

Determining 2012 Flood Havoc On Tourism: A Case Study Of The Floods In The Nadi River In Fiji

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Abstract

Fiji is a small island developing state (SIDS) in the South Pacific Ocean. In its pursuit of sustainable tourism development, this island nation with a tourism-based economy of small size faces numerous challenges such as over-dependence on overseas capital, profit leakage, strict tourism policies and natural disasters, especially the increase in the intensity and frequency of floods. Notably, Nadi town was struck by devastating floods twice (in 2009 and 2012) in the last two decades. Recurrent floods in the Nadi river have posed a serious threat to tourism, and there is a scarcity of literature and data on the assessment of the effects of these floods on tourism. On the basis of the relevant documentary evidence and statistical data, the research discerns how the floods that occurred in the Nadi river in March 2012 affected the tourism sector in the region. There is a lacuna in current literature on a comparative study, that is filled by this pilot study. The data related to international visitors is analysed specifically considering the flood to ascertain correlativity and trace the post-flood recovery patterns. The paper also explores the preventive measures adopted by the tourism sector to reduce similar untoward events and ensure sustainable tourism. In the ending, the paper puts forwards some constructive suggestions to deal with the issue.

Keywords: 2012 Nadi Floods, Nadi River Basin, Tourism, International Visitor Arrivals, Resilience, Flood Risk Management.

1. Introduction

Tourism is a vibrant and lucrative industry with a lot of scope in the socio-economic sphere; however, at the same time, it is full of various risks and challenges. For many South Pacific Island nations, tourism is the backbone of their economies. According to the World Bank report predictions, in 2040, transformed tourism opportunities could bring an additional US\$1.7 billion in revenue and 116,000 jobs to the Pacific Island countries. The tourism industry in the Pacific Islands has the edge over the global tourism market due to its unique and diverse cultural heritages and geographical features (World Bank, 2016). Limited economic diversification and overdependence on the tourism industry for national income and employment make the Pacific Islands vulnerable (Bernard and Cook, 2013), as the tourism industry is not persistently stable; it can be easily affected by natural, social and political factors (Kundra et al.,

2021). To speak of natural disasters, the Pacific Islands, with a population of less than 10 million, have been reported to be the first in bearing the losses on a per capita basis and the second among most affected islands by natural disasters; on average, they suffer direct losses of US\$284 million per year (Brown, Daigneault and Gawith, 2016; World Bank, 2012). The least developed countries like small island developing states (SIDS) (for example, Fiji Islands) have low adaptive potential against the natural climate variability and greenhouse induced climate change, extreme weather and climate events like tropical cyclones and floods.

2. Literature Review

Fiji plays a vital role in Pacific tourism, as it receives around 38.2% of tourists in the Pacific region. Fiji's tourism sector faces numerous constraints, including an excessive reliance on

foreign capital, profit leakage, weak tourism policies, environmental degradation, and climatic contamination, as well as the negative impact of an increase in crime, health issues, and poor service delivery by the tourism business (Robert et al. 2011). Natural disasters, like as cyclones and floods, may have a negative impact on the economy and tourism in Fiji, as well (Prentice et al, 2021). Cyclones may be becoming faster as a result of environmental change, which might lead to more landslides owing to severe rainfall. These rising incidences of floods in Fiji are impediment in the growth of tourism, but the impact of floods on tourism in Fiji's tourism sector need to be ascertained in the scarcity of data.

The expanding unplanned tourism is considered to be a major factor for intensifying floods in Fiji (Chandra and Dalton, 2010) and led to increasing probability of climatic changes, reflected in increased frequency and intensity of cyclones, that led to rise in floods events in recent years. The rising climatic changes have negative impact of growth of tourism, that needs to be ascertained in Fiji's perspective.

Tropical cyclones and tropical depressions are the most common cause of significant flooding in Fiji. Climatic change-induced sea-level rise, urban sprawl, land use activities that cause soil degradation and river sedimentation, and increased growth in flood paths are held responsible for floods in Nadi river (Nolet 2019). Flooding in Fiji is also considered to be caused by excessive coastal urbanization (Kundra et al., 2022). Overall, the Pacific Island Countries need to respond appropriately to rapid urbanization and global environmental change, institutional reforms, better planning, rational urban governance and territorial engagement (Alam et al., 2022).

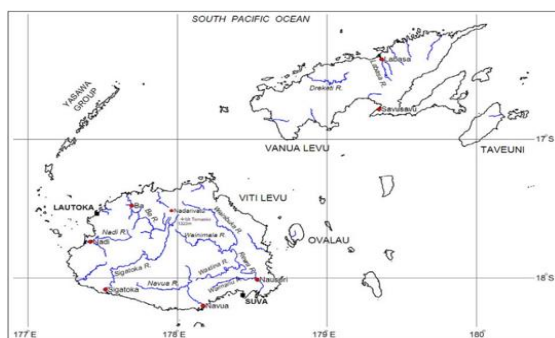
The Nadi river in Fiji witnessed two disastrous floods in 2012. First, in January 2012, a tropical depression brought rainfall of over 400 mm that led to flooding across the western Viti Levu. After two months, on 29th March 2012, the tropical depression developed rapidly, eventuating in heavy, widespread, and intense rain throughout Fiji. The rain was heavy and protracted in the Western Division, causing floods in the division's main rivers, streams, and low-lying regions. The floods wreaked havoc on Fiji's infrastructure, businesses, agriculture, education, and day-to-day life. Four individuals were killed, and one youngster was reported to be missing. At the peak of the flood, over 15,000 people sought refuge in more than 150 evacuation centres. The electricity supply was disrupted for many days and life came

to a halt there. The initial damage was estimated to be more than FJD 71 million (USD 40 million) in critical economic sectors. Each municipality in the Western Division reported significant damage to its commercial and residential property. Torrential downpours and subsequent floods led to landslides and the loss of significant highways and bridges (for example, the Queens Road) (Kuleshov et al., 2014). The March 2012 floods were unprecedented in intensity and devastation, and their affects on tourism growth and the post-flood recovery have not been intensively researched so far.

