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THE ECONOMIC IMPACT OF NATURAL DISASTERS IN FIJI

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March 1997

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Preface

Figures on the 'cost' of natural disasters abound. Such figures are generated by, for example, governments as part of their relief appeals or by the insurance industry in counting its losses. However, they are typically based on only the direct, visible impacts of a disaster, such as damage to homes, hospitals, schools, factories, infrastructure and crops. Meanwhile, less easily quantifiable effects, such as the loss of personal belongings or jobs, widening trade or government budget deficits or the increasing scale and depth of poverty are typically ignored. Similarly, positive benefits of disasters – such as post-disaster construction booms or the opportunities disasters can present to upgrade machinery and equipment – are seldom reported.

From an economic, rather than financial, perspective, the impacts of disasters can be divided into three categories: 'direct' costs, 'indirect' costs and secondary effects (e.g., see Andersen, 1991; Bull, 1992; OECD, 1994; Otero and Marti, 1995). Direct costs relate to the physical damage to capital assets, including buildings, infrastructure, industrial plants, and inventories of finished, intermediate and raw materials, destroyed or damaged by the actual impact of a disaster. Crop production losses are sometimes also included in estimates of direct costs. Indirect costs refer to damage to the flow of goods and services including lower output from damaged or destroyed assets and infrastructure, loss of earnings due to damage to marketing infrastructure such as roads and ports and to lower effective demand; and the costs associated with the use of more expensive inputs following the destruction of cheaper usual sources of supply. They also include the costs in terms of both medical expenses and lost productivity arising from increased incidence of disease, injury and death.[1] Secondary effects concern both the short- and long-term impacts of a disaster on overall economic performance, such as deterioration in trade and government budget balances and increased indebtedness as well as the impact on the distribution of income or the scale and incidence of poverty. They can also include shifts in government monetary and fiscal policy to, for example, contain the effects of increased disaster-induced inflation or to finance additional government expenditure. Direct losses can therefore be roughly equated with stock losses whilst indirect costs and secondary effects both constitute flow losses.

Reflecting the difficulties in analysing economy-wide flow impacts and a preoccupation with the financial costs of disasters, most assessments of disasters concentrate on more easily measured direct 'stock' losses, as already noted. Yet such data are often of little value in informing broader policy-makers about the nature and

[1] For example, droughts can result in an increased incidence of water-borne diseases such as diarrhoea, skin diseases and trachoma whilst floods and tropical cyclones can lead to outbreaks of water problems such as diarrhoea and cholera.

scale of natural hazard risks faced by an economy. Similarly, they say little about the role of various underlying factors in either exacerbating or minimising the economic impact of disasters such as the size and structure of the economy, including the relative importance of various sectors and inter-sectoral forward and backward linkages; the sectors affected by the disaster; economic performance in the period prior to the disaster; the international economic climate, the frequency and magnitude of other recent disasters; or government economic policy. Current disaster damage assessments are therefore of only limited value in helping to design appropriate mitigation, or risk management, strategies to minimise the adverse economic consequences of disasters. Indeed, the mere attempt to measure the economic impacts of disasters in a single figure reflects a naive conception of the economic impact of disasters. Moreover, by potentially considerably under-estimating the true economic impacts of disasters, they may have resulted less than economically-optimal levels of investment in disaster prevention and mitigation measures

This paper forms part of a wider investigatory study on the economic impacts of natural disasters in south-east Asia and the Pacific.[2] The paper is one of three case studies, examining recent experiences in Fiji, the Philippines and Viet Nam. Each case study is based on a two-week country visit in late 1995 or early 1996 and subsequent desk-based analysis

The case studies focus on the disaggregated impacts of natural disasters on various sectors of each economy and the role of government policy. They assess the factors determining the extent of vulnerability of each economy and whether and why that vulnerability has changed over time. They also consider how the economic consequences of disasters could be mitigated and the degree of attention currently attached to natural disasters in economic policy-making and planning The case studies also briefly touch on the relationship between economic poverty and disaster vulnerability.

The case studies are necessarily exploratory given the relatively limited research to date on the economic impacts of natural disasters. This implies that some lines of investigation may reveal relatively little. However, these conclusions are findings in themselves.

[2] The study explicitly excludes pestilence, environmental and technological hazards as well as civil disturbances

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Charlotte Benson
March 1997

Abstract

There has been relatively little research on the economic impacts of natural disasters to date. This paper reports findings of a study of Fiji which is intended as a contribution in filling that gap. Findings include the following:

- Severe natural disasters constitute major exogenous shocks to the Fijian economy, resulting in substantial declines in GDP.

