NEW ZEALAND PROGRAMME

PACIFIC REGIONAL HYDROGRAPHY SURVEY AND MARITIME CHARTING

ASSESSING THE COSTS AND BENEFITS OF HYDROGRAPHIC SURVEY AND CHARTING

A CASE STUDY OF VANUATU

SPC CPS
SECRETARIAT OF THE PACIFIC COMMUNITY
SECRÉTARIAT GÉNÉRAL DE LA COMMUNAUTÉ DU PACIFIQUE

NEW ZEALAND
MINISTRY OF FOREIGN AFFAIRS & TRADE
Aid Programme

Map of Vanuatu

Source: http://www.worldatlas.com/webimage/countrys/oceania/lgcolor/vucolor.htm

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Acronyms

ADB	Asian Development Bank
AUD	Australian Dollar
AusAID	Australian Agency for International Development
BCR	Benefit Cost Ratio
CBA	Cost-Benefit Analysis
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DFAT	Department of Foreign Affairs and Trade
DOT	Department of Tourism
ECDIS	Electronic Chart Display and Information System
ECF	Enterprise Challenge Fund
EEZ	Exclusive Economic Zones
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GNI	Gross National Income
GOV	Government of Vanuatu
IMO	International Maritime Organization
LINZ	Land Information New Zealand
MDGs	Millennium Development Goals
MOFA	Ministry of Foreign Affairs, Vanuatu
MIPU	Ministry of Infrastructure and Public Utilities
NMDI	National Minimum Development Indicators
NPV	Net Present Value
NZ	New Zealand Dollar
NZAid	New Zealand Aid Programme
PICs	Pacific Island Countries
PICTs	Pacific Island Countries and Territories
PMD	Ports and Marine Department
SOLAS	Safety of Life at Sea Convention, 1974 as amended
SPC	Secretariat of the Pacific Community
SPTO	South Pacific Tourism Organisation
TRIP	TRIP Consultants Corp.
UNCLOS	United Nations Convention on the Law of the Sea
USD	U.S. Dollar
UKHO	United Kingdom Hydrographic Office
VAT	Value Added Tax
VATU	Vanuatu Vatu
VPMU	Vanuatu Project Management Unit
VMC	Vanuatu Maritime College

Executive Summary

Like most Pacific Island Countries and Territories (PICTs), Vanuatu is a very open economy and depends heavily on international trade, mainly through maritime transportation. Import duties account for approximately 33.63% of total government revenue and the economy also relies heavily on cruise tourism, which produces over 2.7 billion vatu (USD 28 million) per year.

The majority of Pacific Island Countries (PICs), including Vanuatu, are member states of the International Maritime Organisation (IMO). Starting in July 2014, IMO's Safety of Life at Sea Convention (SOLAS Convention) regulations will require the use of Electronic Chart Display and Information System (ECDIS) on new and existing passenger, tanker, and dry cargo vessels. Currently most PICTs lack such accurate charts. In line with this, it would be advantageous for countries to comply with IMO Conventions, in this case by having updated hydrographic surveys and electronic navigational charts available for their ports.

In the absence of updated hydrographic surveys and electronic charts, there is a risk that cargo and cruise ships visits to these countries could be disrupted, which could in turn cause serious implications for these economies. For this reason, New Zealand Aid (NZAid) has proposed a Pacific Regional Hydrography (Survey and Maritime Charting) Initiative in order to produce electronic navigational charts for all South Pacific Island Countries. In order to assess the likely costs and benefits that this initiative would produce, a demonstration project which surveys Vanuatu's ports is currently being undertaken. This report uses the Vanuatu case study to carry out a preliminary cost-benefit analysis of attaining electronic charts for Vanuatu.

In the case of Vanuatu, this analysis confirms that the benefits of complying with IMO Conventions, in this case of having hydrographic surveys, and electronic charts, far outweigh the costs in all possible scenarios, even when the most conservative estimates of benefits are used. The benefit cost ratio in the "worst case scenario" is still 91, meaning that for every vatu spent on producing the hydrographic surveys and electronic charts, the government can expect to receive 91 vatu in return. In this same scenario, the total expected value to Vanuatu (discounted benefits minus costs) of implementing this project is over 37 billion vatu (USD 383 million) over the next 6 years (2014-2019).

Given that the majority of benefits quantified in this analysis are from the tourism industry, and in light of the significance of the tourism industry to the Vanuatu economy, this analysis highlights the substantial benefits that Vanuatu stands to gain from having updated surveys. It also shows the importance of securing such long-term benefits from the tourism sector for the country's medium to long-term sustainable development.

Based on the analysis for Vanuatu, other PICTs are likely to receive overall benefits from complying with IMO Conventions, including implementing an electronic mapping project. The benefits would mainly accrue through the non-disruption of trade. Consequently, this report demonstrates the potential value of undertaking hydrographic surveys and producing electronic charts for PICTs.

Finally, given the large sunk costs involved in purchasing the technical equipment and the high level of expertise needed in order to carry out hydrographic surveys, it may be worth investing in one regional hydrographic service for all PICs, which could produce maps for the countries for less cost than if each PICTs invested in its own equipment and mapping team.

