group feeling, people seldom work together	Some group feeling, people sometimes work together	Moderate group feeling, people sometimes work together	Good group feeling, people frequently work together	Excellent group feeling, people frequently work together effectively
1	**2**	**3**	**4**	**5**
Few committees, not very effective	Some committees, produce some results	Some areas done well, others not	Generally good but improvements possible	Appropriate number of committees, very effective

Overall subjective rating of AC factor 2E

1	2	3	4	5
Poor decision-making processes, limited information sharing	Mostly poor decision-making processes, mostly limited info sharing	Some good decision-making processes, some information sharing	Good decision-making processes, good information sharing	Excellent decision-making processes, excellent info sharing

Factor 2D Support services and networks; Factor 3E Dependence (government, aid, remittances) vs independence

Druadrua Island is in a relatively isolated part of Fiji where economic activities and infrastructure is limited which may have an effect on the level of the community's relationship with external organisations and individuals. More than half of the respondents said that external assistance was not easy to access, and the rest said that it was or was sometimes easily accessed. A lot of the external assistance provided to the island has mainly focused on water and food security. USP, Red Cross, Rotary Water for Life Foundation were among the organisations that had provided resources to improve their water supply. In terms of food and income, the agricultural department helped the community with gardening root crops and vegetables, and the Department of Fisheries and FLMMA network provide support with sustainably managing their fishing areas.

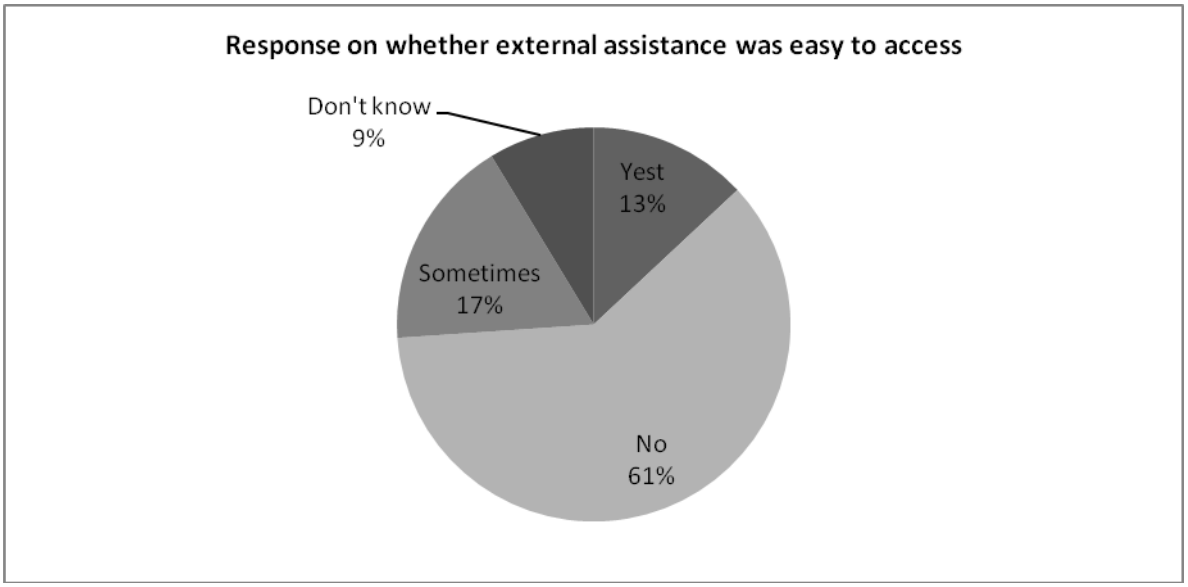


Figure 27 Respondents views on whether external assistance was easy to access on Druadrua Island

Only two respondents saw the CCA Project as having enhanced the community's access to external resources. One of them said that since the water supply was secured, more tanks were donated, and the other respondent stated that he was not aware of any other approaches made by the community to access external assistance since the CCA Project was completed.

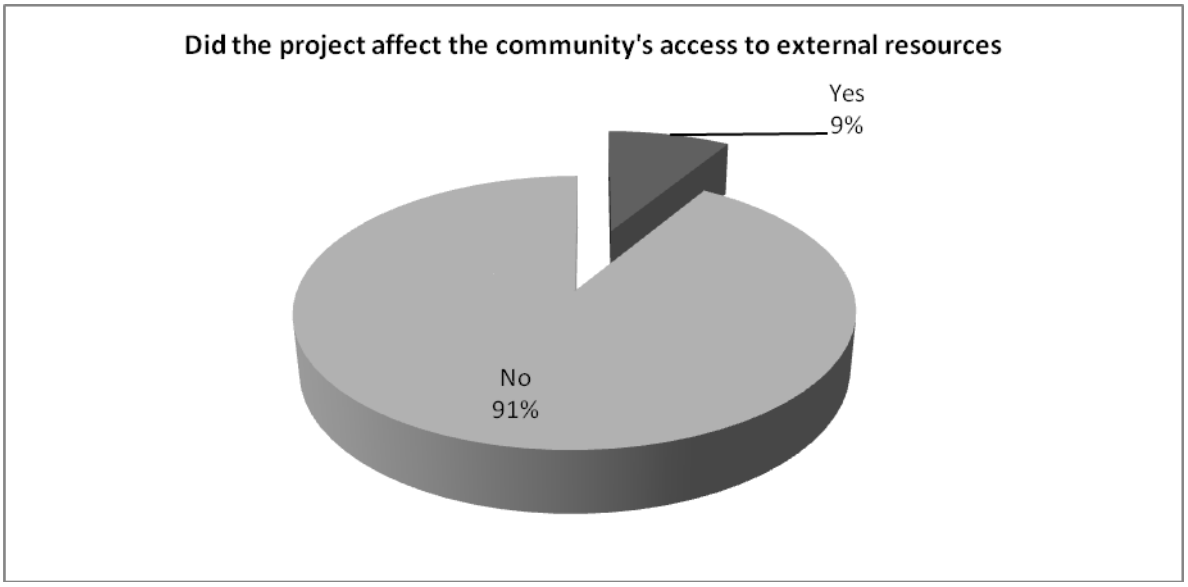


Figure 28 Respondents views on whether the CCA Project affected community access to external resources on Druadrua Island

Subjective rating of Factor 2D

1	2	3	4	5
Few support groups available, ineffective relationship	Some support groups available, ineffective relationships	Fair number of support groups available, some have effective relationships	Good number of support groups available, most have effective relationships	Many support groups available, all have effective relationships

7.3 Factor 3: Belief systems/World views/Values

Factor 3A Traditional values, systems and knowledge (*Mana*)/Modern, western and church value systems

The community rated itself generally high in terms of the value it currently places on traditional knowledge and ways of life.

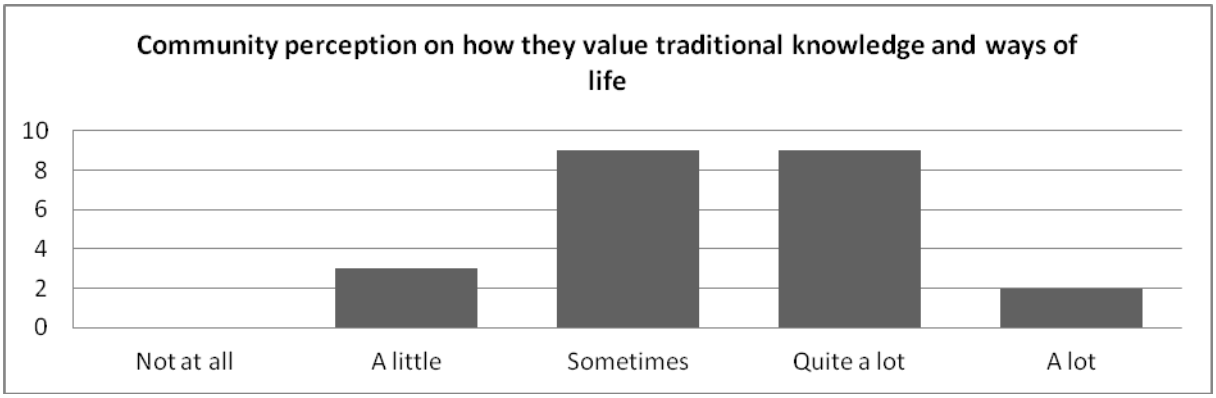


Figure 29 Community perception on how it values traditional knowledge and way of life

However, most participants believed that the community value of traditional knowledge and ways had diminished when compared to 20 years ago.

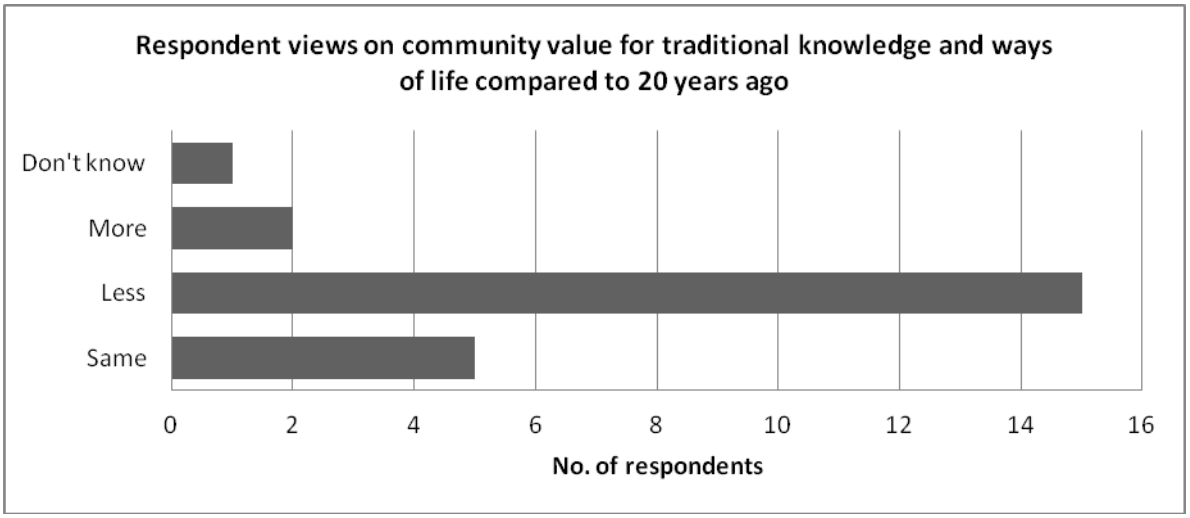


Figure 30 Respondent views on community value of traditional knowledge and way of life compared to 20 years ago

Subjective rating of Factor 3A

1	2	3	4	5
Very low abundance of traditional values	Low abundance of traditional values	Fair abundance of traditional values	High abundance of traditional values	Very high abundance of traditional values

Factor 3C Self agency vs determinism; Factor 3D Here and now/Future thinking

According to the survey responses, the people of Druadrua think about the future and believe in acting in the present to avoid future problems. Some of this thinking is demonstrated in the community's commitment to setting up *Tabu* areas in their traditional fishing grounds. There is also reference to the wellbeing of future generations in traditional ceremonies in the process of validating bonds between two parties. Some parents put a lot of effort into investing in their children's education in the belief that they might be better off securing full-time employment in urban areas in the future.