2.1. Study Area: Fiji Islands and its Vulnerability

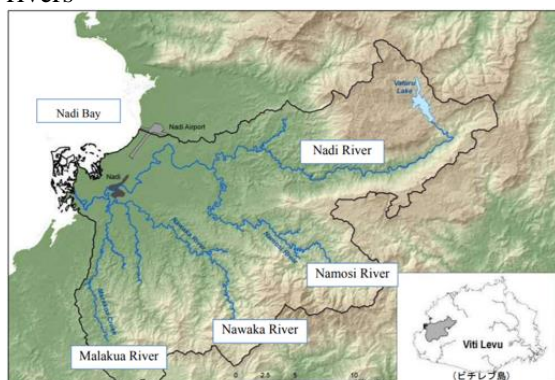
A large population resides on Viti Levu and Vanua Levu, the two largest islands of Fiji Islands. This archipelago constitutes 332 islands (out of which only 111 are inhabited) with total land area of 18,333 km². It is located 3,200 km northeast of Sydney in Australia and approximately 2,100 km north of Auckland in New Zealand. The total population of Fiji is 884,887 (2017 census, Fiji Bureau of Statistics); half of the population reside in urban areas. This island nation is located in the central region of the southwest Pacific Ocean and has a tropical maritime climate, marked by two seasons of summer/wet (November to April) and winter/dry (March to October). Fiji has a numerous vital rivers in Viti Levu and Vanua Levu that had an substantial influence on the local residents' quality of life. (Prasad et al., 2022). This research analyzes the floods that occurred in the Nadi river (Figure 1), located in the Nadi River basin (Figure 2). The river is in the northwest of Viti Levu's main island. It is subjected to have a prolonged period of dryness. The hills and valley along this river offer fertile land, and the average monthly temperature is between 24 and 27 degrees C with the annual rainfall ranging between 1400 and 1933 mm/yr (Koto, 2014). Nadi is the third largest urban area of Fiji and Nadi river plays an considerable role in the lives of local community, used for fishing, irrigation, washing and etc. (Paquette and Lowry, 2012).

Figure 1: Main Islands, Rivers, Cities and Towns of Fiji.



Source: (McGree, Yeo and Devi, 2010)

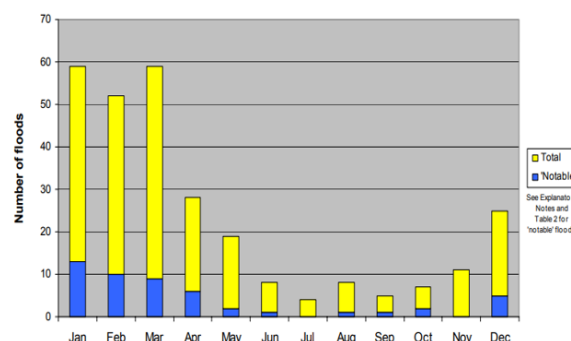
Figure 2: Nadi River Basin representing all major rivers



Source: JICA, 2016.

Floods usually occur in the wet season (mostly in January, February and March) and occasionally in the dry season (June to October) in Fiji, as presented in Figure 3. The island has a tropical maritime climate with a little variation in temperature in winter or summer. Generally, a tropical cyclone usually hits Fiji between January and March, leading to extreme rainfall and winds. Fiji is prone to natural disasters, and it is often hit by many disasters in a single year. Between 1983 and 2012, a total of 106 occurrences were officially documented for Fiji, with an estimated loss of roughly US\$ 1.2 billion (Holland, 2014). The majority of Fiji's major cities and towns are concentrated in coastal areas, vulnerable to cyclones, storm surges, and a possible rise in the sea level due to climate change. The island is exposed to hydro-meteorological hazards (floods, droughts and tropical cyclones) and geophysical hazards (landslides, tsunamis and earthquakes) (Bernard and Cook 2015).

Figure 3: Monthly Distribution of Floods in Fiji, 1840-2009



Source: (McGree, Yeo and Devi, 2010)

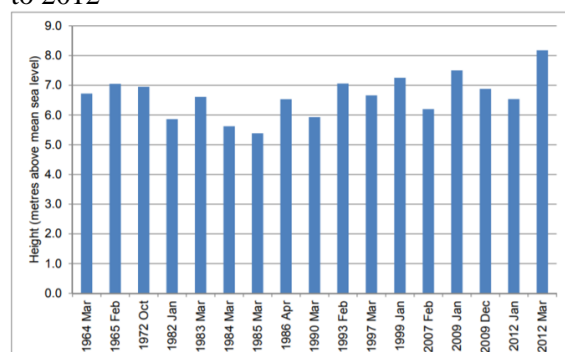
Flooding is a serious and expensive natural calamity that many nations regularly suffer (UNDP, 2004). In the last half-century, the number of catastrophic floods has been on a considerable rise. With every passing decade, there has been a rise in flood catastrophes that impede the country's economic growth and leave a devastating imprint. Climatic changes in Fiji are believed to have increased the intensity and frequency of extreme weather events in Fiji and other Pacific Islands (Barnett and Campbell, 2010). The intensification of floods in Fiji is a result of multiple factors, such as high rainfall intensity, rapid urbanization, population pressure, deforestation, intensification of agriculture, and unplanned tourism expansion. Most of the rivers and streams in Fiji are relatively short and steep (e.g., the Nadi River catchment area is 517 km²), leading to a swift rise in water levels (Yeo, 2013).