Chapter I: Introduction

1.1 Background

Like most PICTs, Vanuatu is a very open economy and depends heavily on international trade. According to the Asian Development Bank (ADB), Vanuatu's economy has outperformed most Pacific region economies in recent years. This is due in part to the resilience of its tourism sector and the stream of several donor funded projects. Overall visitor arrivals grew by 2.1% in 2013; however growth in cruise arrivals was 15%. Cruise ships visit several ports in Vanuatu, and very high visitor satisfaction and return visit factors have been reported

Starting in July 2014, the IMO SOLAS Convention regulations will require member countries to move toward using electronic navigational charts in their regions for safe shipping reasons. Charts used within Vanuatu are outdated; these charts are also not digitized. Given the dependence on trade and the economic importance of cruise tourism to overall development in Vanuatu, it is important to understand the implications of non-compliance with IMO conventions. This case study discusses these issues with reference to hydrographic surveys and electronic charts, and recent economic developments in Vanuatu. Whilst the study focuses on Vanuatu, the results have wider implications.

1.2 Country Context

Vanuatu is an archipelagic country consisting of 83 islands. The country is relatively mountainous with a rugged terrain. The geographic characteristics of Vanuatu gives rise to both its economic development opportunities and challenges. They are a basis for its growing shore-base and cruise tourism industry and its thriving agriculture sector, which are important for both domestic consumption and exports (coffee, kava and cattle being major export items). Vanuatu has an exclusive economic zone (EEZ) of about 680,000 square kilometers, which provides opportunities to develop fisheries. The population was estimated at 264,700 in 2013, with annual growth rate of 2.6% (SPC, 2014). Per capital gross national income was estimated at 265,629 vatu[1] ($2730)[2] (ADB, 2013). The main population centres and urban areas are Port Vila (the Capital) and Luganville. It is estimated that 76% of the population reside in isolated rural communities and Islands (SPC, 2014). Because of the mountainous topography and isolation of many communities, infrastructure, transport, power and communications services provision and maintenance are costly. There is the need to duplicate provision and it is difficult to achieve economies of scale. Many communities have no access to basic healthcare, education and social services. Opportunities are limited in rural areas, which is a 'push factor', contributing to rural-urban migration in the country, which an increasingly severe and adverse impact on urban infrastructure and urban services.

1.3 Recent economic performance

The main economic sectors in Vanuatu are services (including tourism and offshore financial services), and agriculture. Construction, related to tourism plant expansion and donor related projects, is of increasing importance. Services and agriculture account for 20.6% and 67.6% of Gross

[1] All monetary amounts are expressed in Vanuatu vatu and U.S. dollars, unless otherwise stated
[2] All exchange rates used in this analysis refer to Reserve Bank of Vanuatu Quarterly Review rates (Reserve Bank of Vanuatu, 2013).

Domestic Product (GDP) respectively. Mining and manufacturing, together accounting for about 12% of GDP, are less important economic sectors.

Vanuatu recorded modest, but positive, economic growth during the last five years. According to the ADB, GDP growth was 3.5% in 2013, compared with 1.8% in 2012. This was largely due to strong performance of the tourism sector. Agricultural production recovered, following a decline in 2012.

Table 1: Basic Indicators 2009-2013

	2009	2010	2011	2012	2013
Population	274,000				
Per Capita GNI (US$)		2,520	2,580	2,730	
Basic Poverty (%)	12.7				
GDP grow (% change per year)	3.3	1.6	1.4	2.0	3.2
Unemployment (%)	4.6				
Fiscal Balance (% GDP)	1.1	(2.0)	(2.3)		0.3
Inflation (%)	4.0	3.1	1.9	1.4	1.4
External Debt (% GNI)		17.4	17.9		

Sources: 2009 Population Census; SPC, NMDI; ADB, Country Fact Sheet, Asian Development Economic Outlook 2014

According to the 2009 Census the unemployment rate was 4.6%, with a labour force participation rate of 70.9%. Approximately, 33% of the labour was employed in the tourism sector. Vanuatu has made good progress in achieving the Millennium Development Goals (MDGs). The basic poverty rate in Vanuatu was 12.7% in 2010 (SPC, 2014). Inflation was about 4% in 2009 and declined throughout the last five years.

1.4 Recent fiscal results

In Vanuatu, there is no income tax, withholding tax, capital gains tax, inheritance tax, or exchange controls. Tax revenues come mainly from import duties and a 12.5% Value Added Tax (VAT) on goods and services. During 2013, revenue collected from import duties was 4.98 billion vatu ($51.18 million), and 5.53 billion vatu ($56.83 million) from VAT. This income stream will be threatened if shipping is disrupted. A balanced fiscal position was achieved in 2013. The level of external public debt was below 20% of Gross National Income (GNI) in 2010.

1.5 Development prospects

Transport sector development through improving shipping services is integral to the government's strategy. The economic outlook for Vanuatu is favourable, with the ADB forecasting GPD growth of 3.4% in 2014, driven by construction spending and increasing visitor arrivals, particularly in the cruise sub-sector, where Vanuatu is the leading destination in the South Pacific (SPTO, 2014).