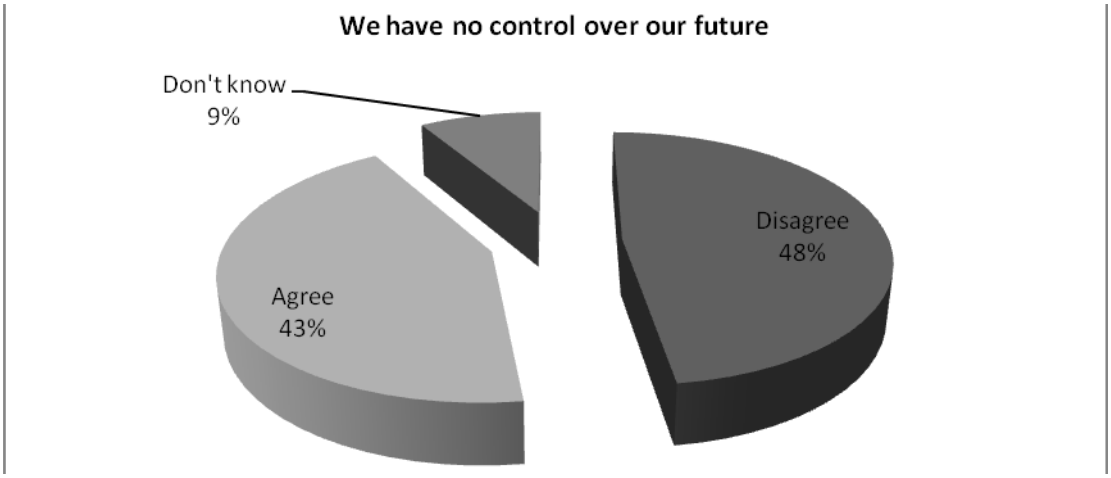


Figure 31 Respondent views on control over their future

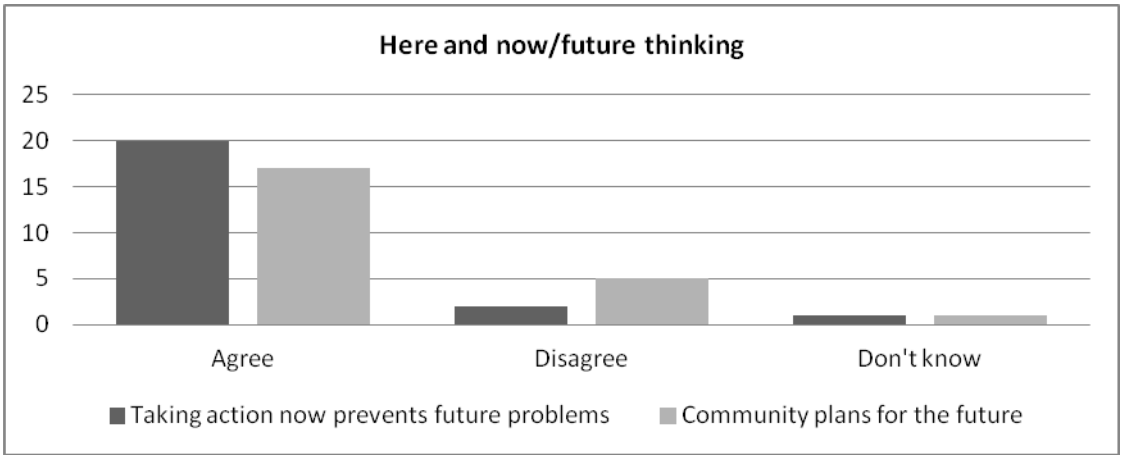


Figure 32 Respondent views on how 'Here and now' vs 'Future' thinking affects future problems and plans

7.4 Factor 4: Resources and distribution

Factor 4A Access to land

All respondents stated that they had sufficient access to land to provide for the households food requirements. The whole island of Druadrua, which is almost four square kilometres in size is communally owned by the 30 households that live on the island. Agricultural activities, however, are concentrated within the vicinity of the village for accessibility. Because agricultural activity is largely for subsistence purposes, significant areas of land remain unused.

Subjective rating of Factor 4A

1	2	3	4	5
Limited land available	Some land made available to some	Adequate land made available to some	Adequate land made available to most	Unlimited land made available to most

Factor 4B Access to fishing grounds

The community has access to and extensive inshore areas for fishing and all respondents said that fishing in these areas was sufficient to feed their families. The abundance of fish harvested daily when fishers return at the end of the day indicates that the community's fishing areas is more than sufficient to meet its food requirements, although the sustainability of the harvesting rate may require further examination.

Subjective rating of Factor 4B

1	2	3	4	5
No fishing grounds available/no catch present	Some fishing grounds available with limited catch available to some	Adequate fishing grounds with catch present available to some	Adequate fishing grounds with catch made available to most	Rich fishing grounds made available to most

Factor 4C Access to income

Most respondents stated that their household income was less than FJD200 a month, but the daily catch value observed by the assessors indicated otherwise and estimated this to be at least FJD300–400 a month. Although this still means that the household income is lower than the national basic needs poverty line, the Druadrua islanders do not have to pay for staple foods, mortgages, land leases or rent—expenses that usually take up a significant portion of household budgets.

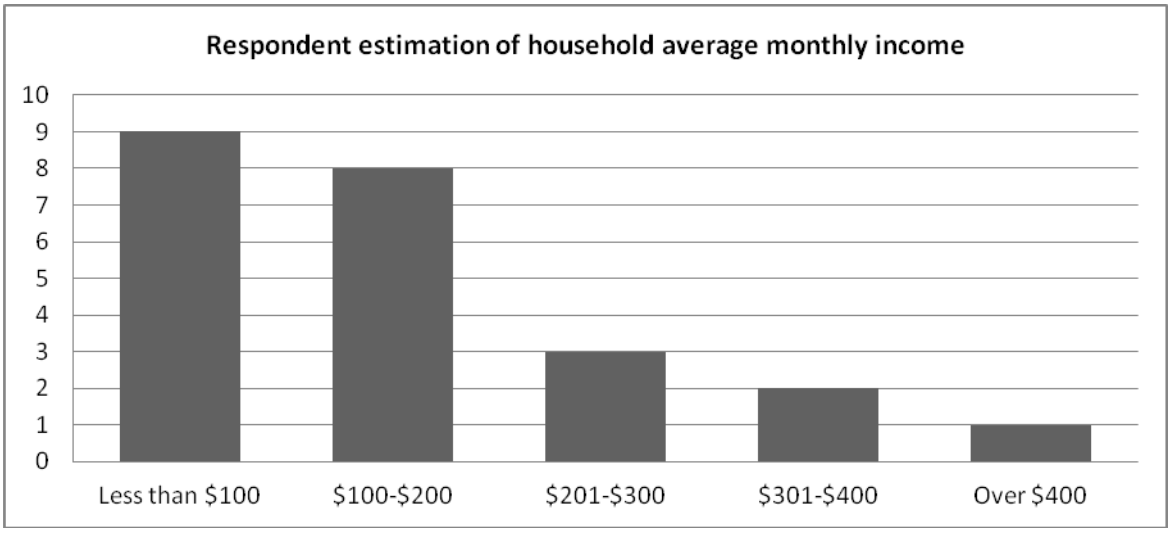


Figure 33 Respondent estimation of household average monthly income

Some respondents stated that the CCA Project affected the community's access to income although the actual changes in income were not specified. Nevertheless, explanations given were that because people spent less time looking for water, they had more time to fish and engage in other economic activities such as mat weaving. Someone stated that her small *yaqona* business did better as there was more water available to mix the 'grog'. Another respondent made reference to the direct financial contribution of the project in paying for visitor accommodation and food.

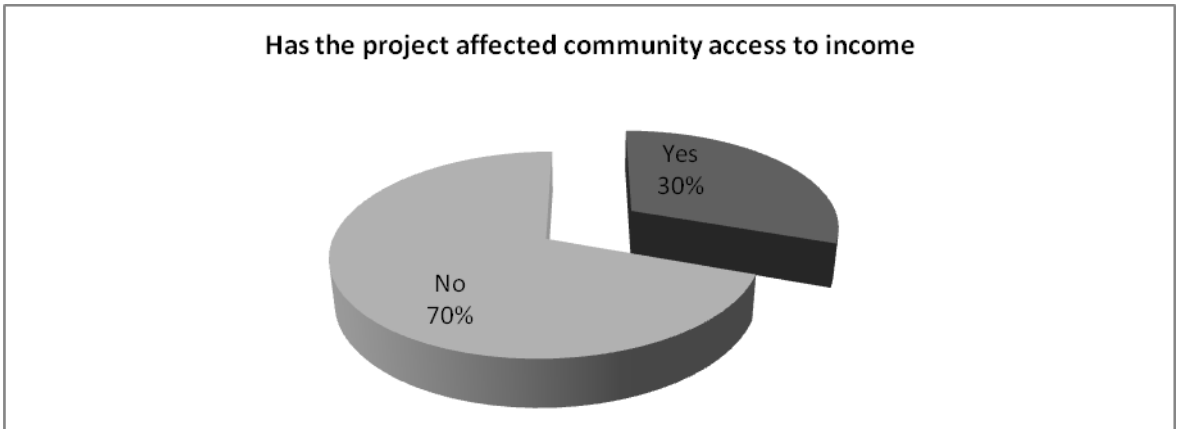


Figure 34 Respondent opinion on the CCA Project affected access to income

Subjective rating of Factor 4C

1	2	3	4	5
Disposable income earned is less than $100 a month	Disposable income earned is between $100 and $200 per month	Disposable income earned is between $201 and $300 per month	Disposable income earned is between $301 and $400 per month	Disposable income earned is over $400 per month

Factor 4D Infrastructure and services

Druadrua has limited access to infrastructure due largely to its geographical isolation. Public transport to the main town centre is accessed from the mainland which is 20 minutes by boat. Energy is sourced from an expensive diesel-powered generator. The nearest health centre is a 30-minute boat ride. The village has telecommunication access via satellite phones and only a certain spot in Salevukoso village is able to receive mobile phone reception. The local rural water authority is located in Labasa and there was a one-off visit in the 1990s to develop the community dam and provide reticulation to the villages. Due to poor design, the system did not operate for very long and several attempts to seek follow-up visits were unsuccessful. However, through the CCA Project, the community now has a restored and upgraded dam and running taps in each house. The village has a primary school and there is a secondary school on the main island that has boarding facilities that senior students from the island attend.

Subjective rating of Factor 4D

1	2	3	4	5
Limited infrastructure made available to all	Some infrastructure made available to some	Adequate infrastructure made available to some	Adequate infrastructure made available to most	Unrestricted infrastructure made available to most

Factor 4E Drinking water

The community water situation has significantly improved since the completion of the CCA Project in that each house now has a running tap. Prior to the project, water was directly accessed in buckets from springs and rooftops during rainy weather. As shown in Figure 35, about one-quarter of respondents said that safe water was only accessible sometimes as the water from the church roof usually dirties the community water supply and that there is a need to have improved filtration as birds tend to nest on house guttering. These generally mean that the community water quality drops during heavy rains.

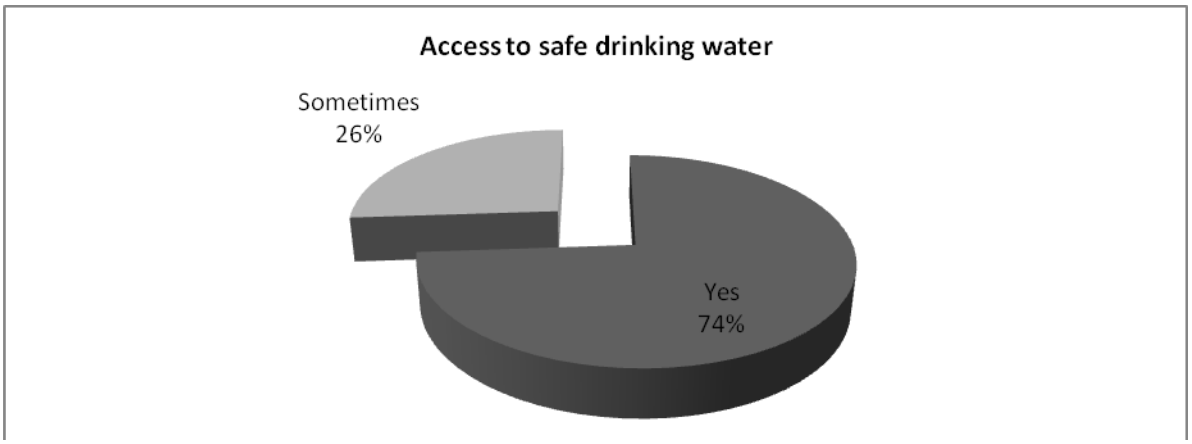


Figure 35 Respondent views on water availability

Subjective rating of Factor 4E

1	2	3	4	5
Limited safe drinking water available	Some safe drinking water available	Adequate safe drinking water available to some	Adequate safe drinking water available to most	Unlimited supply of safe drinking water available to most

7.5 Factor 5: Options

Factor 5A Adaptation possibilities (sector specific); Factor 6B Ability to analyse information/options

There are three viable sources of water on Druadrua island—surface water from streams that supplies the community dam; groundwater via springs located near and within the villages and the three boreholes drilled by the Mineral Resources Department in 2007; and rainwater from building rooftops. Using a process of envisioning, consultation within the community and with external experts and planning, the community chose the options that would prove more effective within the existing resource capacity (available funding, expertise and community human resource). The CCA Project activities included the restoration and upgrade of the old dam, enhancement of water supply storage by setting up four additional 10 000-litre tanks, attaching guttering for rainwater catchment and the reticulation of taps to every household. The project also helped set up the community's first water committee to operate and maintain the community water system.

Although there have been significant improvements in the community water system (such as people being able to access water directly from their homes to cook, clean and bathe), the community leaders are still interested in enhancing the existing system by providing a backup to the current supply in case of a breakdown. Apart from the provision of water through the new water system, the old springs located within the village are still available for use and the three drilled boreholes remain unused because they require pumps that cost around FJD7000 plus a generator and fuel to run. This option may be useful in the next drought when the current water system is tested.