As regards its economy, Fiji's primary industries are sugar, tourism and garment manufacturing. They are the major source of gaining foreign currency. However, these businesses are readily influenced by a variety of external factors such as world economy, market trends, global crises, and climatic changes. Over two-thirds of the visitors come to Pacific Island nations from Australia and New Zealand (for them, Fiji is a short-haul destination). Besides, other important places from where a significant number of tourists come are the United States, Japan, China, and Europe. The tourism market has the potential to expand (World Bank, 2016). Apart from the political upheavals in Fiji in 2000 and 2006 (Kundra et al., 2021), the 2009 and 2012 floods gave an awful shock to tourism in Fiji.

Two large tourism and residential complexes, i.e. Denarau Island and Naisoso have made the Nadi region the country's most popular tourist destination, and some critics are of the view that the capacity of the river to release water is being impeded by human activity (Davis, Fiji Sun, 7 Apr

2012). The man-made tourism development has put the Nadi river into risk of potential floods.

Figure 4: Floods Height in Nadi River from 1960 to 2012



Source: Yeo, 2013; McGree et al., 2010.

The 2012 floods were harsher than the 2009 and 1999 floods, and the water level was even higher in the preceding floods (Figure 4). The 2012 floods were more damaging since they occurred twice (January and March 2012) in three months. A tiny economy's recovery from flood disasters takes time, and there is no time to recover when it is pounded by one flood after another (Ratan, 2013).

2.2. Tourism in Fiji: Potential and Constraints

Fiji, a land with sun, sea and sand, is regarded as a vacation destination where visitors come to relax and rest. This goal is primarily accomplished by visiting Fiji's tourism hubs, i. e. Nadi and Denarau. Earlier, this island nation's geographical centre position in the Pacific was utilized as a refuelling stopover destination for planes and ships sailing from Australia and New Zealand to the United States. Visitors gradually began to remain for longer periods as part of lengthy vacations. During the 1980s, Fiji's major industry, i.e. sugarcane, was superseded by tourism as the source of the country's greatest foreign currency earnings. Like many other small island developing countries, tourism has become the backbone of Fiji's economy. Foreign direct investment (FDI) in hotels, resorts, and other infrastructure facilities has played a significant role in Fiji's tourism industry (Jayaraman and Choong 2006). After Fiji's independence in 1970, the tourism growth was retarded temporarily due to the four political coups in Fiji (in May and September 1987, 2000 and 2006). Several post-coup recovery policies were adopted to regain the growth. Notwithstanding various coups and political upheavals, Fiji's economy remains one of the most developed in the region.

The number of tourist arrivals in Fiji has declined due to the 2000 and 2006 coups and the 2009 and 2012 floods in Nadi. The tourism sector in Fiji has several constraints, which include overdependence on overseas capital, leakage of tourism profits, weak tourism policies, environmental degradation and climatic contamination. Besides, there is a rise in crime rate, health issues, and poor quality of service delivery by the tourism business (Robert et al. 2011). The overdependence on foreign investors and international visitors, lack of local markets and human expertise, and lack of expertise in tourism planning always hamper tourism development.

The town of Nadi is situated along the Nadi River, which is joined by tributaries and smaller rivers just downstream of the town. Nadi and Denarau are renowned tourist hubs in Fiji, accounting for 42% of total visitors in the country and 35% of Fiji's total tourism profits (about \$690 million), making them the biggest earning area in the country (Fiji Tourism, 2021). This is mostly due to the concentration of lodging in Nadi, which ranges from high-end to backpacker. Furthermore, Nadi offers a wide choice of tourism-related activities, sights, and big conference facilities. Fiji's main international airport is also situated here. There is a significant portion of Nadi town that is below 6 meters of mean sea level and that is prone to recurrent floods between November and April (SOPAC, 2007).

The tourism capital of Fiji is considered to be Nadi. This town is located in the western part of Viti Levu Island and is located in Ba Province, western division. There are several hotels, resorts, and backpacker accommodations in the area, making it a significant entry point for travellers. This town constitutes the third-largest population of Fiji, with a land area of almost 1,200 hectares.

3. Objectives of Study

- Ascertain the correlation between tourist arrivals and the 2012 Nadi flood.
- Outline the measures adopted by tourism stakeholders to reduce the possibility of floods in the future and offer suggestions to ensure sustainability in tourism.
- Make a comparative monthly analysis of Fiji's visitors in the years 2009 and 2012 in relation to floods.

4. Method and Material

This case study is correlational research on floods and international tourist arrivals. This includes data collected from various issues of Fiji Bureau of Statistics and other government records. The information used in this study has been gathered from diverse sources, i.e., research books, articles, government records, independent agencies reports, newspaper articles, and statistical records. The quantitative data has been presented in graphs and tables.

5. Tourism' Vulnerability

Fiji is considered to be a holiday destination that provides an opportunity to the tourist to rest and relax. It is regarded as the 'paradise of the Pacific' and an attractive tourism hub in the South Pacific. Since 2014, the annual growth rate of tourism has been 6.4% annually, and Nadi International airport, situated 9 kilometres from Nadi town, serves as the primary gateway to nearby Port Denarau, Yasawa group and Mamanuca group of islands. The archipelago attracted about 842,000 tourists in 2017, making \$1.9 billion throughout the sector, and employing around 118,502 Fijians. The tourism industry contributes around 34% of Fiji's Gross Domestic Product (GDP). The sustainability of the tourism sector is at risk due to events like tsunami, cyclone, floods, tropical storms, and rise in sea level, which pose a massive threat to Fiji's tourism. The conservation of the environment, assurance of safety and security to tourists during climatic hazards, advancement in forecasting technology shall play a pivotal role in attaining sustainability and attaining resilient development in the tourism sector.