Chapter II: Recent Tourism Sector Performance

2.1 Cruise Ship Tourism

Tourism is a major driver of Vanuatu's economic growth and a mainstay of its economy. The industry accounts for approximately 40% of GDP and is a significant source of foreign exchange and employment in the country (DFAT, 2014). About a third of Vanuatu's formal employment is attributable to tourism and tourism-related services sectors, in addition to a significant proportion of informal employment, making the tourism sector a critical player in Vanuatu's economic development. Over the last decade, Vanuatu has experienced strong growth in its tourism industry, fuelled by the rapid expansion of cruise ship visits to the country. Of the total number of tourists that visit Vanuatu annually, almost 70% arrive via cruise ships (TRIP, 2011). Cruise ship tourism is therefore a major and constantly growing segment of Vanuatu's economy.

Presently, Vanuatu receives more cruise ship visitors than any other South Pacific country and is a key destination on the itineraries of major cruise lines including Carnival and Royal Caribbean (SPTO, 2014). This is mainly due to its proximity to Australia and New Zealand, which allows the country to enjoy a steady cruise tourist crowd from both countries. A February 2014 South Pacific Tourism Organisation (SPTO) survey estimated that over 93% of Vanuatu's cruise visitors are predominantly residents of Australia (SPTO, 2014). Vanuatu has some of the most unique and wide-ranging natural and historic tourist attractions in the Pacific region, located across several of its islands, making it very attractive for cruise ships to visit more than one site during their time in Vanuatu. For instance, Vanuatu is home to some of the world's most remarkable active volcanoes, such as the constantly erupting *Yasur* on Tanna Island, and the lava lakes of *Ambrym* (SPTO, 2014). The country also has a wealth of flora and fauna, some of which are rare and vulnerable species (*ibid.*). Within Vanuatu, Port Vila is the primary destination of most cruise ships, although cruise ships also visit several outer islands, including Mystery Island, Santo and Pentecost.

Most cruise ships visit Port Vila, the capital city, and an attractive location for shopping and sightseeing; however, cruise ships seek to visit often remote, but naturally picturesque and unspoilt sites where visitors could meet locals with very preserved cultures and traditions. In addition, most tourists enjoy 'island hopping' – visiting several remote islands/sites within Vanuatu. Such sites are often in very remote areas that are unsurveyed, with basic infrastructure absent, thus creating significant maritime safety issues. As a result, this discourages cruise ship operators from venturing into such uncharted waters.

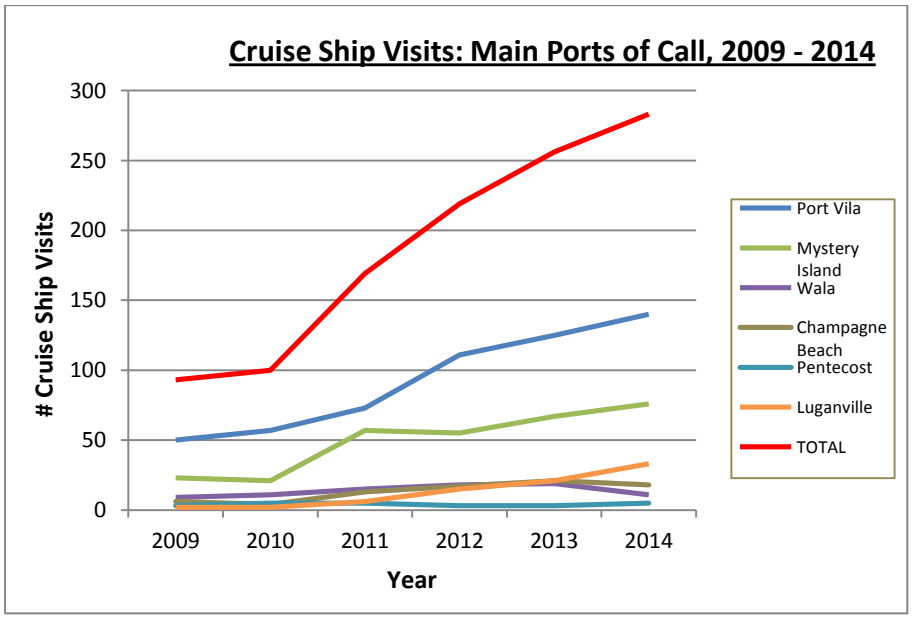
As table 2 and figure 1 below show, cruise tourism in Vanuatu has grown considerably over time, increasing from about 93 cruise ship arrivals across six main ports of call to about 256 in 2013. In 2014, the country is scheduled to receive about 283 cruise ships across six ports of call and six additional sites across the country, including 140 calls to Port Vila.