Subjective rating of Factor 5A

1	2	3	4	5
No technological adaptation implemented in the last decade/five years	Limited technological adaptation implemented in the last decade/five years	Some technological adaptation in the last decade/five years	Successful adoption of one or two technological options in the last decade/five years	Successful adoption of more than two technological options in the last decade/ five years

Factor 5B Livelihood options

Fishing is the main source of income for the houses surveyed. Other economic activities supplement this income source such as woven mats, agricultural produce, remittance and casual work on the mainland. However, nearly one-third of the respondents relied solely on fishery harvests as shown in Figure 36. This places significant pressure on the community marine resources and the expanding population and increasing rates of harvest may put the community in a vulnerable position in terms of economic and food security. Hence, future plans to develop tourism products may be a welcome alternative income source for expanding the community's livelihood options.

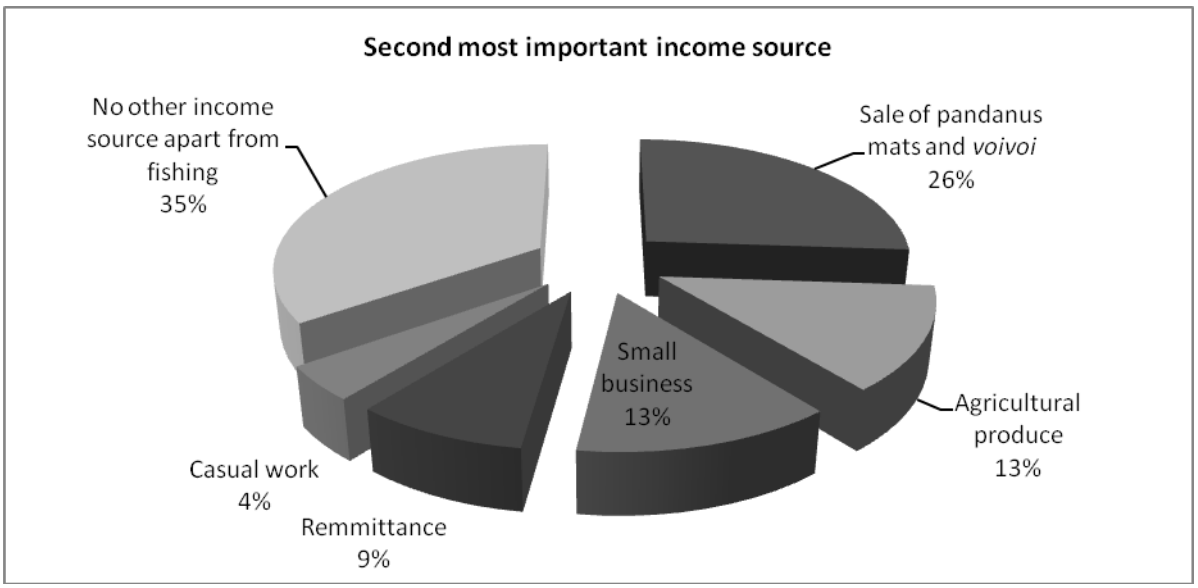


Figure 36 The survey group according to second most important income source

Subjective rating of Factor 5B

1	2	3	4	5
No income generating options available within the community	One income generating options available within the community	Some income generating options available within the community	Income generating Options available within and outside the community	Readily available income generating options within and outside the community

Factor 5C Food acquisition options

Agricultural and wild tree or plant produce are the staple food sources for the community and these are cultivated close to the village. Cultivated food includes cassava, wild yams, sweet potatoes, *bele*, *rourou*, eggplant corn, coconut, cabbage, chillies and lemons. There are also seasonal fruits and trees that contribute to the community diet such as mangoes, Tahitian chestnuts, breadfruit and mandarins. As Figure 37 shows, fisheries are the second main staple food and several households

have access to livestock. Compared to other villages located close to urban centre, the use of consumer food products accessed from supermarkets are minimal and this is mainly due to their distance from the main shops.

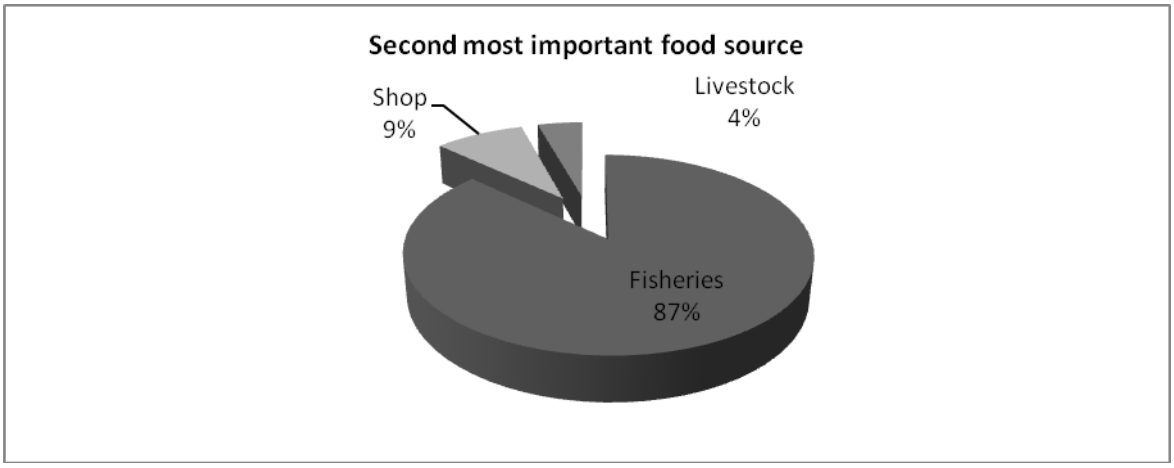


Figure 37 The survey group according to second most important food source

Almost half the respondents stated that the CCA Project had affected the community's access to food with the main explanations being that gardens can now be watered, especially in the dry season and green leafy vegetables thrive along drainage paths. Some respondents also stated that they are able to spend more time gardening and fishing given that there has been a significant reduction in the time spent accessing water.

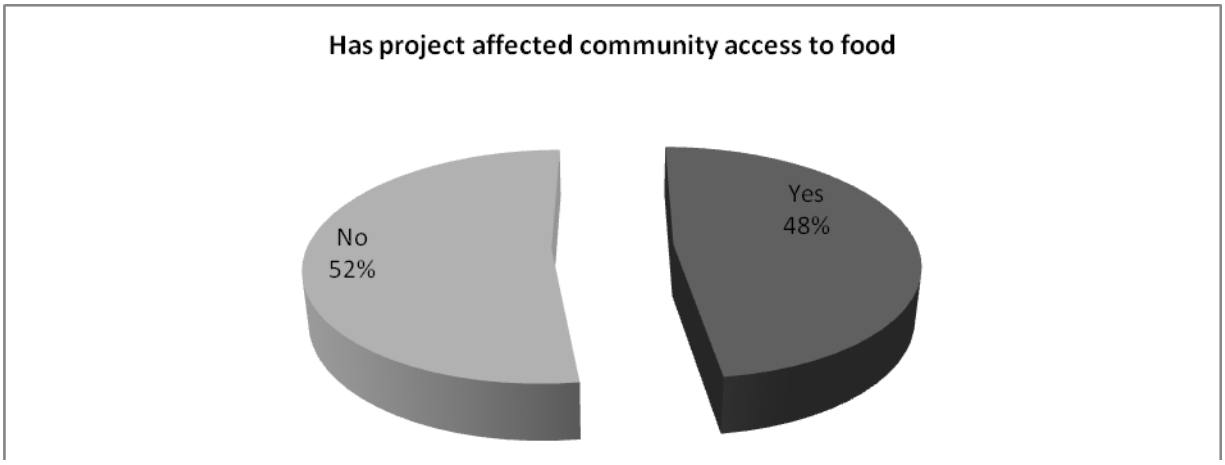


Figure 38 The effect of the CCA Project on community access to food

Subjective rating of Factor 5C

1	2	3	4	5
very limited subsistence and no access to imports	No famine food, limited subsistence, extremely limited access to imports	Little famine food, some subsistence, limited access to imports	Some famine food, some subsistence, food imports available	Famine food, abundant subsistence and abundant food imports available

7.6 Factor 6: Information/awareness

Factor 6A Access/level of access to relevant information; Factor 6C Communicated risks and importance

The community has a general understanding of the basic science of climate change as a result of the CCA awareness workshops and given that the topic is also part of the school curriculum. The community also has observed some changes in their own environment such as a certain wild fruit tree called *kavika* that is no longer bearing fruit and the disappearance of the native bird *bici*. The most significant environmental change observed by the communities, however, is their receding coast line which has moved about 10 m inland over the past decade. In response to this and incorporating the views of a technical expert who visited the island, the community has taken steps to arrange groynes on the village beachfront and have grown coastal plants along the beaches. These activities along with the pursuit to enhance the existing water system shows a high level of understanding of the threats of the changing environment—be it climate related or not—and taking steps to reduce those risks.

Subjective rating of Factor 6A

1	2	3	4	5
No knowledge	Very limited knowledge	Limited knowledge	Good level of knowledge	Very good level of knowledge

7.7 Factor 7: History of dealing with climate stresses

Most of the information provided during the compilation of the historical profile was largely related to the population changes, natural disasters and water development. According to the oldest man in the village who was in his eighties, government assistance in times of natural disasters only occurred recently (around the 1980s). He recalled that prior to the arrival of radios and government services, the elders would read cyclone warnings from the environment such as how high or low bees would nest, how far inland turtles laid their eggs and how banana shoots sprout. He also said that there were rules around handling water, Children, in particular, were not allowed to fetch water as they risked wasting it. During that time, all the houses were traditional thatched bures constructed to weather cyclones and during strong

winds the children were called to hang onto ropes that held the bure posts down. In traditional life, the day after the cyclone was a time of blessing as the villagers would walk around to gather their gift from God (fallen food from trees, breadfruit in particular) pile them all together and the village would share and feast on the food. It was *tabu* to eat cyclone harvest until the communal ceremony was over due to its spiritual significance.

Other more recent developments in Druadrua are as follows:

1800s	Village was established with three households (need to ascertain the exact period)
1949–1987	Community conserved trees and there were trees growing on the coast of Salevukoso village
1953	School was built
1970	Storm surge occurred and sea water flowed into houses
	Community was hit by Hurricane Bebe
	- plantations and houses were damaged
	- no government aid provided
	- community survived on breadfruit
1973	Water pipes built in Salevukoso village
1982	Boat was built and community started to dive and use fishing nets at night
1983	Piping for rainwater built and this lasted three months in Delaivadra village
1987	Storm surge occurred
1997	Community was hit by Cyclone Kina
	- significant coastal erosion occurred
	- government assistance provided (20 sheets of corrugated iron to Delaivadra village)
1998	Water piping development at Delaivadra village
2002	Cyclone Amy occurred
	- government assistance provided (food and housing)
	- church fell and rebuilt in 2005
2006	3x 5000-litre water tanks built in Delaivadra village
	Women's Club bakery established

The community now has modern means of recovering from cyclones in the form of government assistance and cash-purchased goods from nearby supermarkets. The community's access to cash income means they are able to buy food when the local produce has been destroyed.

Some current ways of dealing with weather-related problems are as follows:

Food shortage

- Buy in bulk from supermarkets in Labasa
- Seek assistance from government for food
- Red Cross usually provides relief supplies
- *Sosolevaki* – people work together in relation to cultivating and harvesting food

Dry season

- Dig wells to collect and store water
- Plant more food
- Install common water tank in village

Cyclones

- Village headman sends out warning and precautionary measures
- Village headman disallows people from going out to sea
- Individual houses stock up on food and water
- Move to higher ground
- Community works together to rebuild houses
- Seek assistance from government for building materials
- Community works together to address common needs because easier option that to address issues individually

Nearly all the respondents stated that the CCA Project had affected the community's ability to address weather-related stress with the common explanation being the improved water supply system.