Tourism is highly vulnerable to flood situations that may have a detrimental impact on visitors. So, Fiji must ensure the safety and wellbeing of visitors and industry employees. There should be a systematic risk identification method that should follow the immediate implication of mitigation measures as per the crisis situation. This is important to preserve Fiji's image as a safe tourism destination. Under the threat of natural disasters, the National Disaster Management Office is the prime government agency that works towards preparedness in the cases of disaster, mitigation, and emergency operations; it also ensures relief rehabilitation in affected areas. Most of the resorts located in the coastal areas of Nadi, Denarau and the Coral Coast of western Viti Levu are highly vulnerable.

Viti Levu has several river basins with large watershed areas, e.g. Nadi, Rewa, Sigatoka, Nauva

and Ba. Nadi town is located in the Nadi river basin, popular as a tourism hub and commercial centre of Fiji. This river basin is highly vulnerable to flood disasters and the frequent flood events have reduced the number of tourists and interrupted economic activity, and the government has stressed the strategic economic importance of protecting Nadi from future flood events. An increase in the intensity of rainfall has been recorded in the Nadi river basin; it has exposed the vulnerability of the economy on account of climate change forces. Businesses such as construction, manufacturing, distribution of power, gas, and heat, drinking water plants, hotels, and restaurants are concentrated around Queen's Road in the center region of Nadi Town. Tourism enterprises and hotels are near the airport and Denarau. Nadi Town comprises wholesalers as well as retailers, and it provides services linked to everyday life and leisure (JICA, 2016). Many businesses such as clothing, handicraft, jewellery, and merchandise shops in the Nadi River Basin serve as the large international tourism market. The Nadi area has a large number of hotels, motels, and affordable accommodations; it is known for its nightlife and notable attractions like Martintar, Namaka, Sabeto, and Votualevu.

The rise in the number of floods in the Nadi area is allocated to multiple factors, including climatic change and development in Denarau. There was a considerable loss of income and assets due to floods. There was a cancellation of bookings after the broadcasting of the flood news in 2012. Overtime was paid to the staff to do clean-up work and hefty discounts were given to attract the tourist. The floods blocked access to the airport and supplies to the hotels, and even the airport runway submerged; it was filled with debris, leading to the cancellation of flights for some days. The untoward situation dented Fiji's international reputation as a tourist place for safe vacation. Several foreign airlines flew in empty planes to evacuate tourists, who had to pay a lot of money to return home safely (From Shared Risk, January 2015).

Observation 1: The devastating floods and tropical cyclone that hit Fiji in 2012 led to a decline in the visitor arrivals, i.e. from 675,050 in 2011 to 660,590 in 2012, with a fall of 2.1% (Table 1). The reason for this decline was due to the flooding in March and cyclone in December 2012. The drop in the number of visitors was 14,460 in 2012 in comparison to 2011. However, the total number of tourist arrivals in Fiji in 2012 was 801,719, a rise of 1.0% over the 793,442 tourists in 2011. Total

tourist arrivals included visitors (82.4%), cruise-ship passengers (10%), and transit passengers (7.6%).

Table 1: Tourist Arrival in Fiji from 1998 to 2012

	Visitor	% of	%	Cruise-ship	% of	Transit	% of	Total	Change over
Years	Arrivals	Total	Change	Passengers	Total	Passengers	Total	Arrivals	Previous
1998	371,242	74.3	3.3	17,917	3.6	110,382	22.1	499,940	-8.8
1999	409,955	75.3	10.4	14,030	2.6	120,460	22.1	544,445	8.9
2000	294,070	67.6	-28.3	10,081	2.3	130,736	30.1	434,887	-20.7
2001	348,014	77.9	18.3	6,858	1.5	91,910	20.6	446,782	2.7
2002	397,859	86.2	14.3	5,699	1.2	58,091	12.6	461,649	3.3
2003	430,800	86.8	8.3	20,058	4.0	45,676	9.2	496,534	7.6
2004	504,075	92.1	17.0	8,718	1.6	34,385	6.3	547,178	10.2
2005	545,185	96.4	8.1	2,442	0.4	18,076	3.2	565,663	3.4
2006	548,589	93.5	0.6	-	0.0	39,741	6.8	588,330	4.0
2007	539,881	90.4	-1.6	2,435	0.4	54,639	9.2	596,955	1.5
2008	585,031	84.3	8.4	41,669	6.0	67,298	9.7	693,998	16.3
2009	542,142	82.4	-7.3	63,292	9.6	52,733	8.0	658,211	-5.2
2010	631,868	85.5	16.5	60,301	8.2	46,670	6.3	738,839	12.2
2011	675,050	85.1	6.8	58,722	7.4	59,670	7.5	793,442	7.4
2012	660,590	82.4	-2.1	80,003	10	61,126	7.6	801,719	1.0

Source: Fiji Bureau of Statistics (FBoS)

The 2009 floods and Global depression led to the decline of international visitors by 7.3% and there was an overall decline by 5.2% as regards total tourist arrivals. In comparison, 2012 witnessed less fall in visitor arrivals. In fact, the number of cruise ships and transit passengers increased in comparison to that in the previous year. The comparative data shows that despite the intensity of floods was higher in 2012 in comparison to 2009, the decline was international tourist was less in 2012 when compared to 2009. This depicts the percentage of change in international tourist arrivals is dependent on various factors besides the flood hazards that may include global depression, political coups and other environmental hazards.