Table 2: Vanuatu Cruise Ship Statistics by Port, 2009 – 2014

Port	2009	2010	2011	2012	2013	2014
Port Vila	50	57	73	111	125	140
Mystery Island	23	21	57	55	67	76
Wala	9	11	15	18	19	11
Champagne Beach	6	4	13	17	21	18
Pentecost	3	5	5	3	3	5
Luganville	2	2	6	15	21	33
Port Resolution	-	-	-	-	1	1
Toman Island	-	-	-	-	-	1
Metenovor Bay	-	-	-	-	-	1
Ranon/Ambrym	-	-	-	-	2	2
Maewo Island	-	-	-	-	1	0
Loh Island	-	-	-	-	-	1
TOTAL	93	100	169	219	256	283

Note: These figures are based on the number of cruise ships coming in via two major cruise ship agencies. The total number of cruise ship arrivals in the country will be slightly higher than the figures provided.
Source: South Sea Shipping (2014); Pacific Shipping Agencies (2014)

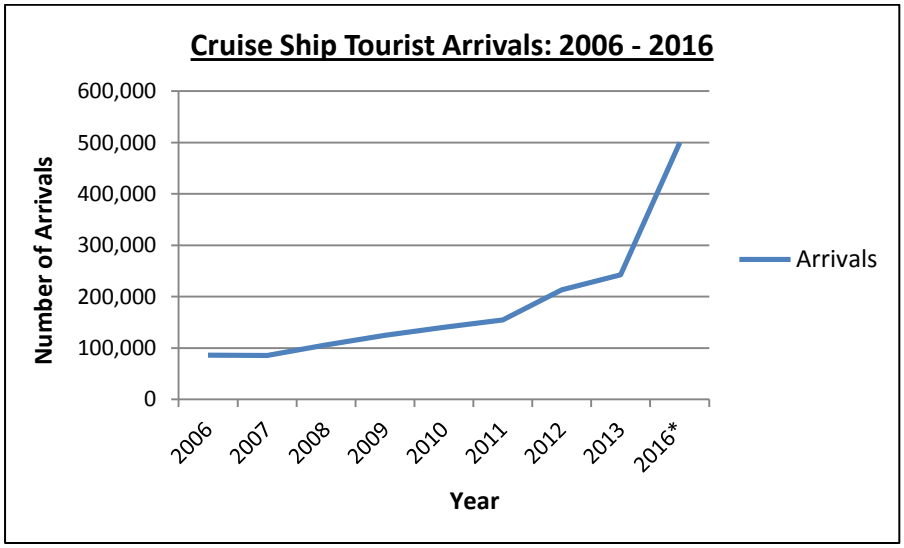
Figure 1: Cruise Ship Port Calls, 2009 – 2014



Since 2009, the number of cruise ship visitors has increased by a yearly average of 16%, and this number is expected to increase with time, as figure 2 below illustrates. In 2013, Vanuatu hosted over 242,000 cruise ship visitors, an increase of almost 200% from its 2006 figure of over 85,000 visitors. Two thirds of these visitors arrived with Carnival Australia. By 2016, Carnival Australia forecasts that the number of tourists arriving on cruise ships will double to over 500,000 (MOFA, Personal Communication, March 2014). Presently, Vanuatu hosts almost one cruise ship a day, and this is expected to double to about two cruise ships a day by 2016-17. Cruise ship tourism therefore has

the potential to become a major contributor to the country's sustainable economic growth and development.

Figure 2: Vanuatu Cruise Passenger Arrivals, 2006 – 2016



Source: VNSO, Dec 2013; TRIP Consultants, 2011; Department of Tourism

Cruise ship visitors to Vanuatu come from a very diverse demographic and a wide range of cruise markets. Compared to the worldwide cruise market, Vanuatu attracts relatively young cruise visitors, with the largest age group being 45 – 54 year olds; it also attracts lower end, middle end and upper (more expensive) ends of the cruise market (SPTO, 2014). Vanuatu also has strong repeat visitation levels; a recent Vanuatu cruise visitor survey conducted by SPTO (2014) revealed that almost a third of all cruise passengers had visited Vanuatu before, 77% of whom had previously visited on a cruise. The survey also revealed that cruise visitors showed great satisfaction with their visit to Vanuatu: while over 70% and 97% of visitors to Port Vila and Mystery Island, respectively, stated that their trip was enjoyable, 60% and 88% of visitors to Port Vila and Mystery Island, respectively, stated they would *definitely* return to those respective destinations in Vanuatu on another cruise (*ibid.*). Over 70% of all visitors stated they would *very likely* recommend Vanuatu to friends and family. Repeat visitors that returned for a land-based holiday were about 33% and had an average length of stay of 7 to 10 days (*ibid.*; TRIP, 2011). This is a strong indication of a relatively high visitor satisfaction, but also indicates that cruise tourism in Vanuatu could be sustainable.

While the number of cruise ship visits to Vanuatu has been increasing exponentially, the size of cruise vessels visiting the country, and in particular, Port Vila, is also becoming significantly larger. This growth in both number of cruise vessel visits and vessel size is likely to be sustained in the future. These numbers signify a growing and potentially sustainable sector; yet, they also highlight the need for key infrastructure to sustain this growth, which includes updated charts to support cruise tourism. The consolidation of the cruise-line industry at the end of the 20th century means that most cruise lines are now owned by a handful of corporations. The cruise industry is even more concentrated in the Pacific region, with two thirds of the cruise ships coming into Vanuatu owned by Carnival Corporation. If *even* one of the major cruise corporations decides to pull out of Vanuatu, this could adversely affect the cruise tourism industry and Vanuatu's economy.