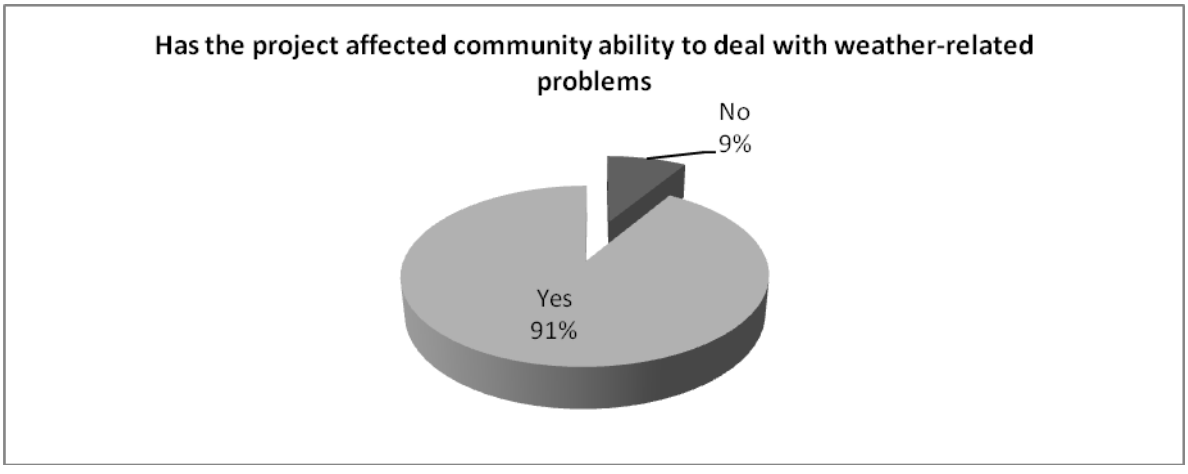


Figure 39 The effect of the CCA Project on community ability to deal with weather-related problems

Subjective rating of Factor 7A

1	2	3	4	5
Very poor ability. Community is heavily reliant on external assistance to recover. Community has few internal preparation, coping and recovery measures in place.	Fairly poor ability Community is reliant on external assistance to recover but has a few preparation, coping and recovery measures in place.	Fair ability. Community has a number of preparation, coping and recovery mechanisms in place. External assistance is usually required for effective recovery.	Good ability. Community has a number of effective preparation, coping and recovery mechanisms in place. External assistance is sometimes required for effective recovery.	Excellently. Community has a number of highly effective preparation, coping and recovery mechanisms in place and is largely self-reliant. External assistance is seldom required for effective recovery.

7.8 Overall adaptive capacity of Druadrua island community

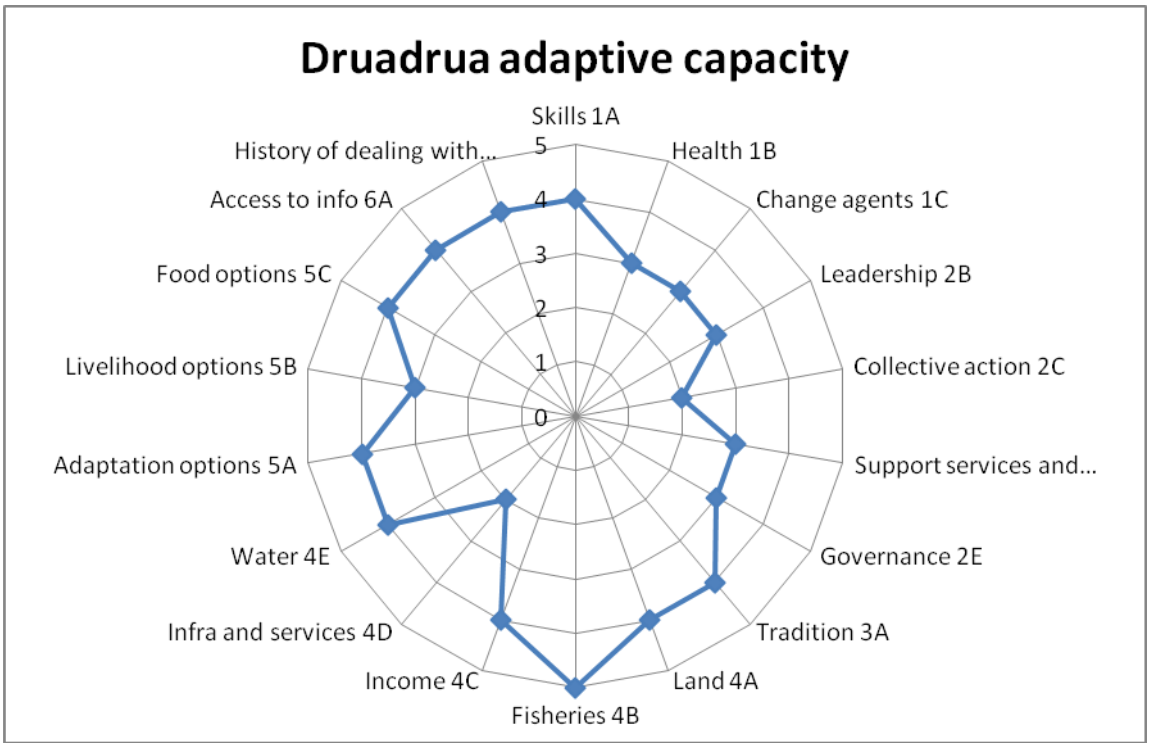


Figure 40 The effect of the CCA Project on community ability to deal with weather-related problems

8. Navukailagi results

8.1 Factor 1: Human capital

Factor 1A Traditional and modern skills

The people of Navukailagi village posses various traditional and modern skills that enable them to take advantage of Fiji's modern economy, while maintaining their cultural identity and lifestyle. The community is generally literate and has had some experience with formal education. About three-quarters of the 23 respondents had reached secondary education and several have had some form of vocational training. The community members are skilled copra producers and the client buys directly from them on Gau Island. There is also experience in bee keeping, production of virgin coconut oil, vanilla growing and cultivating marketable produce such as watermelon, pineapple, taro and *yaqona* for sale in the main urban centres on the mainland. Some committee members recently attended biofuel production training and are now waiting for the government to provide the machinery so they can apply this knowledge. The village dam water system is operated and maintained by a water committee.

The community's traditional knowledge and skills relate mainly to securing basic needs and in managing social relations through traditional ceremonies that mark significant social events such as weddings, births, and funerals. Traditional fishing skills help the villagers secure marine food enhanced by modern equipment such as metal hooks, nylon lines and nets. Navukailagi people still make use of the *bilibili* (bamboo rafts) very effectively in the rivers and inshore marine areas. The community has joined the FLMMA network with the purpose of sustainably managing their marine resources through the revival of traditional *Tabu* areas. The community plants staple crops and vegetables such as taro, yams, cassava, *bele*, *rourou* and other local foods. The general community's traditional skills were particularly valuable during the Fiji CCA Project implementation. Locally available resources were used to construct the groyne which included the weaving of bamboo to hold the rocks on the coastal mudflats. Rocks for the groyne were transported by *bilibili* from inland. The Navukailagi women are skilled weavers and many of them sell their mats as well as treated pandunus leaves (for mat weaving) to contribute to household income.

Overall subjective rating of AC factor 1A

1	2	3	4	5
Very low traditional and modern relevant skills	Low traditional and modern relevant skills	Some traditional and modern relevant skills	Abundance of traditional and modern relevant skills	High abundance of traditional and modern relevant skills

Factor 1B: Health security

According to the village, lay nurses and general observations the community is generally healthy and able bodied. Cases that often came up were minor such as flu, fever and skin diseases. The community's distance from the mainland and supermarkets means that their daily diet is made up of locally produced and harvested food and minimal shop food. Navukailagi people also live an active life as they produce and harvest their own food to generate their income. The nearest large health centre is a 10-minute boat ride or a 20minute walk. Women can deliver babies in this health centre but if they suffer complications are referred to Suva.

Overall subjective rating of AC factor 1B

1	2	3	4	5
Very low health security	Little health security	Some health security	Good health security	Excellent health security

Factor 1C: Change agents

The village change agents are mainly those who have liaised effectively with external organisations for the purpose of accessing resources to improve community living standards. The village headman and two older men, who have worked effectively with the FLMMA network, have shown influence and mobilised the community to take action to respond to community-identified problems. These leaders have played a key role in envisioning, planning and implementation of the adaptation management plan developed thought he Fiji CCA Project and other initiated sustainable development projects. The successful mobilisation of community resources and securing wide community participation in the building of the coastal groynes was a testament to this ability.

Overall subjective rating of AC factor 1C

1	2	3	4	5
None	Some but not listened to	Some and somewhat effective	Good ideas are often implemented	Ideas flow freely at meetings and are analysed and implemented

8.2 Factor 2: Social capital/community cohesiveness

Factor 2A: Community diversity

Navukailagi villagers are all ethnically Indigenous Fijians, share Christian beliefs and are literate with varying levels of formal education. Most of the community households belong to the Methodist church denomination and five (out of 39) households belong to the Gospel church.

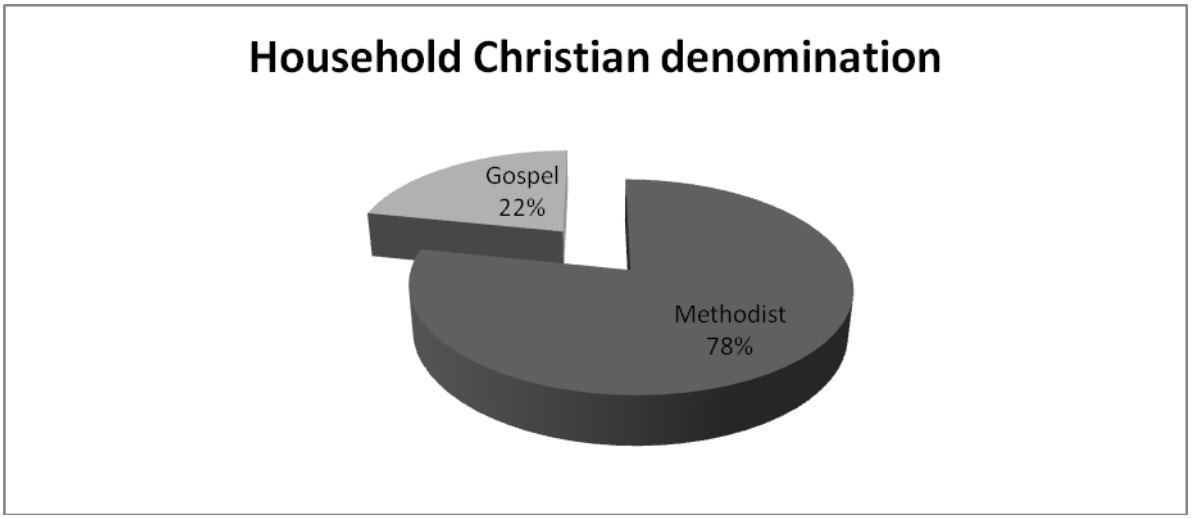


Figure 41 House Christian denomination

All households are paternally linked to the village with several households having both links. While there are some variations in the material wealth possessed by each household, they are not very obvious. Those who have pursued higher education and secured paid employment rarely return to the village.

According to the village headman, there are more Navukailagi people on Fiji's mainland than the village itself. Most of the Navukailagi population have migrated from the island in search of greener pastures and many never returned. Some of the households in the village comprise one or two members due to these migration rates.

The village is divided into six *mataqali* or landowning units with access to land and to fisheries. However, the village is now currently primarily located on the clan's land, so they have had to seek the approval from another clan to use their land to establish their food garden.

Factor 2B Leadership; Factor 2C Strength of the *Vanua* collective action; Factor 2E Good governance; Factor 3B Willingness to accept change

The installation of the last chief of Navukailagi occurred before the oldest person in the village was born (who is now in her 90s) and no-one in the community could give a general estimation as to when this was done. The community, however, is currently gearing up for their next chiefly installation scheduled for December this year. Without a traditional chief for possibly over 100 years, decision-making has occurred collectively through a meeting between the six *mataqali*. According to the elders and the residing pastor, such a set up prolongs the decision-making process and sometimes there is a deadlock at the cost of community cooperation and progress. Although the village headman and church pastor are also accorded leadership status, it appears that the decision-making powers rest largely on the collective *mataqali* meeting. A well-regarded elder from the chiefly clan has been showing great leadership skills and has gained much community approval. However, given that he is not the oldest in the clan, he cannot assume the chief's position. An older clan member who resides overseas has expressed interest to return to the

village to take up this position of *vanua* chief. People are hopeful that the installation of the new traditional chief will improve decision-making processes and follow through. Despite these leadership challenges, most respondents had a positive regard for the village's leaders and governance processes as most indicated that leaders played a significant role in solving community problems.

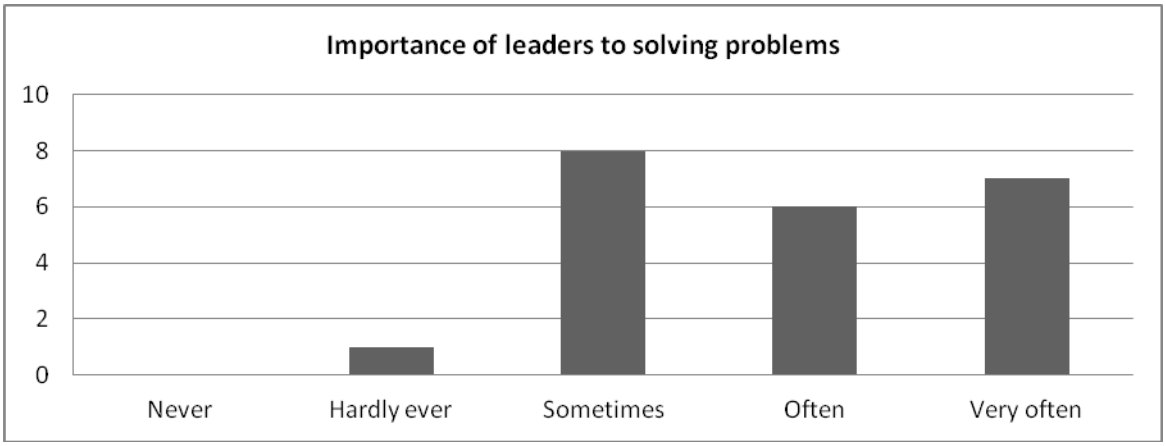


Figure 42 The importance of leaders in solving problems

Most respondents thought that the CCA Project affected the community leadership's ability to solve problems. Some explanations for this view included that all the leaders shared the concern of the coastal erosion problem and were determined to address them through opportunities provided externally. Some respondents said that working together to build the coastal groynes brought them closer to the leaders.