Observation 2: Assessment of 2012 Floods: Affects on Tourism and Related Businesses

Tourism profits went down by 35% approximately, owing to the destruction caused by the Nadi 2012 floods. Flight disruptions resulted in a considerable number of booking cancellations. Availability of limited seats and cargo capacity on certain international routes also discouraged prospective tourists, and hence, low profits were yielded (January 14, 2012). Businesses in Ba and Nadi, which were the most hit by the floods, remained closed for about four weeks, resulting in the loss of wage income for thousands of employees. After the floods, 65 small stores and companies — 40 in Nadi and 25 in Ba — were forced to shut forever (January 14, 2012). The proprietors cited an unpredictable and unstable business climate as one of the causes for the demise of their businesses. The Nadi Chamber of Commerce stated that due to the huge losses caused by the March 2012 floods, 126 businesses in the town voted to be relocated, whereas 108 decided to stay in their current locations. Notably, small businesses incurred a loss

of \$40 million and residential properties suffered a loss of \$12 million. Only 23 businesses were insured and most of them were partially covered. In the survey, it was found that diverting the river, dredging, installing a foolproof flood warning system, converting the ground floor into a car parking, and shifting shopping centers to the first floors, waiving off commercial rent for three months, and getting special grants from the government for small and medium enterprises could be adopted as some practical measures to deal with the situation (Lal, *Fiji Sun*, 14 May, 2012).

There was a decline in the tourist visitor arrival and a huge amount was allocated for rehabilitation in the government budget. Assistance was also given by development partners and donors. The poor suffered the most due to the floods.

Two months after the March 2012 floods, the Nadi Chamber of Commerce claimed that 46 small enterprises (out of a total of 250 registered firms) were closed due to the damage to their premises and stock destruction, resulting in the layoff of more than 100 employees (Nasiko, *Fiji Times*, 15 May 2012). Only a few of them were likely to reopen. Thus, it led to the forced migration of the employees. Only large and mostly international businesses were able to resume operations quickly after the flood. After the floods, ANZ bank relocated to a higher ground level and invested in floodproofing its new premises, ensured that wiring was in the ceilings rather than the floor, and installed waterproof materials for all surfaces (Bernard and Cook 2015).

Flood dangers have halted or delayed the town's existing and prospective development efforts. This has implications for the Pacific area, as Nadi has a critical role to play as a regional gateway, economic connection to neighbouring islands, and tourist and international event center. During the floods, the central business area was drowned up to 4 m of water, essentially limiting the tourist's access to the airport and preventing supplies to the hotels. Following the March 2012 floods, some visitors were transported to the airport by helicopter at the cost of \$300 USD per person, while others were taken to the airport by boat in select regions (Bernard and Cook 2015). In the absence of any substantial relief to residents and business owners in relocating their assets to the higher ground, the outcome was a huge financial loss that impacted a sizable number of the local population in the affected districts.

The local business suffered tremendous financial loss and had to bear high recovery cost, as the insurance coverage for property and goods was limited, and the government support to aid businesses in preparing for and recovering from the disaster was almost negligible (McNamara, 2013). Insurance could have played a critical role in helping businesses to manage climate risks by protecting their important assets. However, insurance is difficult and highly expensive to get for small enterprises in Nadi. Due to the significant danger of flooding, local insurance firms refuse to cover enterprises in Nadi. This leaves firms with just one alternative for insurance, i.e. multinational corporations, which may be highly expensive (McNamara, 2013). Only partial insurance is available to big businesses houses, mostly on very high premium rates. The factors that led to the lack of insurance are high upfront capital costs for climate-proofed infrastructure, an increase in the frequency of floods, a shortage of qualified risk assessors, uncertainty surrounding climate change projections, difficulty in distinguishing between climate-induced and resource degradation-related floods, low-profit margins for flood insurance, a limited capacity to conduct an economic analysis of flood damages, and change in premiums (Chandra and Gaganis, 2014). Thus, a large number of small companies in Nadi did not get any compensation for flood-related damage and suffered immense losses.

Without business insurances, the local businesses could not bear the natural disaster and save their capital. It is important to take measures to deal with the crisis. The Head of Westpac Banking Corporation stated that his bank rebuilt the Nadi branch for the third time in two years, doubled the thickness of the walls, installed a huge pumping system in the basement, and made alterations by placing windows higher and smaller (UNDRR, 10 July 2013). There were also reports in the media about the rise in crime rate after the 2012 floods.

The government agencies are reported to have deliberated on the mitigation policy to control floods and the recovery policy to bounce back to routine life in Nadi. Mr. Collin Simmons, Director of Land and Water Resource Management Division, stated that abandoning the flood-prone area is not a viable option when there is a high level of investment in the flood-prone plain and there is unavailability of any alternative land. The integrated flood risk management approach is through dredging the Nadi river, the work started after the 2009 floods in the Western division. "An 8.5 km section of the Nadi River was dredged,

from the river mouth right up to the Nadi town bridge to the tune of \$7.9million and with 1.1 million cubic metres of soil removed from the river system" (Biumaiono, 2012). The other flood mitigation plans undertaken by the government are "water catchment management, proper land use planning, flood plain zoning and regulations, hazard and risk mapping, building codes and flood proofing infrastructure, flood forecasting, disaster preparedness and ecosystem conservation to preserve natural resources" (Biumaiono, 2012).

To build man-made tourist spots and facilities, mangroves were cut. A survey-based research on the floods of 2012, 2009 and 1999 found that the floods wreaked havoc due to the improper drainage system and construction of new resorts by overseas foreign investors and hoteliers on the coastline of Nadi area and these were made by cutting lush mangroves (Ratan, 2013). Moreover, due to the prevalence of customary land ownership (84% owned by Fijians or native land, 8% State-owned and 8% freehold), the restrictions imposed in light of the land use planning often remain ineffective in Fiji since local dominating groups have the last say in land-use choices (Yeo, 2013). Although some businesses have been relocated to safer places, the demand for the relocation of the commercial centre of Nadi town has been contested as an economically unfeasible option. Business houses and shopkeepers have taken some measures, which are inappropriate and lacking (Yeo, 1998). The economic and commercial motives act as a hurdle on the way to sustainable development. This problem needs an amicable solution through public-private partnership. Personal interests must be ignored and side-lined in the larger interest of the country.