2.2 Trade and Commercial Shipping/Cargo Services

Compliance with IMO conventions is vital for the facilitation of trade, economic growth and development, and national well-being in Vanuatu. Vanuatu is highly reliant on sustainable maritime transport for international, regional, and inter-island shipping, to ensure that its inhabitants are able to access food, petroleum products, and other essential goods. It also depends on reliable commercial shipping services to import construction materials and equipment required to support its thriving construction industry, which next to tourism, is another major driver of economic growth in Vanuatu. A majority of Vanuatu's imported goods are transported by sea from the countries of origin to its hub ports, and a large proportion of its exports are transported by domestic vessels from the outer islands to its hub ports, and then onto its various export destinations. In 2012 the value of imports, excluding those for re-export, totalled 27.45 billion vatu ($283.28 million) (Reserve Bank of Vanuatu, 2013; IMF, 2013). Exports totalled 5.07 billion vatu ($52.32 million) and annual GDP in 2012 was around 72.19 billion vatu ($745 million) (*ibid.*). With almost 99% of goods imported through cargo ships (MOFA, Personal Communication, March 2014) the value of goods traded by sea is large in proportion to the economy and Vanuatu imports the majority of its merchandise, consisting of about 80,000 tons of cargo vessel imports a year to Port Vila, its major port (Batie, 2013). The country enjoys relatively reliable international shipping services, with an annual average of 200 international cargo ship calls to Port Vila and 95 to Luganville (*ibid.*).

2.3 Government Revenues and Foreign Exchange Earnings

The government of Vanuatu currently receives a consistent stream of revenues from the tourism and commercial shipping industries. These revenues are generated directly through port fees and charges levied to cruise ships (including berthing fees, landing fees, and tourist head tax), cargo vessels, and tankers; import duties, and income taxes and licensing fees from tourism employment and businesses. In 2013, the government collected import duties amounting to 4.98 billon vatu ($51.39 million) (GOV Budget Book, 2013). This was the second largest revenue item, accounting for 33.63% of total government revenue. In terms of direct taxes and fees, cruise ships for instance pay between 1.30 million and 2.17 million vatu ($14,000 - $23,000[3]) in port charges to berth for a day, in addition to landing fees of about 433,000 vatu ($4600[4]) (Scheyvens & Russell, 2013, South Sea Shipping, 2014). Based on 2013 cruise ship visit outturn, the total government revenue accruing from cruise ship berthing and landing fees amounts to an average estimate of 1.73 million vatu, at a minimum. Average port charges for cargo ships are 580,000 vatu ($6000), and average berthing duration is 1 day (MIPU-PMD, 2014*)*. Taking into consideration only Port Vila and Luganville port calls for 2013, an estimated 295 annual port calls amounts to about 171 million vatu ($1.77 million).

Vanuatu also accrues revenues indirectly through the taxes and duties on goods and services provided to cruise passengers. In terms of indirect taxes and duties, the Department of Tourism in Vanuatu reports that tourists spend an average of 6 million vatu ($64,000) each year per cruise visit. SPTO (2014) also found an average spend per visitor of about 10,739 vatu per cruise ship visit (USD $114.80). These relatively large amounts of cruise tourist expenditures would translate into reasonably significant tax revenues from tourist spending across the country. In cases where cruise ships visit several locations within Vanuatu, this could mean more spending across the various sites

[3] Original amount quoted as between AUD 15,000 - 25,000
[4] Original amount quoted as AUD 5,000

visited, and in turn, higher government revenues through taxes collected (although it can be argued that with more sites to visit, tourists distribute their spending across the sites more evenly, rather than spending a larger amount in total).

2.4 Infrastructural Development

Infrastructure development is central to the growth of Vanuatu's tourism and economic development. With the significant projected growth in the cruise ship industry, the existing infrastructure and services may struggle to cope. Driven by the steady growth of cruise ship tourism, and the tourism industry as a whole, the government of Vanuatu in partnership with several donors, has embarked on a number of infrastructural development projects, many of which are directly aimed at improving the quality of the cruise ship visitor experience, but also to promote and support the tourism industry. One of such projects is the 'Vanuatu Tourism Infrastructure Project', funded by the governments of New Zealand and Australia (VPMU, 2013), and aimed at turning Port Vila, its main commercial and tourist centre, into the 'Pearl of the South Pacific' (DailyPost 2013). A key component is a seafront beautification project, which includes the rehabilitation and development of public areas around the Port Vila cruise ship wharf, and the seafront in downtown Port Vila. A similar project is the 3.39 billion vatu ($36.46 million[5]) *Port Vila Urban Development Project*, 2013-2017, funded jointly by the Vanuatu Government, AusAID (now the Australian Government Department of Foreign Affairs and Trade (DFAT)), and Asian Development Bank (VPMU, 2013). One of the key goals of this project is to promote investment and tourism. In the long run, these development projects would provide employment opportunities government revenues; in the short-term, they would also provide job opportunities for the construction workers, and other locals involved in various aspects of the projects. The improved infrastructure would facilitate tourism, but also improve the standard of living of Vanuatu's residents.