- Both the manufacturing and agricultural sectors, as well as overall GDP, have become increasingly vulnerable to natural disasters since the early 1980s. Current changes in the agricultural sector suggest that its vulnerability to natural disasters could increase further in the short- to medium-term. However, the vulnerability of the manufacturing sector looks set to decline.

- Severe natural disasters have had profound budgetary implications.

- The balance of payments has been relatively immune to natural disasters, primarily reflecting higher reinsurance flows as well as the use of sugar reserves to further boost earnings in the event of a disaster. However, anticipated diversification out of sugar production could increase the exposure of the balance of payments.

- Considerable attention has been paid to disaster management, particularly preparedness and post-disaster activities. Much less effort has been made to incorporate hazard risks into broader economic strategic planning or to mitigate the economic impacts, specifically, of disasters.

- There has been a gradual breakdown in traditional mitigation and coping mechanisms and communities have increasingly turned to the government for assistance in the aftermath of disasters.

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Acronyms

ADB	Asian Development Bank
AusAid	Australian Aid
EDF	European Development Fund
EMSEC	Emergency Services Committee
ENSO	El Niño Southern Oscillation
EU	European Union
FAO	Food and Agriculture Organisation
FSC	Fiji Sugar Corporation
FTIB	Fiji Trade and Investment Board
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
NDMC	National Disaster Management Committee
NDMO	National Disaster Management Office
NGO	Non-Governmental Organisation
PMHRC	Prime Minister's Hurricane Relief Committee
SPDRP	South Pacific Disaster Reduction Programme
UNDHA	United Nations Department of Humanitarian Affairs
UNDP	United Nations Development Programme
VAT	Value Added Tax

1. Introduction

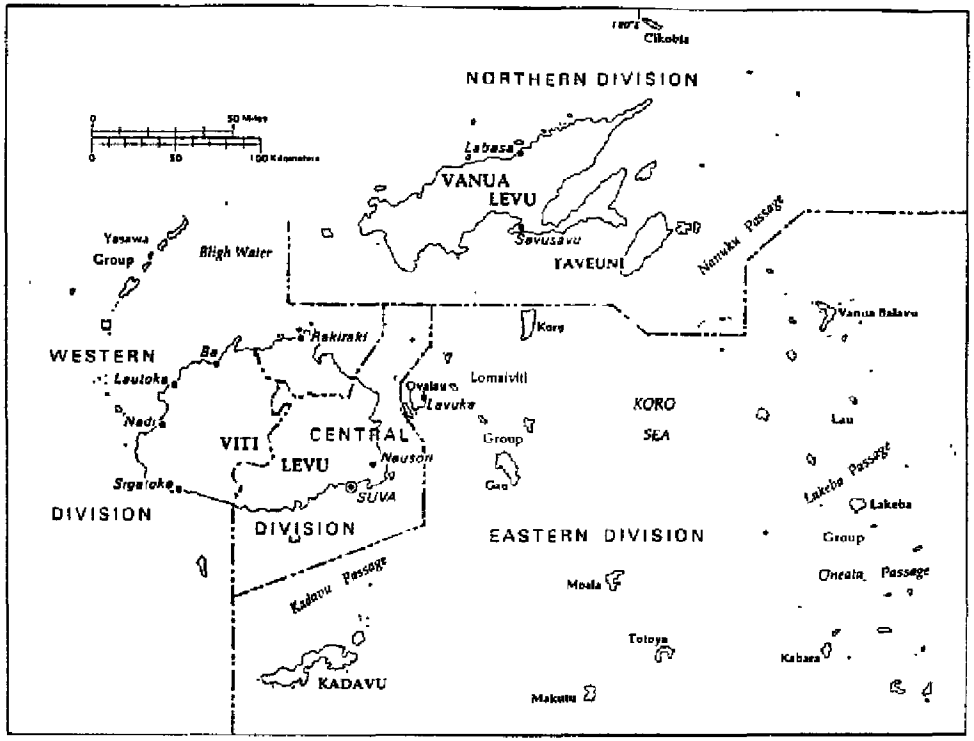
Fiji is comprised of an archipelago of over 300 islands, some 100 of which are permanently inhabited. The country had an estimated population of 771,000 in 1993 (EIU, 1995). The two largest islands, Viti Levu and Vanua Levu, account for some 87% of the total land area of the country and 75% of the population. Some 22% live in the capital city, Suva, on the east coast of Viti Levu (EIU, 1995) while over 90% live in the coastal lowlands (Nunn *et al.*, 1993). Around 60% of the population live in rural areas The country has relatively high human resource development, ranking 47th on the UNDP human development index with an average life expectancy of 72 years and an adult literacy rate of 91% (UNDP, 1996). It is one of the most developed island economies in the South Pacific. For administrative purposes the country is divided into four divisions (Figure 1.1).