Due to their emotional attachment with the land, the natives feel reluctant to relocate themselves and continue to live in looming fear of natural catastrophies. Besides, the unequal distribution of freehold and state-owned land forces many people to stick to their original homes (Yeo, 2013). The commercial development has continued in the Nadi area in last decade despite tremendous damages caused by the damaging floods.

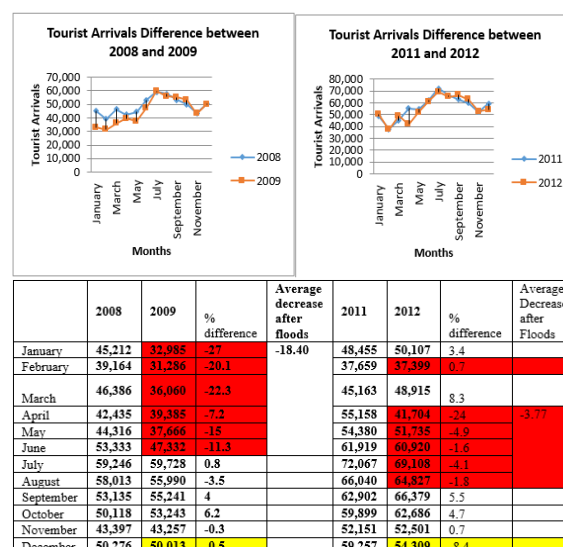
The influx of businesses in this region acts as a magnet for many people, who come to Nadi and surrounding areas to provide products and services to visitors. The population density of Nadi district has risen dramatically. However, due to the 2009 and 2012 floods, the owners of small business suffered significant losses. To support the tourism expansion and control floods, Fiji government has

adopted a mitigation programme (River Dredging Project, and Watershed Management Project) to dredge the Nadi river. It is believed that the sedimentation in the river bed is the primary exacerbating factor (Bernard and Cook, 2013). Large amount of money has been spent on dredging the Nadi river (Malo, 2010). However, people have different views about the role of dredging in curbing the menace of future floods; some believe that this may enhance the capacity of the river system to discharge the floodwaters; others are of the view that the hole made by dredging would be filled within a few hours of floods.

There are a few possible solutions to deal with the problem in question effectively. One of them is the partial diversion of the Nadi river that would require the evacuation of two villages. The relocation of the Nadi city centre to less vulnerable areas like Namaka, Martintar or a higher level ground as in Votualevu (Nolet, 2019) may be of great help. However, the very idea of shifting has been rejected by many natives and businessmen. The observation depicts that floods have direct impact on tourism-related stakeholders and businesses, which has been disrupted by the incidences of heavy floods be it 2009 or 2012. But based on observations 1 and 2, it can be summed up that the disruption caused by floods in Nadi is short-term due to strong resilience to bring international tourists back to Nadi, Fiji.

Observation 3: A comparative monthly analysis of Fiji's visitors in the years 2009 and 2012 (the years that witnessed floods in the Nadi River) is shown in Table 2. After the 2009 flood, it took 6 months (January- June) to show positive growth, whereas, after the March 2012 floods, it took 5 months. The total average monthly decline after 2009 is 18.40 %, whereas after 2012 it is 3.77 %. Although the 2012 floods are considered more devastating than the one in 2009, yet the data analysis reveals that the severity of the flood had less impact on tourist arrivals. The other factors like global economic decline (2009) and political coups in Fiji (2000 and 2006) seem to have played a more important role than the flood on international tourist arrivals in 2009. However, the damages caused by the floods in Fiji cannot be overlooked, as they slowed down the pace of the growth of the nation in 2009 as well as in 2012.

Table 2: Tourist arrival difference: a comparison of the floods of 2009 and 2012



Source: Authors' Calculations based on FBoS records

6. Discussion and Suggestions

Tourism is considered the most reasonable and lucrative option for SIDS to capitalize on natural attractions and gain foreign currency (Prentice et al, 2021). The industry has a risk of natural disasters in the form of floods, which may make a negative impact on tourist arrivals. In Fiji, people involved in the industry are always inclined towards urban sites in the Nadi River Basin in the hope of making more profit; they overlook the fact that these sites are prone to floods. It is seen that more preference is given to monetary gains than one's safety and security.

Notably, tourism industry remains under the influence of global crisis like pandemics (COVID-19), the Great Depression, and political upheavals. Such a crisis discourage international tourist visitors to a considerable scale. Many international investors usually compensate for their losses in no time by relocating their businesses to least affected places. It is the responsibility of the government and stakeholders, especially native stakeholders to explore and promote other economic sectors and implement the policies framed to cope with natural disasters in an efficient manner.

The 2012 floods in Nadi raised the issue of climate change in Fiji. This study gives the following suggestions that shall help to promote tourism and curb the adverse ramifications of future floods.

1. Improvement in Flood Forecasting and Warning System: An early flood warning system that has immense potential to reduce the economic damages in the tourism industry is

the need of the hour. This shall also be helpful to take planned, proactive safety measures for tourists. Weather forecast information based on the latest technology and satellite images can be of immense usage for the safety of tourists and localities. All stakeholders should take collective responsibility of managing and maintaining the warning system. Although there has been considerable improvement in the flood warning system in the Nadi river compared to the one used in the past, yet the system is not being properly managed and maintained due to the lack of coordination among the managing team (Yeo, 2013). There should be an improvement in flood predicting technologies with the help of the extension of rainfall gauges, water level gauges, and the installation of real-time monitoring cameras (JICA, 2016).

Moreover, Flood Forecasting and Warning Centers (Fiji Met) can play a prominent role in evolving the mitigation methods that can be helpful to the tourism industry. It is the duty and responsibility of the Government, stakeholders and tourists to fight against the natural disaster collectively. In the implementation of the Nadi River Flood mitigation programme, the larger interest of the country should be given importance over individual interests. Technical expertise should be roped in to analyze the long term implications of different measures.