Other infrastructure development projects include wharf upgrades for incoming cruise liners and major road upgrades across Vanuatu's main islands. This includes the construction of the new international wharf in Port Vila in mid-2014, which will free up the old wharf to be dedicated solely to cruise ships (VPMU, 2013). Another includes planned road upgrades such as the Chinese-funded road project from Luganville to South Santo that would enable tourists to have easier access to the Millenium cave in South Santo (DOT, 2014). These projects will only be implementable, yield high returns on the current investments, and be an impetus for businesses, if cargo vessels are able to bring in the equipment and materials required for the construction, but more importantly, if Vanuatu is able to secure long-term cruise ship visits.

In addition to government investments, some cruise ship companies also carry out infrastructural projects in remote islands, including building jetties and other facilities to support tourism in these areas. For instance, in 2012, Carnival Australia, the biggest cruise ship operator in Vanuatu, supported by a AUS 805,000 grant from the AusAID funded Enterprise Challenge Fund (ECF), implemented a variety of infrastructure projects in Mystery Island, Wala Island and Champagne Beach, to improve jetty landings, build sanitary facilities, provide fresh water supplies, but also train for the local traders in areas such as hospitality and passenger handling, financial management and development of local trade initiatives (ECF, 2013). These investments have had tangible impacts on the economic livelihoods of locals: they have created jobs, increased income generation

[5] Original amount quoted as AUD 39.1 million

opportunities, increased tourism, and have contributed to economic development in these parts of the country (*ibid.*). As a result of these investments, calls by Carnival Australia passenger ships to the three sites increased from 36 calls in 2009 to 77 planned calls in 2013, and Royal Caribbean has commenced calls at Mystery Island and Champagne Bay (*ibid.*). Local community incomes increased as a result of the increased number of ship calls, with average passenger expenditure at each of these sites of over 1.31 million vatu ($14,000[6]); these incomes benefited mainly women and their children, as many of them depend on ship calls as their major source of family income (*ibid.*). It would advantageous to take steps to sustain such public-private partnerships between cruise companies and the country for the long-term.

2.5 Multiplier Effects

Cruise tourism has significant multiplier effects on the economy of Vanuatu through direct spending by cruise ships and cruise ship visitors, but also through the creation of jobs, greater private sector development, and the attraction of foreign direct investment (FDI).

Cruise visitors spend an average of 10,739 vatu ($114.80) per cruise ship visit in Vanuatu (SPTO, 2014). This amount directly benefits the Vanuatu economy. Visitors spend an average of 13,624 vatu ($145.60) in Port Vila and 3,142 vatu (USD 31.42) in Mystery Island, its two most popular sites (*ibid.*). Return visitors also spend about 27% more than those visiting for the first time (*ibid.*). In their 2011 Vanuatu Tourism Survey, TRIP Consultants estimated a much higher average daily expenditure of cruise ship visitors of 21,446 vatu (USD 229.20), amounting to an estimated total direct expenditure of 3.142 billion vatu ($33.58 million). Based on these figures, cruise ship visitors contributed to approximately 15.2% of the estimated total direct tourist expenditure in 2010.

Table 3: Cruise Visitor Expenditure – Average Spend Per Person

Port Vila			Mystery Island		
Item	Amount (VATU)	Amount (USD)	**Item**	Amount (VATU)	Amount (USD)
Duty Free	3,732	39.90	Clothes	1,337	14.29
Transport	2,077	22.21	Other goods	586	6.27
Clothes	1,882	20.12	Handicrafts	558	5.97
Handicrafts	1,754	18.75	Duty free	228	2.44
Shore excursions	1,575	16.84	Foods and beverages	196	2.10
Food and beverages	1,460	15.61	Services	160	1.71
Other goods	991	10.60	Shore excursions	77	0.82
Services	154	1.65	Transport	0	0
TOTAL	13,624	145.68	**TOTAL**	3,142	33.60

Source: SPTO, February 2014

Cruise ship tourism has a wide-ranging impact on Vanuatu's economy. As the table above shows, cruise visitors spend on a variety of items, illustrating the impact of cruise tourism expenditure across many segments of the economy (including handicraft markets, food markets, restaurants, clothing shops, taxis and buses, as well as a variety of other services). The steady growth in cruise tourism and the resulting increase in expenditure, leads to significant employment creation, directly

[6] Original amount quoted as AUD 15,000

creating jobs through hotels, restaurants, souvenir shops, taxis, tour companies, travel agencies, rental cars services. This leads to further business growth, and makes Vanuatu an attractive and viable place for private sector and foreign investment.