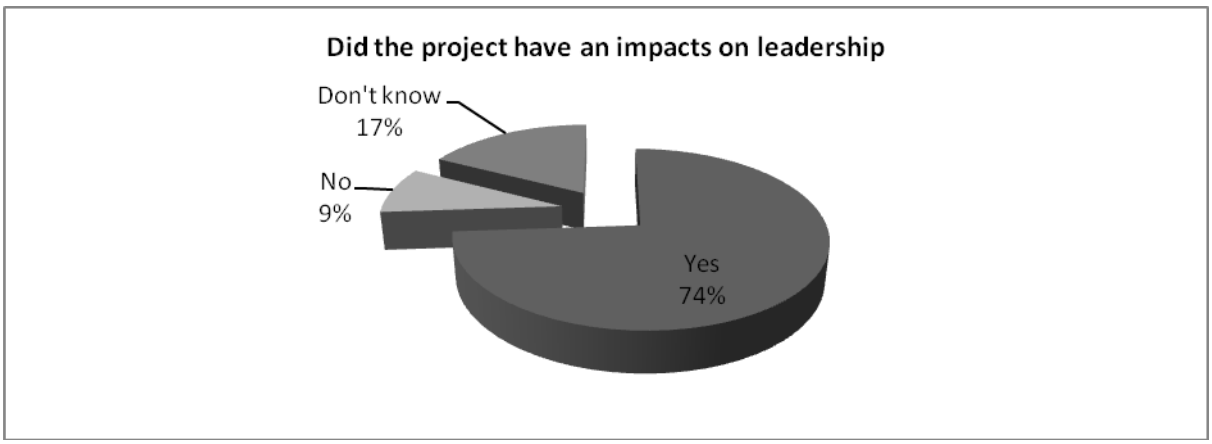


Figure 43 The impact of the CCA Project on leadership

The community leadership quality was particularly demonstrated in the groyne-building process. To facilitate healthy and productive competiton, the leaders decided to allocated a groyne (of equal size) for each clan to build. Generally, the male clan members did the physically laborious tasks of carting and piling the groynes while the women prepared food. However, in the heat of the competition, the women also helped the male clan members in order to finish their structure sooner. There was a collective community feast afterwards as everyone was

generally proud of their achievements and the potential benefits it may bring to stabilising their coastline. In sharing this story, one of the community members said the he hoped the structure will be a symbol of hard work and community effort to the generations that follow. Such communal spirit may be reflective of Navukailagi village life in general as respondents generally gave a high rating to the frequency of the community working together (Figure 44).

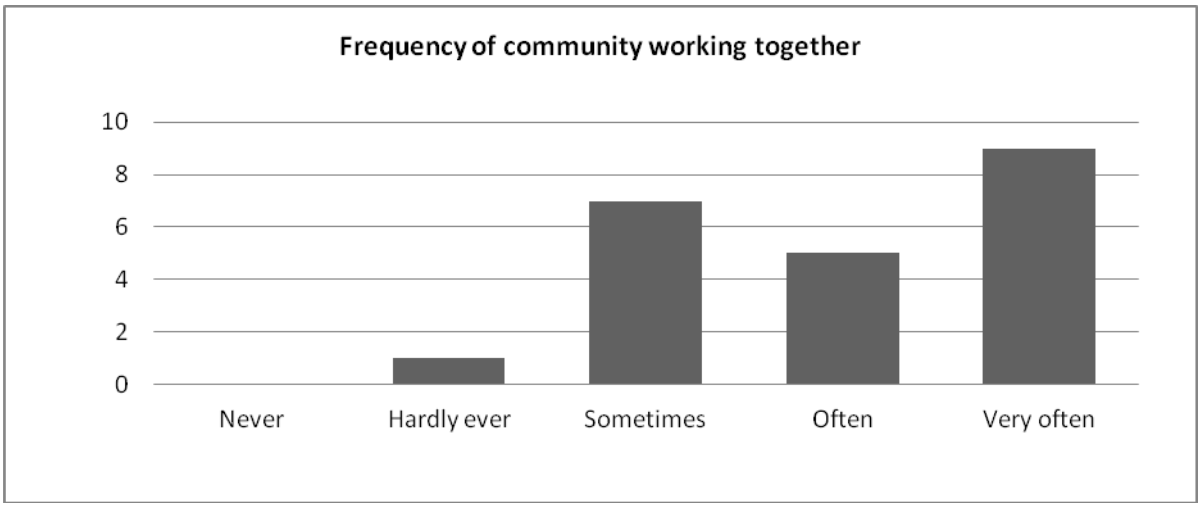


Figure 44 The frequency with which the community works together

All respondents believed that the CCA Project affected the community's ability to work together and some explanations included:

- The project reinforced traditional value of *sosolevaki* or working together to achieve a common aim.
- Everyone was concerned about the receding shoreline so the project was an opportunity for them to do something about it.

Overall subjective rating of AC factor 2B

1	2	3	4	5
No vision, little collective action	Little vision, some collective action	Some vision and implementation	One visionary with good implementation	Several people with vision and implementation skills

Overall subjective rating of AC factor 2C

1	2	3	4	5
Little group feeling, people seldom work together	Some group feeling, people sometimes work together	Moderate group feeling, people sometimes work together	Good group feeling, people frequently work together	Excellent group feeling, people frequently work together effectively

1	2	3	4	5
Few committees, not very effective	Some committees, produce some results	Some areas done well, others not	Generally good but improvements possible	Appropriate number of committees, very effective

Overall subjective rating of AC factor 2E

1	2	3	4	5
Poor decision making processes, limited information sharing	Mostly poor decision-making processes, mostly limited info sharing	Some good decision-making processes, some information sharing	Good decision-making processes, good information sharing	Excellent decision-making processes, excellent info sharing

Factor 2D Support services and networks; Factor 3E Dependence (government, aid, remittances) vs Independence

Although most respondents stated that external assistance was not easy to access, as shown in the Figure 45, the community has been able to access several external services and resources over the past five years. For example, through the CCA Project the Fiji Department of Land and Water Resources visited the island twice and assisted with the design and arranging the necessary materials for implementation. The community has been trained in bee keeping and provided with equipment to undertake this on the island, although this activity seems to have stalled. There has also been training on the extraction of virgin coconut oil and several community members are starting to sell them directly to markets in Suva and other urban areas. The Ministry of Agriculture and SOPAC had also provided community training on biofuel production from coconut oil and the community are still waiting for the biofuel machine to arrive on the island. The FLMMA has a governance project in Navukailagi village that has been on ongoing for over five years.

Most respondents stated that external assistance usually took a long time to arrive and that the community was disadvantaged by its relative isolation from potential external partners.

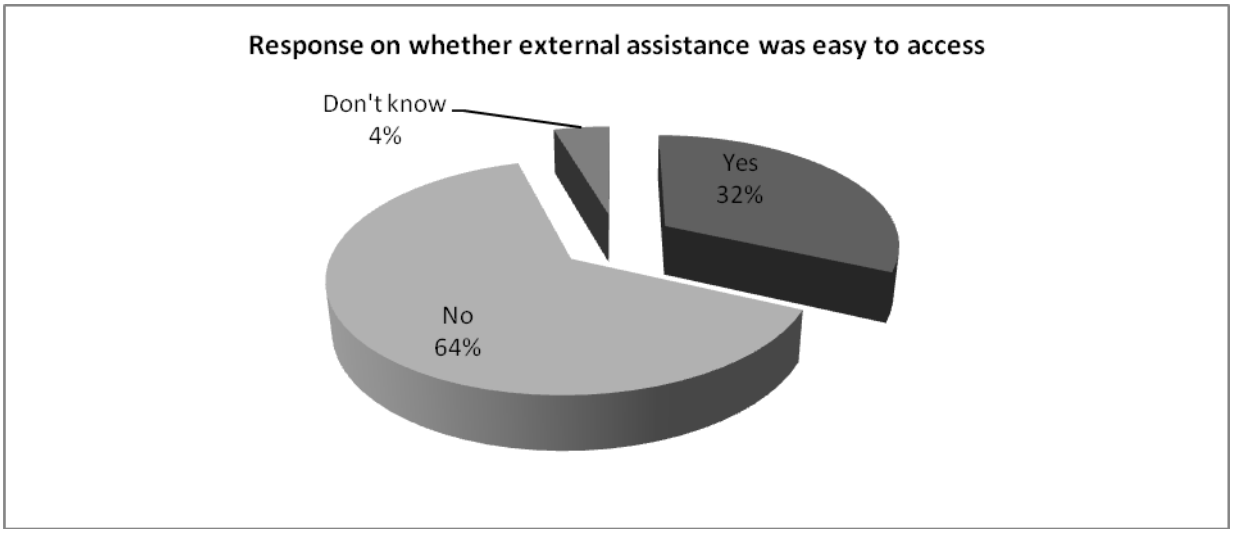


Figure 45 Responses as to whether external assistance was easy to access

When asked if the project affected the community's access to external resources, almost all said 'Yes' although explanations related mainly to the internal impacts of the project in terms of bringing the community together on a much needed activity.

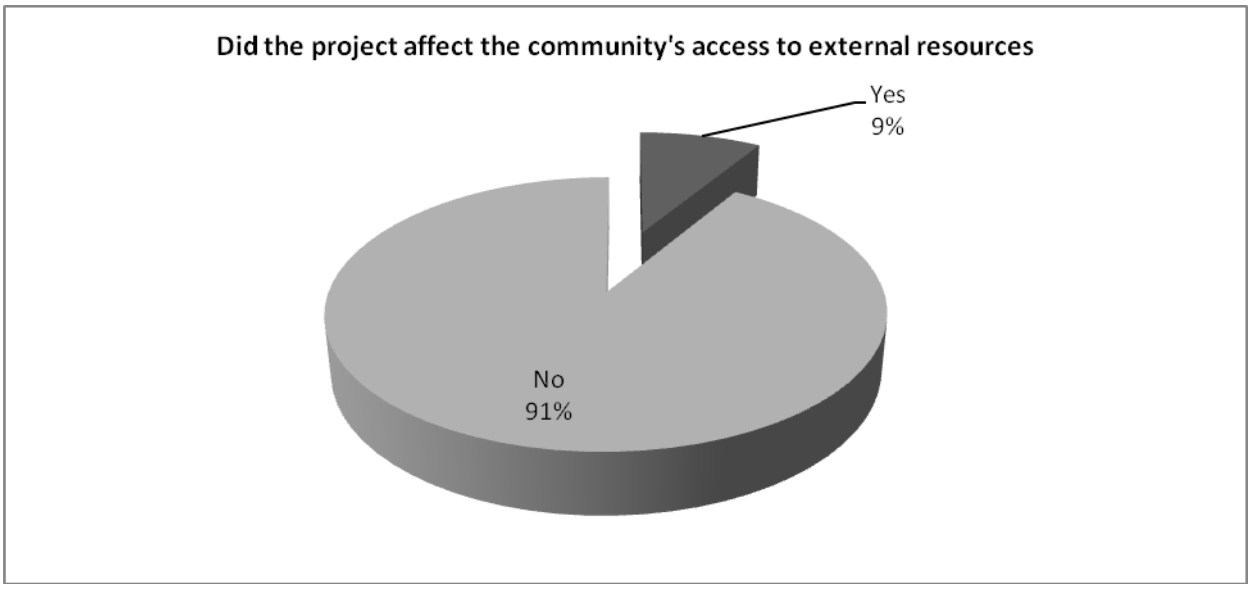


Figure 46 The CCA Project's effect on community access to external resources

Subjective rating of Factor 2D

1	2	3	4	5
Few support groups available, ineffective relationship	Some support groups available, ineffective relationships	Fair amount of support groups available, some have effective relationships	Good amount of support groups available, most have effective relationships	Many support groups available, all have effective relationships

8.3 Factor 3: Belief system/world views/values

Factor 3a: Traditional values, systems and knowledge ('Mana')/Modern, western and church value systems

There was a mixed response in determining how much the community valued traditional knowledge and ways. About half of the respondents thought 'quite a lot' or 'a lot' while a significant number of respondents thought that the community valued traditional knowledge only sometimes.