2. **Tourist's Response to Flood Warnings:**

The tourist should keep himself/herself updated on early warnings and be ready to make last-minute changes in the travel itinerary. Flood forecasting and warning should be taken seriously by the tourist, especially the international tourist. The tourist should abide by the government instructions that come with such forecasts. He/she should rely on the news and warnings issued by credible government agencies rather than rumours. Misinformation and disinformation should be curbed and the safety of the visitor should be a priority. The flood-prone and high-risk areas should be avoided by the tourist during his/her visit if any warnings are issued.

3. **Insurance of Tourism Businesses:** Many small and medium-range businesses remain either uncovered or partially covered under insurance against floods. Measures should be adopted by the tourist service sector and businesses to make suitable changes in their business outlets and adopt flood mitigation measures. These steps shall make them more secure and these businesses will have better

opportunities to get insurance to safeguard their investments.

4. **Proactive Crisis Management Approach:**

The crisis management approach should be proactive; it should be based on cooperation and communication among all stakeholders and government agencies to manage any untoward situation before, during and after crisis efficiently and effectively. Risk profiling and appropriate mitigation measures should be in place under risk management structure and policy.

5. **Diversification:** Conventional urban tourism that overcrowds some specific spots should be discouraged to promote diversification. Special attention should be given to rural tourism, sustainable tourism, green tourism, and nature-based tourism. This will ease the pressure on the Nadi tourism hub and help in reducing intense human pressure on specific popular spots and eventually reduce the negative ramification that enhances flood risks.

6. **Sustainable Self-Management:** Fiji is heavily dependent on international aid for flood mitigation projects that are of limited duration. Sustainability can only be achieved when stakeholders show a willingness to fund these programmes from within the nation. Any random policies in the name of tourism development should not be approved in an unplanned manner.

7. **Long Term Affiliation and Association:**

The question of customary land ownership must be handled by ensuring the security of foreign investments while protecting indigenous customary rights. Foreign investors should be given incentives and concessions within controlled parameters, with some inherent advantages to landowners. Long term association of these foreign investors will give them a reason to take sustainable measures against climate change and flood hazards. If investment and interest are restored, investors will participate in the mitigation measures to safeguard their businesses to achieve long term gains.

8. **Post-Flood Marketing strategy:** After taking post-flood recovery steps, the tourism stakeholder should run campaigns to rebuild trust in international tourists from Australia, New Zealand and North America. Flood mitigation policies should be strictly implemented to restore normalcy and bring the tourism businesses on track. These policies can only be successful if Fiji's ground-level measures against future floods are practical and viable.

7. Conclusion

The economy of Fiji heavily relies on the tourism industry due to the lack of other viable alternatives. Fiji's tourist expansion is always demanding, as it requires continuous investment in one or the other form to maintain international standards. However, sustainability of the tourism sector is at risk due to the rising intensity and frequency of floods. To make tourism sustainable, adaptive and mitigating strategies must be implemented. Different measures to mitigate floods should be adopted by stakeholders, the government, and tourists in a collective manner to achieve the goal of sustainable tourism. Although the quantitative analysis reflects the low impact of the 2012 Nadi floods on tourist arrivals in comparison to the impact of the 2009 floods, yet the huge damages caused by the 2012 floods cannot be overlooked. The 2012 floods retarded the growth of the nation. The climatic vulnerabilities should be eradicated by showing resilience and prudence in planning. After a decade of 2012 floods, there has been not much drastic improvement in Fiji's flood control measures, as noticed in January 2022 floods caused by Tropical Storm Cody leading to 1 death and 4,000 evacuations. Therefore, it is suggested that effective mitigation measures should be taken against future floods to safeguard Fiji's tourism.

References

- [1]. ABD: Technical Assistance Report (2019). Fiji Preparing the Nadi Flood Alleviation Project. Asian Development Bank.
- [2]. Alam, M. A., Prasad, R. R., Kundra, S., Alam, M., & Iqbal, M. A. (2022). Urbanization and Sustainability in the South Pacific Region from the 1990s to 2020. In *Sustainable Urbanism in Developing Countries* (pp. 229-243). CRC Press.
- [3]. Buimaiono, S., 2012. Nadi underwater by 2030. The Fiji Times. Suva, Fiji. 15 June 2012.
- [4]. Brown, P., Daigneault, A., & Gawith, D. (2017). Climate change and the economic impacts of flooding on Fiji. *Climate and Development*, 9(6), 493-504
- [5]. Bernard, Karen, and Samantha Cook. 2015. "Luxury tourism investment and flood risk: Case study on unsustainable development in Denarau island resort in Fiji." *International Journal of Disaster Risk Reduction* 14: 302-311.
- [6]. Chandra, A., & Gaganis, P. (2016). Deconstructing vulnerability and adaptation in a coastal river basin ecosystem: a participatory analysis of flood risk in Nadi, Fiji Islands. *Climate and Development*, 8(3), 256-269.
- [7]. Davies, R., "Fiji-Tropical Storm Cody Causes Flooding, 1 Death, 4,000 Evacuated" (11 January, 2022) Retrieved from <https://floodlist.com/australia/fiji-tropical-storm-cody-floods-january-2022>
- [8]. Fiji Meteorological Service. (2001). List of tropical cyclones affecting Fiji between the 1830/1831 and 1999/2000 seasons. FMS Information Sheet 120. Nadi: Author.
- [9]. Fiji Sun, "Manmade Element in Nadi's Floods?" 7 April, 2012.
- [10]. Fiji Sun, "Nadi Firms Vote On Future", 14 May 2012
- [11]. Fiji Sun (2012). 'Nadi flood plan shown.' 17 July 2012.
- [12]. Fiji Times, Nasiko, Repeka, Jobless on the Rise, 15 May 2012
- [13]. Fiji Times, "Businessmen take heed of Warning", 5 April 2016.
- [14]. Fiji Tourism 2021. 2018. Ministry of Industry, Trade and Tourism.
- [15]. Holland, P. (2014). Economic dimensions of improved meteorological services in the Pacific. SPC SOPAC Published Report PR185, SPC Applied Geoscience and Technology Division.
- [16]. Jayaraman, Tiruvalangadu K., and Chee-Keong Choong. 2006. "Foreign direct investment in the South Pacific Island Countries: a case study of Fiji." *World Review of Entrepreneurship, Management and Sustainable Development* 2, no. 4: 309-322.
- [17]. Japan International Corporation Agency (JICA) (2016). The Project for the Planning of the Nadi River Flood Control Structure, Vol - 1 Summary, The republic of Fiji, Ministry of Agriculture, rural and Maritime development and national disaster Management. Retrieved from https://openjicareport.jica.go.jp/pdf/1226352_1_01.pdf
- [18]. Koto, R. N. T. W. (2014). Flash Floods in the Nadi watershed, Fiji: Morphometry, Precipitation, Hydrology and River Channel Variation.
- [19]. Kuleshov, Y., McGree, S., Jones, D., Charles, A., Cottrill, A., Prakash, B., ... & Seuseu, F. L. S. K. (2014). Extreme weather and climate events and their impacts on island countries in the Western Pacific: cyclones, floods and droughts. *Atmospheric and Climate Sciences*, 4(05), 803.