The benefits of cruise ship tourism in Vanuatu extend beyond the direct expenditure of visitors; they also include providing support for the local industry and local people. Two major national brands – "Vanuatu Natural water" and Vanuatu-grown "Tanna coffee" – have been contracted to be supplied with a guaranteed consignment for use and purchase on-board majority of the cruise ships that visit Vanuatu, including all P&O Cruise ships (Cruise Weekly, 2014; Daily Post, 2014). This provides unique marketing opportunities and greater awareness abroad of these local Vanuatu products, and in doing so, these industries are likely to experience a subsequent increase in sales and exports of these items. This will in turn have positive spillover effects on the agricultural sector by creating more job opportunities, stimulating further investment in the coffee growing industry, and expansion of the value-added industry. In addition, cruise liners employ ni-Vanuatu crew on their cruise ships (VMC, 2014). To encourage more employment of ni-Vanuatu on cruise ships, the government of Vanuatu through negotiations has made provision for cruise ship berthing fees to be reduced to 4.10 million vatu ($42,300[7]) if the ships have at least 40 ni-Vanuatu staff on board when arriving or departing Port Vila (Scheyvens & Russell, 2013). These are unique initiatives to ensure that Vanuatu communities and its economy share in the benefits of the massive growth in cruise tourism, and thus, contribute to sustainable tourism in the country. These arrangements, including a guaranteed consumer market for some of its niche products, as well as employment for a number of its seafarers, may no longer hold if the cruise ships pull out of Vanuatu. This could inadvertently lead to loss of jobs, and with their flow-on effects on individuals and families in Vanuatu.

[7] Original amount quoted as AUD 16,000

Chapter III: PICTs Obligations for Hydrographic Services under the SOLAS Convention

3.1 Obligations for hydrograhic services under the SOLAS Conventions

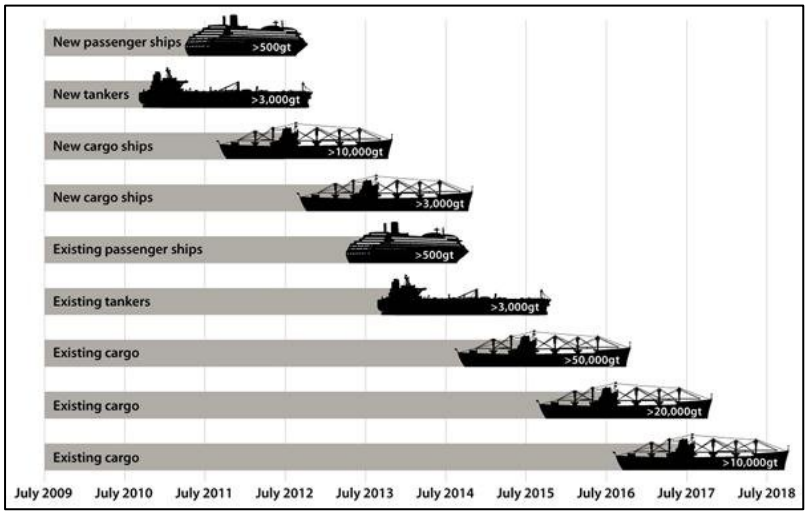
PICTs have a long history with seafaring and are renowned for their voyaging skills. With globalization and integration of PICTs within the world economy, most PICTS are member states of the IMO. Management of the maritime sector in PICTs is benchmarked in terms of compliance with IMO conventions and codes on safety, security and environmental performance of international shipping. A major convention is the SOLAS Convention which aims to specify minimum safety standards for the construction, equipment and operation of ships. To date, this convention has been ratified by 159 states, including the following PICTs: Cook Islands, Fjii, Kiribati, Marshall Islands, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu. Chapter V of the SOLAS Convention identifies certain navigation safety services that should be provided by contracting governments, and sets forth provisions of an operational nature applicable in general to all ships on all voyages.

Under the SOLAS Convention (Chapter V, Regulations 4 and 9), each Coastal State shall ensure that: (i) maritime safety information is promulgated; (ii) hydrographic surveys are carried out; and (iii) appropriate nautical charts and other nautical publications are available and up to date.

The provision of these hydrographic services shall not be seen as optional. It is an international obligation encompassed in the United Nations Convention on the Law of the Sea (UNCLOS), which entered into force in 1994 and lies on all contracting governments.

Additional SOLAS regulations provide for the phased introduction of a mandatory carriage requirement for Electronic Chart Display and Information Systems (ECDIS) between 2012 and 2018, depending on the class of ship and tonnage. From mid-2014 the regulation will come into force for existing passenger ships above 500 gross tonnage (GT), followed by tankers and cargo ships as shown by the timeline for compulsory implementation in figure 2 below, and table B.1 in appendix B.

Figure 2: Timeline for mandatory use of the ECDIS system



Source: http://www.ecdisfit.com/regulations/implementationdates/

This system relies on having hydrographic charts for all areas on the vessel routes; this includes all ports used by these types of vessels. Currently the vast majority of PICTs neither have updated hydrographic charts for their ports nor electronic charts. In the case of Vanuatu, charts rely on 19th century data and no new information has been added since the Second World War. Given the dependence on trade and the economic importance of cruise tourism to overall development in Vanuatu, it is important that urgent efforts are undertaken to meet the IMO requirements; to avoid possible disruption of development plans. Land Information New Zealand (LINZ) has undertaken a risk assessment for Vanuatu and has identified the areas as having significant, heightened or moderate risk without electronic charts as displayed in figure 3 annex 1 (LINZ, 2013).