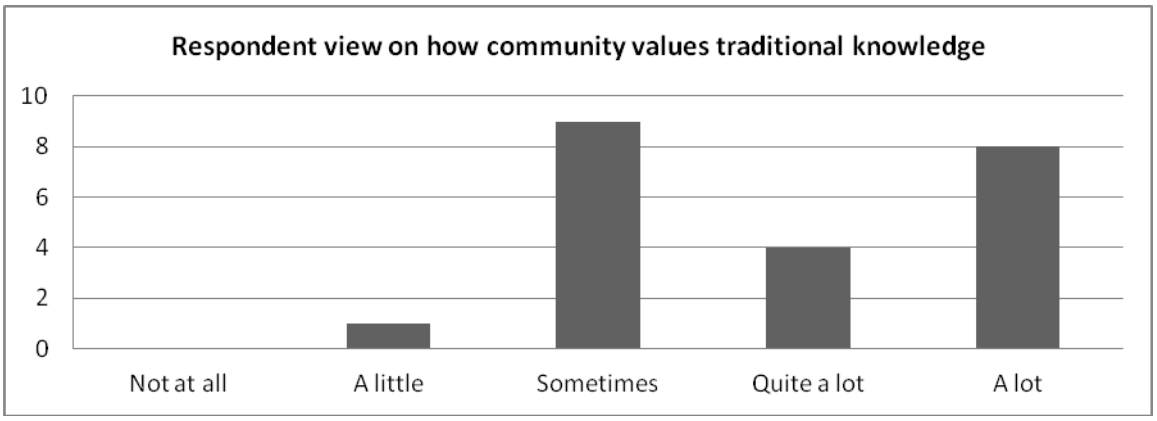


Figure 47 Respondents' view on how the community values traditional knowledge

Most survey respondents thought that the community's value for traditional knowledge reduced from 20 years ago.

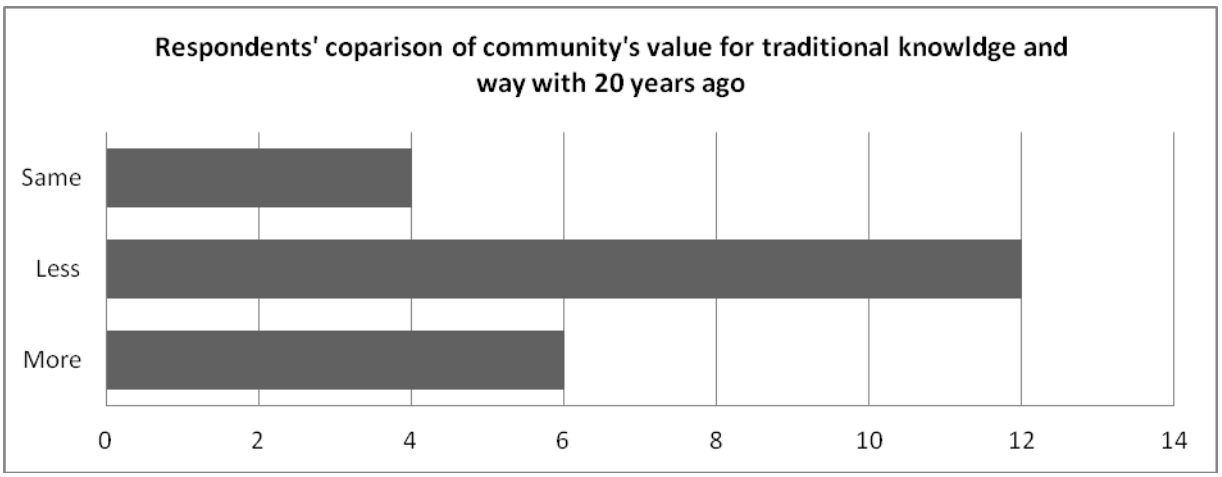


Figure 48 Respondents' comparison of community value for traditional knowledge and way of life now with 20 years ago

Subjective rating of Factor 3A

1	2	3	4	5
Very low abundance of traditional values	Low abundance of traditional values	Fair abundance of traditional values	High abundance of traditional values	Very high abundance of traditional values

Factor 3C Self agency vs determinism; Factor 3D Here and now/Future thinking

As figures 49 and 50 show, most people believed that they had no control over their future although at the same time think that planning and acting now could prevent problems later. This thinking may be linked to Christian views of 'God willing' while also doing what you can now for the future. In the process of planning, developing and completing the coastal protection structures, much motivation was driven by thinking what the future might be without coastal protection structures. There was also sense of duty and pride expressed when talking about the benefits of the structures for future generations. The minimal impact of the cyclone that hit after the structures were completed and the gradual positive impacts of the groynes to the village shoreline only reinforced such thinking.

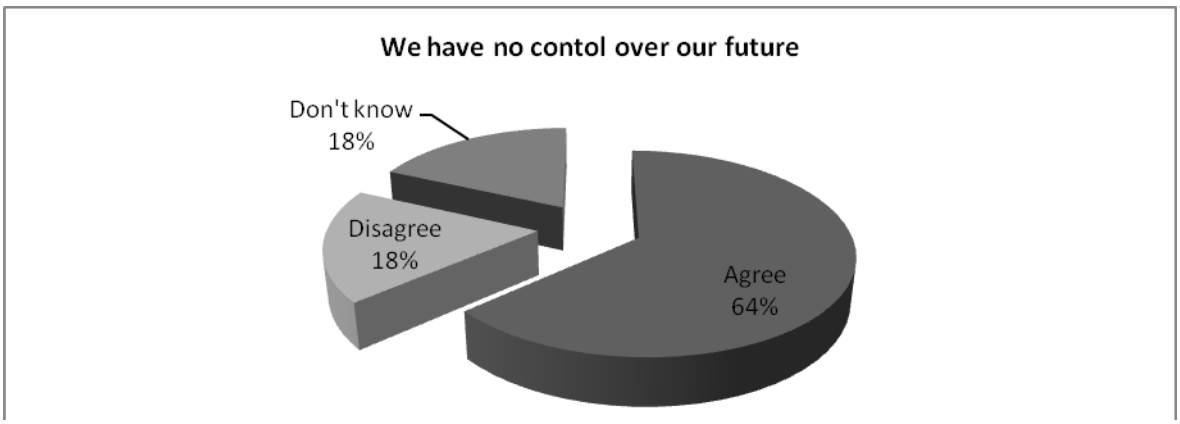


Figure 49 How respondents viewed their control over its future

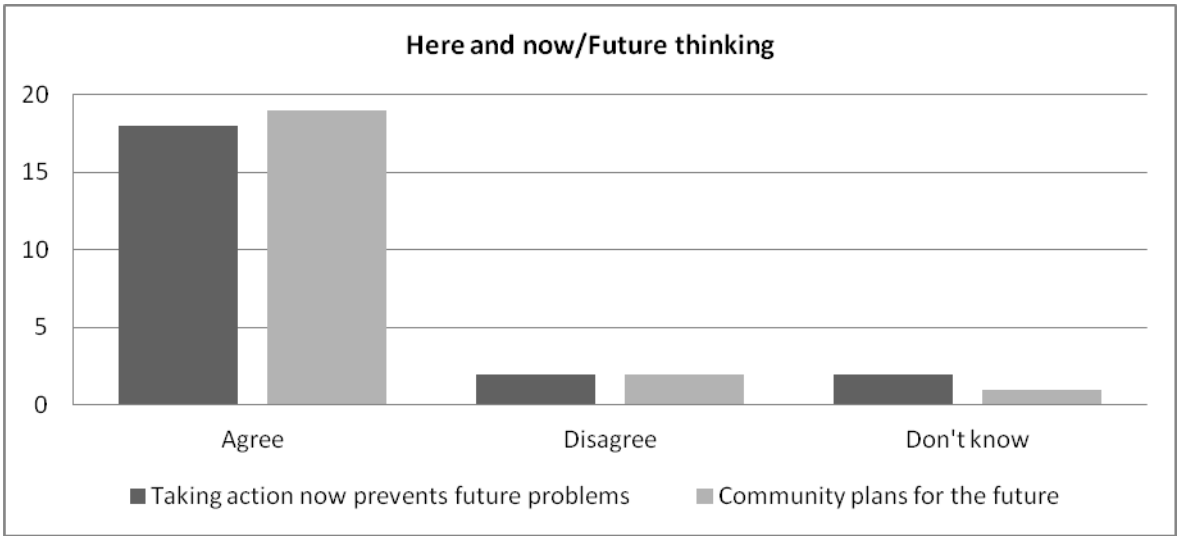


Figure 50 How 'Here and now' vs 'Future' thinking affects future plans and problems

8.4 Factor 4: Resources and distribution

Factor 4A: Access to land

All respondents said they had enough land to provide for their family's food needs. Even the chief's clan who did not have much land for agriculture because the village covered most of it said they still have access to more than enough land from another clan and were confident and secure in that arrangement.

Subjective rating of Factor 4A

1	2	3	4	5
Limited land available	Some land made available to some	Adequate land made available to some	Adequate land made available to most	Unlimited land made available to most

Factor 4B: Access to fishing grounds

All respondents stated that they had sufficient access to fisheries to satisfy their family's food needs and this was apparent by the daily catches by fishers observed and consumed during the visit.

Subjective rating of Factor 4B

1	2	3	4	5
No fishing grounds available/no catch present	Some fishing grounds available with limited catch available to some	Adequate fishing grounds with catch present available to some	Adequate fishing grounds with catch made available to most	Rich fishing grounds made available to most

Factor 4C: Access to income

Half of the respondents estimated their household income per month to be less than FJD100 a month, although the researchers thought that this might be more due to the various sources of income available to the village and the time spent on those income-generating activities during the visit.

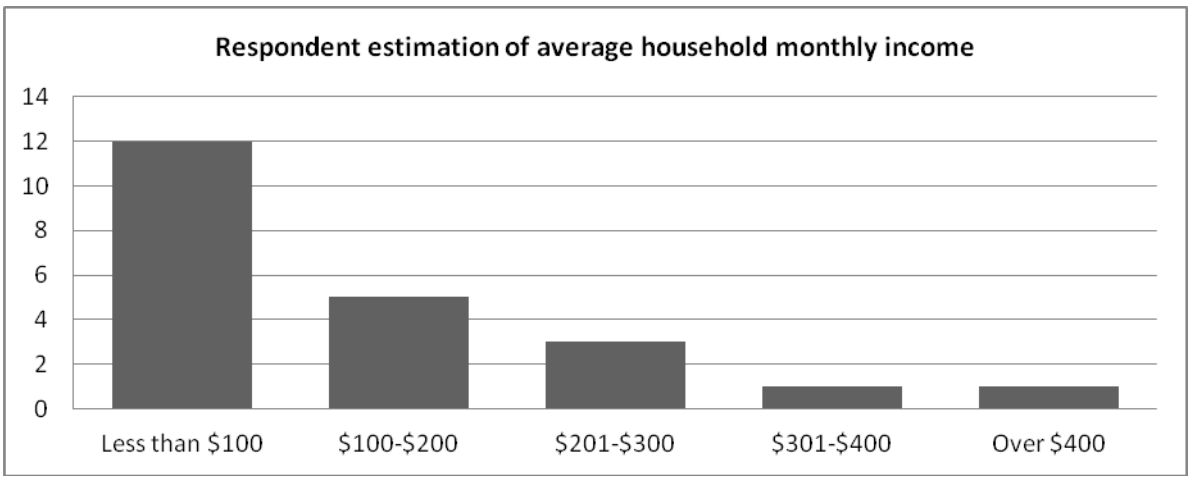


Figure 51 Respondent estimation of average household monthly income

Most respondents (77 per cent) did not think that the CCA Project affected their household income. Those that did made reference to the improved fish catch (for sale) as the groynes helped to trap fish. One respondent stated that the project affected the community income through the financial contributions made by project visitors for food and accommodation.