Fiji experiences a range of natural hazards, particularly cyclones and droughts. The population, agricultural and other economic activities, housing and key infrastructure are heavily concentrated in coastal areas because mountainous terrain further inland prohibits extensive development This has effectively increased the disaster-vulnerability of both the population and economy. However, the number of deaths from natural disasters is relatively low with, for example, only 697 official deaths between 1882 and 1982 (although the real figure might be in excess of 800) (Campbell, 1984).

The Fijian economy has been heavily dependent on two industries – sugar and tourism – since before Independence. Successive development plans have emphasised a strategy which entails continued dependence on these two industries as well as some efforts at diversification to increase the long-term productive potential of the economy Prior to the 1987 coups, these diversification strategies emphasised import substitution, with high effective rates of protection developed to protect domestic industries. Following the coups, there was a major shift in emphasis towards a more open economy, stressing export orientation in a low tax environment and a renewed focus on economic diversification.

The primary sector, including forestry and fisheries as well as agriculture, forms the backbone of the economy, contributing 21% of gross domestic product (GDP) in 1992–4. Sugar alone accounted for 41% of agricultural value-added and 9% of GDP over the same period. The two other main traditional crops are copra and rice. The industrial sector accounted for a further 17% of GDP in 1992–4 with the remaining 61% provided by the services sector. The latter includes a sizeable tourism industry which has been the country's single largest source of foreign exchange since 1989.

Figure 1.1 Map of the Fiji Islands



Source: Manao Mapworks

More recently, garment production has emerged as a new important industry but, despite government efforts to promote diversification, sugar and tourism remain the main driving forces behind the economy.

Maintenance of international competitiveness as well as global economic trends are critical to performance of the domestic economy in a small island economy such as Fiji which relies on world markets both as a source of imports and as an outlet for much of its output. Fiji's rate of inflation is also heavily influenced by price movements in the principal economies sourcing much of its imports.

Economic vulnerability is therefore a concept which is widely appreciated in Fiji, typically couched in terms of heavy dependency on sugar and tourism as a source of employment, government revenue and export earnings and of high dependency on world markets as a source of consumer goods and intermediate inputs to domestic production and as an outlet for its production. The role of natural disasters in determining inter-annual fluctuations in rates of growth and levels of capital stock in the Pacific islands economies is also well-recognised (e.g., World Bank, 1993; ADB, 1995).

Yet the economic impacts of natural disasters in the Pacific have been under-researched (PIDP, 1990),[3] effectively hindering the adoption of appropriate mitigation strategies or the integration of disaster management into overall macroeconomic planning and policy-making. Interest in disaster preparedness and mitigation is increasing but considerable further progress is still needed. Cohesive overall strategies, taking account of natural hazard risks in broad policy and strategic planning, rather than piecemeal strategies to respond to disasters as and when they occur, need to be set in place.

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[3] Socio-economic impacts of climatic change in the Pacific are also reported to have been under-investigated (Porter, 1994).

2. Natural hazards in Fiji

The major natural hazards faced by Fiji are cyclones, floods and droughts and, on a less frequent basis, earthquakes and tsunamis.[4] Most of the soil is volcanic but no volcanic eruptions have been recorded since the arrival of the Europeans (Carter et al., 1991) and may not have occurred for over 2,000 years

Cyclones Fiji lies in one of the most active tropical cyclone zones in the Pacific (Ibid.) and all areas of the country are probably equally vulnerable to cyclones (Blong et al , 1994). The main cyclone season extends from December to March but cyclones can occur as early as October or as late as May and do not occur every year. For example, there have been no cyclones since the 1992/3 season and nearly a quarter of the cyclone seasons between 1953/4 and 1992/3 were cyclone-free. In contrast, as many as seven cyclones were reported in the cyclone seasons 1922/3 and 1992/3 (Ibid.). Cyclones are typically classified according to wind strength and central air pressure. Based on the Australian cyclone severity scale, between 1953 and 1993 Fiji experienced two Category 5 cyclones, (with wind speeds in excess of 280km/hour); six Category 4 cyclones, (with wind speeds between 225 and 280km/hour); thirteen Category 3 cyclones (with wind speeds between 170 and 225km/hour); thirteen Category 2 cyclones (with wind speeds between 125 and 170km/hour); and fifty Category 1 cyclones (with wind speeds under 125km/hour). On the basis of records for the same period, Fiji can expect to receive 1.7 cyclones per annum whilst 2–4 cyclones will cause serious damage every decade.