- [20].Kundra, S., Alam, M., & Alam, M. A. (2021). How do political coups disrupt Fiji's tourism? Impact assessment on ecotourism at Koroyanitu National Heritage Park (KNHP), Abaca. *Heliyon*, 7(5), e07101.
- [21].Kundra, S., Prasad, R. R., Alam, M. A., Alam, M., Nabobo-Baba, U., Ali, M. F., & Iqbal, A. (2022). 7 Urbanization in the Fiji Islands during the 21st Century: A Tourism Perspective. In *Advances in Urbanism, Smart Cities, and Sustainability* (pp. 123-136). CRC Press.
- [22].McGree, Simon., Yeo, S. W., & Devi, Swastika A. (2010). Flooding in the Fiji Islands between 1840 and 2009. *Risk Frontiers*, 1-69.
- [23].McNamara, K. E. (2013). A state of emergency: How local businesses experienced the 2012 flood in Fiji. *Australian Journal of Emergency Management*, The, 28(3), 17-23.
- [24].Narain, S. (2016). Innocent victims of climate change: A case study on the Fiji Islands. *Asia Pac. J. Envtl. L.*, 18, 193.
- [25].National Disaster Management Office (2012) 2012 January Flood Report, Suva. Fiji. 1-19. Retrieved from http://www.ndmo.gov.fj/images/AllDisasterReports/2012_JANUARY_FLOOD_REPORT_-_Final.pdf
- [26].Nolet, Emilie. 2019. "5 A Tsunami from the Mountains: Interpreting the Nadi Flood." In *Pacific Climate Cultures*, pp. 60-72.
- [27].Paquette, J., & Lowry, J. (2012). Flood hazard modelling and risk assessment in the Nadi River Basin, Fiji, using GIS and MCDA. *The South Pacific Journal of Natural and Applied Sciences*, 30(1), 33-43.
- [28].Prasad, R. R., Alam, M. A., & Kundra, S. (2022). The River of Life, Its Importance, and Conservation-A Case Study of the Qawa River in Vanua Levu, Fiji Islands *Journal of Positive School Psychology*, 6(7), 3627-3640.
- [29].Prentice, C., Kundra, S., Alam, M., Alam, M. A., & Nguyen, M. (2021). Utopia or dystopia—deterrents to ecotourism development in Fiji. *Tourism Geographies*, 1-22.
- [30].Ratan, R. (2013). Sustainable Livelihood Security as an important factor for Food Security in the Context of Extreme Flood Events.
- [31].Roberts, G., Irava, W., Tuiketei, T., Nadakuitavuki, R., Otealagi, S., Singh, S., Chang, O. 2011. 'The health islands urban systems review'. Asia Pacific observatory on health systems and Policies.
- [32].SOPAC. (2007). Report on GEF hotspot workshop for Fiji. Suva: Pacific Islands Applied Geoscience Commission.
- [33].The Business care for disaster risk reduction, workshop report From Shared Risk to Shared Value, Suva, Fiji, 13-14 Janaury 2015. Retrieved from https://www.preventionweb.net/files/41837_fijiprivatesectorforumjanuary2015fi.pdf
- [34].UN-Habitat. 2012. "Fiji: Nadi Town Urban Profile", United Nations Settlements Programme.
- [35].UN Resident Coordinator, 2012, Humanitarian Action Plan: Strategic Plan for Response to Fiji Flood (TD17F) – March/April 2012, UN, Suva.
- [36].University Report paints a different picture to the official spin, 14 January, 2012. Retrieved from <https://fijitoday.wordpress.com/2012/06/14/a-university-report-paints-a-different-picture-to-the-official-spin/>
- [37].World Bank. (2012). Disaster risk reduction and financing in the pacific. Washington, DC: World Bank.
- [38].World Bank. 2016. Trading Economics Statistics.
- [39].Yeo S.W. (1998). Natural and Human Controls on Flood Damages in the Ba River Valley, Fiji. PhD thesis, Natural Hazards Research Centre, Macquarie University, Sydney, Australia.
- [40].Yeo, S. W., Blong, R. J., & McAneney, K. J. (2007). Flooding in Fiji: findings from a 100-year historical series. *Hydrological Sciences Journal*, 52(5), 1004-1015.
- [41].Yeo, S. (2013, September). A review of flood resilience in Fiji. In International conference on flood resilience, "Experiences in Asia and Europe," University of Exeter, UK, September (pp. 5-7).