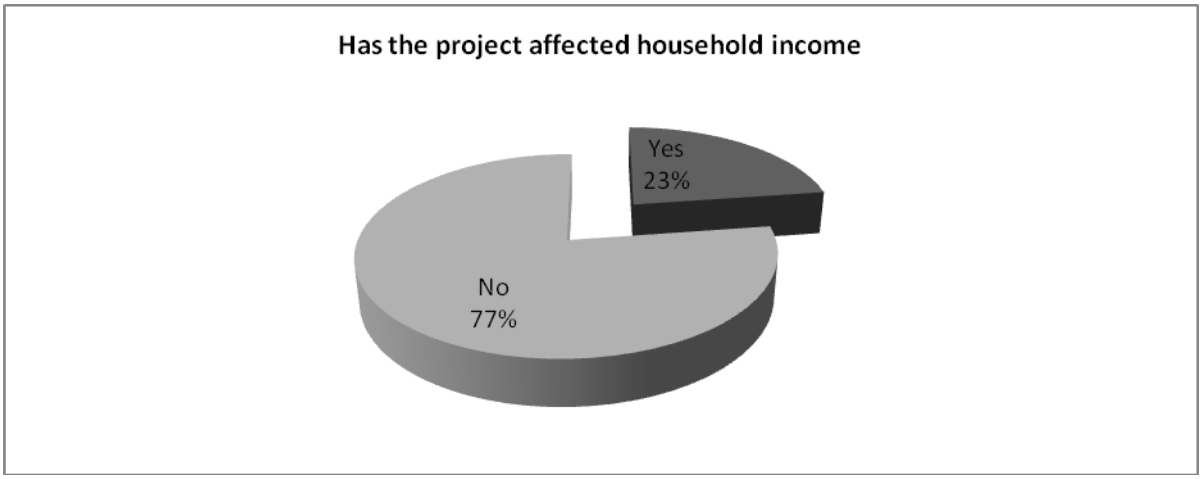


Figure 52 The affect of the CCA Project on household income

Subjective rating of Factor 4C

1	2	3	4	5
Disposable income earned is less than $100 a month	Disposable income earned is between $100 and $200 per month	Disposable income earned is between $201 and $300 per month	Disposable income earned is between $301 and $400 per month	Disposable income earned is over $400 per month

Factor 4D: Infrastructure and services

Navukailagi's access to infrastructure is generally poor and needs attention. While the community is self-reliant in managing its own water supply system and are only 20 minutes by a powered boat from the island's main health centre, transportation and energy access is very limited, particularly given that no one in the village owns a boat. The ferry connection to Suva departs once a month and people tend to travel to the main island at risk via open fibre boats that can take between two to seven hours depending on the weather. The community operates a diesel-fuelled generator for their power supply which can cost up to FJD40 per night. Copra seems to be the main community commodity because the buyers have their own boats that travel inter-island buying directly from producers. Gau Island (where Navulailagi village is located) is the largest island in the Lomaiviti Group although it has yet to have a tourism operation venture. However, there is a United Kingdom marine science research institute that has based themselves on the island to study the reefs in area. Improved transportation to the main urban centres of the mainland could mean better access to markets for non-copra commodities and possibly the tourism industry.

Subjective rating of Factor 4d:

1	2	3	4	5
Limited infrastructure made available to all	Some infrastructure made available to some	Adequate infrastructure made available to some	Adequate infrastructure made available to most	Unrestricted infrastructure made available to most

Factor 4E: Drinking water

Most of the respondents said they had access to safe drinking water. The five respondents (23 per cent) who answered 'sometimes' explained that the community water supply would get dirty during heavy rains or water may be shut down for short time periods to fix burst pipes. Others said the water source can get very low during long dry periods.

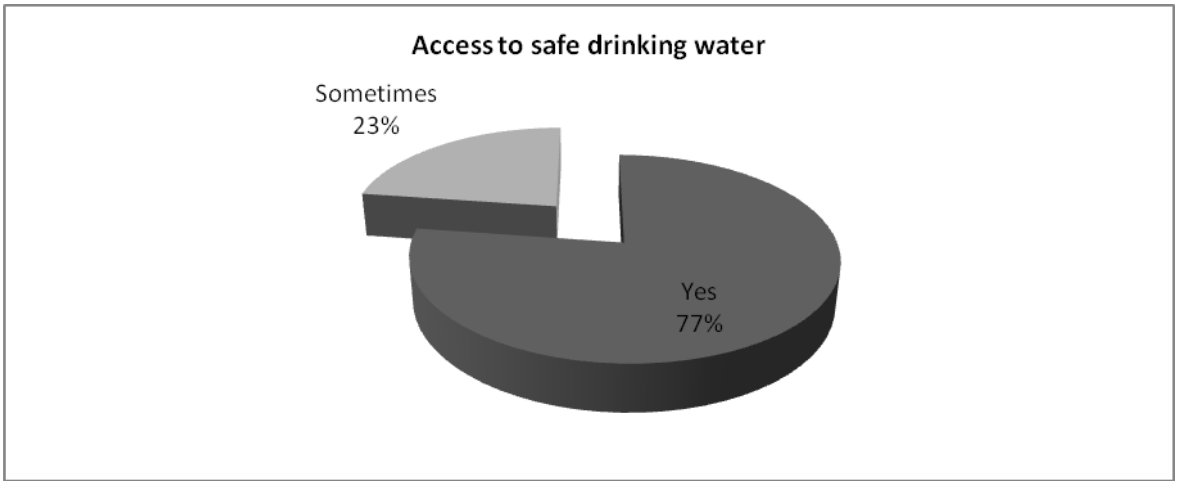


Figure 53 Access to safe drinking water

Subjective rating of Factor 4E

1	2	3	4	5
Limited safe drinking water available	Some safe drinking water available	Adequate safe drinking water available to some	Adequate safe drinking water available to most	Unlimited supply of safe drinking water available to most

8.5 Factor 5: Options

Factor 5A Adaptation possibilities (sector specific); Factor 6B Ability to analyse information/options

The project implementation process for Navukailagi took a relatively longer time due to its location as well as the complexity of dealing with coastal processes. Experts were required to go to the island and see for themselves the coastal change that was taking place and advise of possible measures to deal with the problem that was within the community and CCA Project's reach. Addressing coastal erosion is usually a battle with nature and so unless there is significant access to finance and technology, options to reduce or stop coastal erosion can be limited to relocating inland. Apart from the option of moving dwelling places inland, most other options may just be buying time. Options that involved fewer environmental and financial risks and seemed more manageable and sustainable by the community were mangrove planting, planting of vetiver grass and general coastal revegetation. These were first trialled before the more costly and engineering-based options were implemented in which groynes were constructed on the mudflats in front of the village and gabion baskets along the river mouth on the eastern part of the village boundary.

The coastal protection work conducted by the community and external partners has had an immediate impact on Navukailagi's coast. Sand is building up in parts of the

coastline that used to be particularly vulnerable. Also the impacts of cyclone-induced storm surges that occurred in December 2009 were minimal as the groyne structures were stable enough to break the waves. The community members said that the impacts of the surges would have been much worse without the groynes.

Subjective rating of Factor 5A

1	2	3	4	5
No technological adaptation implemented in the last decade/five years	Limited technological adaptation implemented in the last decade/ five years	Some technological adaptation in the last decade / five years	Successful adoption of one or two technological options in the last decade/five years	Successful adoption of more than two technological options in the last decade/five years

Factor 5B: Livelihood options

Navukailagi has several income-generating options although copra is the main source of income for nearly all the households. Additional income commodities include *yaqona* (kava), fisheries, agricultural produce (root crops, vegetable and fruits), production of virgin coconut oil, mats, *voivoi* (treated pandanus leaves for weaving) and vanilla. The transport limitation linking the island to major markets in the mainland continues to hinder the potential growth of the village's agricultural industry and possible access to tourist dollars. Income is also sourced from paid employment and remittance for some households. Two elderly women relied solely on social welfare allowance paid out through the state as they did not have immediate family members living in the village—remittance from relatives would occur during Christmas. Over one-quarter of the households rely on only two income sources.

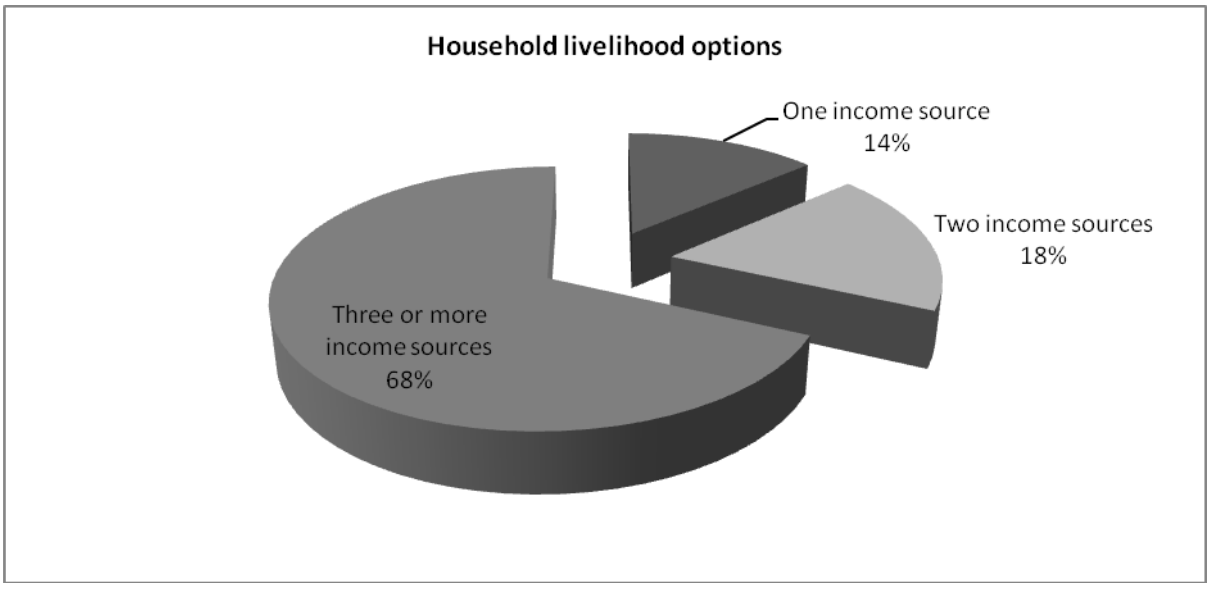


Figure 54 Household livelihood options

Subjective rating of Factor 5B

1	2	3	4	5
No income generating options available within the community	One income generating options available within the community	Some income generating options available within the community	Income generating Options available within and outside the community	Readily available income generating options within and outside the community

Factor 5C Food acquisition options

Agricultural and wild tree or plant produce are the most important food source for the Navukailagi villagers. The second most important food source being fisheries, while the use of shop food such as floor, sugar, biscuits, margarine and cooking was regarded as the third most important food source. The ability to store shop food for long periods may have reduced the reliance on traditionally preserved food. However, the absence of traditional food preservation skills may not necessarily mean that that people will be faced with food security issues in times of famine as shop food was relatively more accessible.

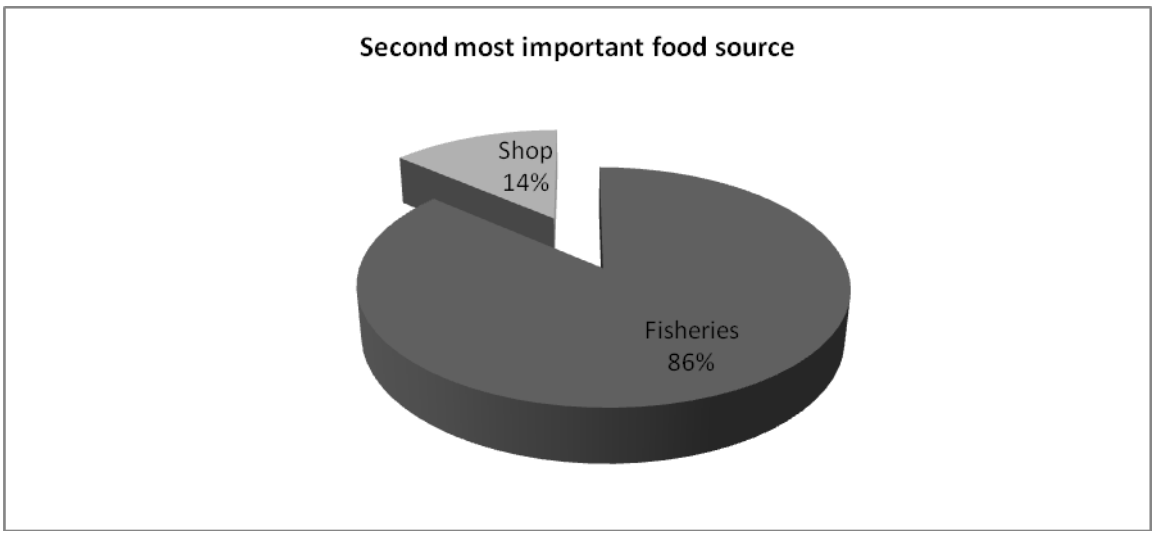


Figure 55 Second-most important food source

More than one-quarter of the respondents said the CCA Project affected their ability to access food in the following ways:

- Groynes helped by trapping fish.
- Vegetables growing on the coastline as encouraged through the project.
- Breadfruit trees production improved due to less water in the soil.
- Banning of bushfires helped with gardens.