However, classification of cyclones by strength alone is not very useful in assessing the economic significance of particular events. For example, cyclones will not necessarily strike towns or even land; and may or may not be associated with sea surges. Meanwhile, the occurrence of two cyclones in quick succession over the same area may result in higher levels of damage than would have occurred had there been a longer period of time between the two, allowing some opportunity for rehabilitation. Timing of cyclones is another critical factor, particularly in terms of damage to crops. Cyclones are typically accompanied by heavy rainfall and may result in landslides, again partly determining the scale of damage caused. However, more moderate and weak cyclones have sometimes been referred to as a 'blessing in disguise' by official

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[4] A tsunami or tidal wave is a fast-travelling, broad wave normally generated by an undersea earth displacement. As the wave nears land it slows down and becomes much higher. A tsunami with a height of 24 metres was recorded in Japan in 1896, drowning 26,000 people (Alexander, 1993).

sources because of the heavy rain associated with them, bringing relief to drought stricken areas.[5]

Drought Fiji also experiences periodic national as well as more frequent regional drought.[6] The wet season runs from November to April, with much lower rainfall during the remainder of the year although the rainfall pattern varies across the country. The south-east and interiors of the two larger islands receive the highest rainfall. Lower rainfall is experienced in the north-west of the larger islands and the small outer eastern islands; and the Western Division and most of the islands in the Eastern Division regularly experience water shortages. However, the latter areas are not necessarily the most drought-vulnerable parts of the country: households in these areas will have adapted agricultural, economic and domestic activities to cope with regular water shortages. Instead, drought is defined for this study in terms of abnormally low rainfall in areas where water supply is normally assured.

There is some evidence of a relationship between weather patterns and El Niño Southern Oscillation (ENSO) events, which are associated with lower rainfall in the tropical Pacific region.[7] For example, both the 1987 and 1992 droughts appear to have been caused by ENSO episodes. The development of ENSO events is therefore monitored to provide medium term weather forecasts. The 1987 drought was considered to be one of the worst for much of the country (e.g , Porter, 1994) It began in the latter half of the 1986 dry season and continued through the 1986/7 wet

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[5] For example, such statements were made concerning Cyclones Rae (March 1990) and Fran (March 1992). The 1983 drought was also broken by two cyclones.

[6] This study uses drought to refer to infrequent rather than regular annual shortages of water during the dry season. Droughts are notoriously difficult to define and there is an extensive literature on their definition. For example, Glantz (1987) in a widely cited review, distinguishes meteorological, hydrological, agricultural and social drought. A general working definition of meteorological drought is 'a reduction in rainfall supply compared with a specified average condition over some specified period' (Hulme, 1995). Hydrological droughts pertain to the impacts of a reduction in precipitation on surface or sub-surface water shortfall and so may lag behind periods of agricultural or meteorological drought (Wilhite, 1993) Meteorological drought may result in hydrological conditions that have a direct impact on non-agricultural production, including hydro-electric power generation, and on human water supply. Agricultural drought is defined as a reduction in moisture availability below the optimum level required by a crop during different stages of its growth cycle and resulting in impaired growth and reduced yields. Social drought relates to the impact of drought on human activities, including indirect as well as direct impacts. However, it is difficult to establish a common basis for comparing different droughts because 'drought' as a concept is derived from the recognition of impacts Furthermore, the relationship between rainfall variability and impacts depends on the specifics of a particular agro-ecological zone or economy.

[7] The relationship between El Niño events and cyclones in Fiji is less clear cut although there are apparently more cyclones east of the dateline during ENSO years.

season. It was particularly severe in the sugar cane-growing region of northwestern Viti Levu but even the normally wet Suva/Nausori area was affected.

Periods of low rainfall are also associated with increased risk of uncontrolled fire, reaping particular havoc on forests (see section 4.2).[8] The 1987 drought played an important role in exacerbating the scale of damage incurred as a consequence of increased numbers of arson fire attacks in that year, in turn associated with the then prevailing political turmoil.