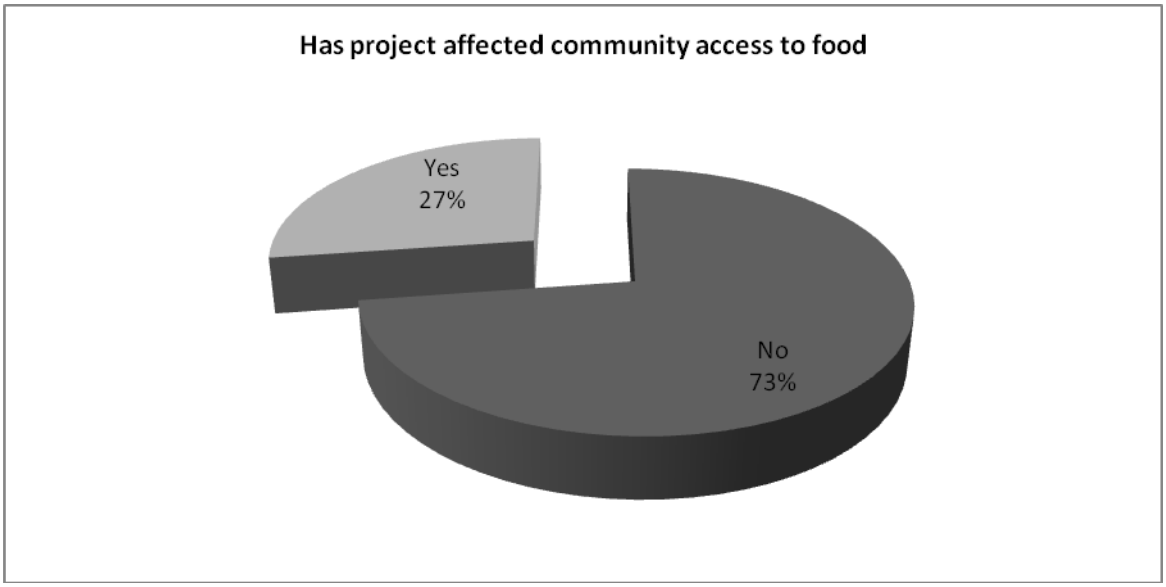


Figure 56 The effect of the CCA Project on community access to food

Subjective rating of Factor 5C

1	2	3	4	5
Very limited subsistence and no access to imports	No famine food, limited subsistence, extremely limited access to imports	Little famine food, some subsistence, limited access to imports	Some famine food, some subsistence, food imports available	Famine food, abundant subsistence and abundant food imports available

8.6 Factor 6: Information/Awareness

Factor 6A Access/Level of access to relevant information; Factor 6C Communicated risks and importance

Being a community threatened by the encroaching sea, it is very conscious of the potential impacts of climate change not only to sea-level rise but also in relation to impact on food security. Knowledge of climate science is generally at a basic level and learnt through the Fiji CCA workshop and possibly through the local radio programs. Climate change is also part of Fiji's education curriculum. Some community members have also shared some locally observed environmental changes such as:

- fish deaths during hot weather
- drought affecting plantation
- fruit-bearing trees no longer occurring during the traditional seasons but throughout the year

- more rainfall experienced
- various weather changes in a day
- flooding occurs regularly since the reclamation development in the village (more water flows from the roofs of current houses compared to bures where the water flows from the thatched roof was slower)
- incidences of coastal erosion occurring and sea level is rising towards the village
- sand on the coastline being replaced by mud (from land works)
- *dalo* consumed in the village currently not as good as those consumed before (possibly because hybrid *dalo* species replacing traditional ones)
- a certain shellfish named *su* is now hard to find since the land development
- mountains are getting more lush and soil is becoming more fertile.

Local knowledge from outside partners was used in the process of developing the village's adaptation plan. For example, the assessment results by technical experts on the causes of coastal erosion were communicated to the community and incorporated into their traditional knowledge for future planning.

Subjective rating of Factor 6A

1	2	3	4	5
No knowledge	Very limited knowledge	Limited knowledge	Good level of knowledge	Very good level of knowledge

8.7 Factor 7: History of dealing with climate stresses

Cyclones were referred to as the main weather-related stress experienced by the community whereby more traditional methods of coping were used until the 1980s when government and other non-governmental groups started engaging in relief efforts. Interestingly, while the bure was the main source of shelter for community members in the past, none exist in the village today.

History of dealing with climate stresses

1940s	Major cyclone and village took shelter is a big bure
	A lot of *dawa* fruit fell to the ground
	People didn't know the cyclone would hit twice
	Community took shelter in a bure and children hung (Parents would call out *Sobe ra gone* (Hang on children!) on posts to put weight on the structures
	Roofs of modern houses were blown away
	No government assistance, community survived on breadfruit and wild yams

1970	Road development
1972	Community was hit by Cyclone Bebe
1979	Community was hit by Cyclone Meli (village was flooded)
1981	Reclamation work conducted to expand the village (before that a stream used to flow through the village)
1986	Water pipes developed
1990-93	Village church and community hall was built
2000	Pastor's house was built
2003	Locally managed marine area established
2005	First group of 17 young men left the village to work in Kuwait. To date 47 have left the village and most have not returned as they are now residing in Suva (this had a negative effect on the village wellbeing).

In general, survey respondents said they dealt with weather-related stresses in the following ways:

Coastal erosion	Planting of mangroves, vetiver and food gardens on the shoreline
	Natural debris dumped on the shoreline
	Houses built on stilts
	Building inland is being promoted in the village
Tsunami and inundation	Move to higher ground
Heavy rains and flooding	Pipes are fixed and extra storage tanks installed
	Digging of ditches around the village area to improve drainage
	Community know-how to access water from springs
Cyclones	Community follows village headman's instructions
	Community sits together to address cyclone impacts
	Each family/household prepares by storing own food and water.

However, the community has also experienced stresses that had more to do with human activities than climate-induced ones. The road construction and reclamation works that were carried out on the island had significant environmental implications which the community linked to the 1981 landslide that killed two children and increased flooding incidents. The coastal half of the village sits on land that was reclaimed during the road construction works in the 1980s. Hence, three decades of managing stresses related to this in terms of accessing external assistance and continuing to develop is indicative of the community's ability to deal with such impacts. The key question then is how long will they be able to sustain this in light of the additional threats from possible climate change and sea-level rise impacts.

All respondents said that the CCA Project had affected their ability to address weather- related stresses of which common explanations are that the wave breakers helped reclaim some of their shoreline and reduce the impacts of wave action on their coast, especially during cyclones.

Subjective rating of Factor 7a

1	2	3	4	5
Very poor ability. Community is heavily reliant on external assistance to recover. Community has few internal preparation, coping and recovery measures in place.	Fairly poor ability Community is reliant on external assistance to recover but has a few preparation, coping and recovery measures in place.	Fair ability. Community has a number of preparation, coping and recovery mechanisms in place. External assistance is usually required for effective recovery.	Good ability. Community has a number of effective preparation, coping and recovery mechanisms in place. External assistance is sometimes required for effective recovery.	Excellently. Community has a number of highly effective preparation, coping and recovery mechanisms in place and is largely self-reliant. External assistance is seldom required for effective recovery.

8.8 Overall adaptive capacity of Navukailagi

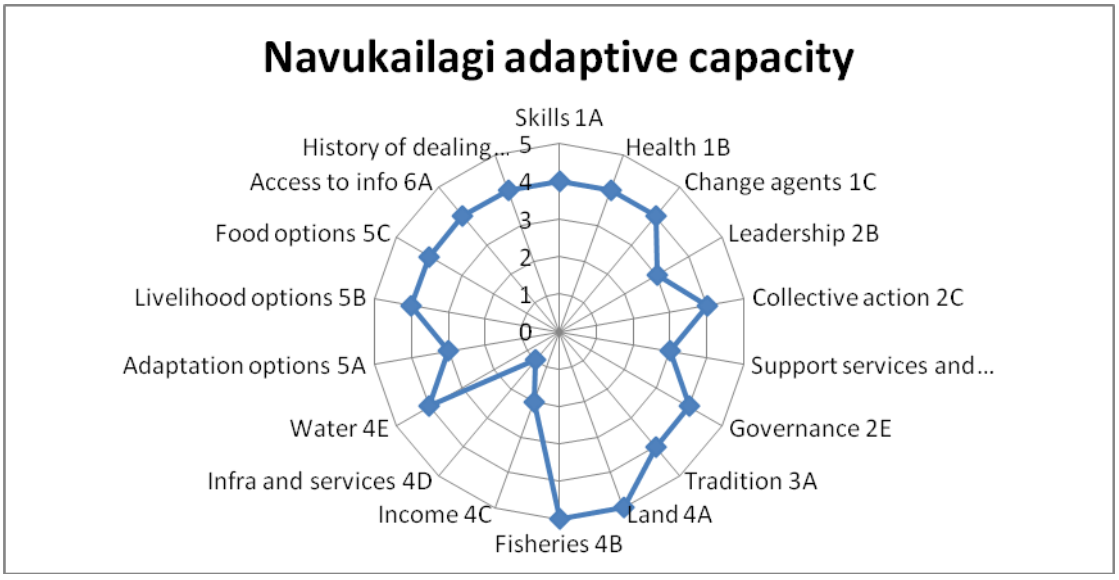


Figure 57 Navukailagi adaptive capacity

9. Adaptive capacity comparisons of the three Fiji CCA project sites

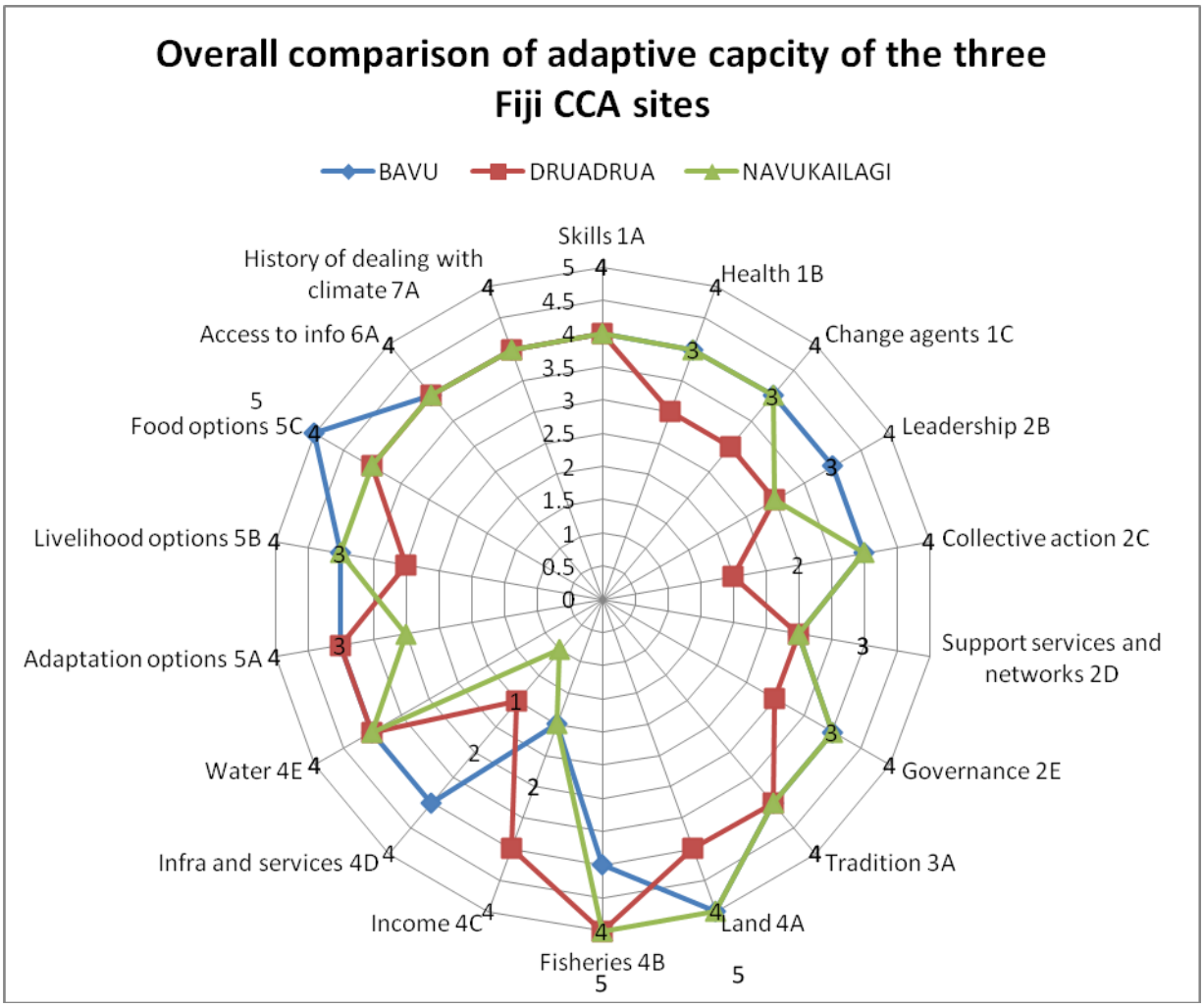


Figure 58 Comparison of the adaptive capacity of the three CCA sites