Floods Many of the worst floods on record have been associated with cyclones and storm surges, resulting in riverine, coastal and flash flooding in catchments with steep mountains (Carter et al., 1991). For example, Cyclone Kina (1993) is reported to have caused the worst flooding in 60 years (NDMC, 1995). Fiji also experiences some seasonal riverine flooding, the risk of which has increased with deforestation, expansion of agricultural cultivation onto marginal lands and poor soil conservation techniques, in turn contributing to increased rates of soil erosion and siltation. Meanwhile, increasing urbanisation coupled with poor drainage facilities have increased the risk of urban flooding (Ibid).

Earthquakes The Fiji Group experiences around 300 tremors per annum measuring under 4 on the Richter scale, particularly along the Suva-Beqa seismic zone. Earthquakes of Richter 6 or over occur about once every 10 years while earthquakes of Modified Mercalli Intensity 7.5 can be expected every 50 years on soft sediments and reclaimed lands in Suva and Nausori (Blong et al., 1994). The most damaging earthquake on record occurred in 1953, registering 6.5 on the Richter scale and, on the basis of available evidence, perhaps Mercalli Modified Intensity of 8 in some parts of Suva (Ibid).[9] Considerable damage occurred in Suva and Kadavu, largely due to differential ground settlement rather than ground shaking (Ibid.). Most of the structures damaged were located on reclaimed land. The current macrozonation divides the Fiji region into areas of high, medium and low risk, with most of the region classified as medium risk However, this map was developed for use by the building industry on a partly subjective basis and was considered 'too simplistic' by a spokesperson at the Minerals Resources Department Furthermore, there is general 'apathy' about the risk of earthquakes, which are not perceived as a real threat (Prasad, 1993) by the general public. However, a new map is currently under

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[8] Fires are not considered as a disaster in their own right in this study but only to the extent that they are exacerbated by droughts. Major fires are usually started by the burning of sugar cane and cause considerable damage every year One person interviewed for this study estimated fire damage of perhaps F$20m in 1995 alone.

[9] The Modified Mercalli Intensity ranges from 1 (not felt except by a few people under special circumstances) to 12 (total damage, objects thrown up into the air) (Alexander, 1993)

preparation and a microzonation is also being prepared for the Suva area, hopefully helping to improve public risk awareness.

Tsunamis Records on tsunamis are incomplete. The largest recorded tsunami occurred as a consequence of the 1953 earthquake, striking during low tide and reaching a height of 1.8 metres in Suva harbour. However, tsunamis of 2 metres are considered possible perhaps every 100 years in areas protected by reefs, with larger ones in other coastal areas. For example, a 2.8 metre tsunami could occur in Suva harbour during high tide (Blong et al , 1994). Past tsunamis have been generated both locally, within the Fiji area, and on the other side of the Pacific Ocean. Tsunamis can damage wharf and port facilities as well as seawalls, roads, bridges and buildings, as, for example, in 1953.

Global warming and changing hazard risks There are concerns, as yet scientifically unsubstantiated, that the frequency and intensity of certain natural disasters will increase as a consequence of global warming and that Fiji can also expect to face a rise in sea-level. For example, there has been an apparent increase in the frequency of cyclones since the early 1980s which some suggest may be linked to higher sea surface temperatures (e g., Nunn et al., 1993). However, there is no hard evidence to suggest that this trend will be sustained or, indeed, that it is linked to global warming. There is also great uncertainty concerning the impact of global warming on levels of precipitation Some argue that it may increase rainfall but there could also be greater inter-annual fluctuations in both precipitation and temperature (Porter, 1994). More intense rainfall events would trigger a larger number of landslides as well as increase the rate of soil erosion.

Environmental factors are also playing some role in increasing the country's hazard vulnerability. For example, mangrove forests, which offer important protection to both coastlines and coral reefs from coastal flooding, have declined from an original level of 45,000 ha to 42,000 ha as land has been reclaimed for agricultural purposes and trees cut down for fuelwood (IUCN, 1993). Ironically, some of the reclaimed land has subsequently proved unsuitable for agricultural production (Porter, 1994). The threat of damage from landslides is also reported to be increasing, in part due to the expansion of agriculture and urban areas into higher risk zones. The most extensive landslides recorded followed Cyclone Wally in 1980. A large number of landslides also occurred following Cyclone Kina in 1993, around half of which were related to road construction practices (NDMC, 1995). Greater attention to protection of the environment is clearly important in reducing the scale and frequency of natural disasters.