3.2 Potential Risks and Impacts

Vanuatu' s development plans centre around having a viable tourism sector, of which cruise tourism has been the major growth leader, and poised for continued growth in the medium term. Reliable trade is also integral to the country's sustainable economic growth and development. Therefore, the country's development plans could be disrupted and there are several risks potentially associated with non-compliance with IMO Conventions, including the absence of hydrographic charts, which this project intends to mitigate. These include risks to the tourism sector, trade and safety of maritime navigation, as well as the knock-on effects on ongoing or planned public and private sector investment projects, cost-effective movement of goods and people, and government revenues.

Chapter IV: Economic Assessment

4.1 Cost Benefit Analysis

The Cost Benefit Analysis of Hydrographic Surveys and Maritime Charting will be based on an economic assessment of maritime charts from a 'with' and 'without' scenario. The 'with' scenario implies that Vanuatu will introduce electronic charts and continue to enjoy the current benefits from its existing maritime activities and their multiplier effects on the economy, in addition to any potential benefits that will indirectly accrue. In the 'without' scenario, the charts are not updated and Vanuatu stands the risk of losing both its existing and any other potential benefits. In the assessment, benefits directly associated with the ports are elaborated as well as indirect benefits.

Whilst the CBA is based on Vanuatu's recent sectoral performance, it is anticipated that this is the pilot study for a wider regional project involving several other PICTs.

4.1.1 Costs

The costs assessed in this analysis solely reflect the cost of carrying out any initial surveys, and the cost of transferring those surveys into electronic charts.

QUANTIFIED COSTS

1. Hydrographic Survey and Maritime Charting cost

There are 4 phases of work that must be undertaken to obtain the finished electronic chart products, as presented in table 5 below.

Table 5: Cost of producing electronic charts (Vanuatu case)

Phase/ Activity	Service Provider (Vanuatu case)	Cost[8] (Vanuatu case)
Country level risk assessment to prioritise where electronic maps are required	Land Information New Zealand Hydrographic Authority (LINZ, 2013)	Estimated NZ$125,000 to NZ$175,000 per PIC (Weinstein, 2013)
Existing data discovery and identification of data required	SOPAC Geoscience and Technology (SPC)	Free of charge/ pro bono
Hydrographic survey	SOPAC currently undertaking survey of 4 sites, funded by NZAid (NZ$535,000). In-kind costs from UKHO, LINZ and GOV (NZ$100,000). Total costs is NZ$635,000. Remaining sites are yet to be contracted out.	Total estimated NZ$1.8m and NZ$5.5m (Weinstein, 2013)
Electronic map production	National or Principal Charting Authority (UK Hydrographic Office (UKHO) for Vanuatu case)	Free of charge/pro bono
Total in NZ$ (Vanuatu case)		**NZ$1,925,000 to NZ$5,675,000**
Total in vatu (Vanuatu case)		**153,615,000 vatu to 452,865,000 vatu**

[8] This is the cost of producing electronic charts for the entire country.

For Vanuatu, the first 2 phases of work have been completed and SOPAC is currently surveying the 4 sites which are the highest priority in need of hydrographic surveys: Luganville, Champagne Beach, Wala, and Pentecost (these were identified by the country risk assessment undertaken by Land Information New Zealand and through consultation with the Vanuatu Government).

UNQUANTIFIED POTENTIAL COSTS

This analysis does not quantify all potential costs due to lack of sufficient data to value such costs. Some of these costs are summarized in the section below.

Socio-cultural impacts of cruise ship tourism, including potential cultural erosion.

With the increasing number of cruise ship visitors to Vanuatu, locals could experience a loss of local culture, customs, and traditions in two potential ways. There is the potential loss associated with the culture and traditions being over-commercialized to conform to tourist expectations, but also local craftsmen possibly deviating from their original designs of crafts and artefacts to make them more attractive to tourists. This is also related to modernization of the major tourist destinations within a country to cater to *perceived* or *actual* tourist preferences. Arguably, increased tourism could also lead to cultural and historical preservation and revitalization, particularly where there are economic incentives associated with doing so. Secondly, there could be the loss of culture and traditions associated with local residents adopting habits and patterns from tourists, such as their dress code and language, which may not be in line with local customs, identities and values. That is, the possibility that the locals become influenced by 'Western' practices that they copy from tourists.

4.1.2 Benefits

The benefits assessed in this analysis reflect the current and potential benefits of updating hydrographic surveys and electronic charts. These benefits are listed in table 6 below.

Table 6: Current and Potential benefits

Current		Potential	
Direct	**Indirect**	**Direct**	**Indirect**
• Cruise ship visitor expenditure • Cruise berthing and landing fees • Cruise ship tax per head • Cargo ship berthing fees • Import duties & Excise Taxes • VAT Receipts • Foreign Exchange Earnings • Infrastructural Investments[9]	• Multiplier effects • Infrastructural Investments • Business licensing fees	• Safety of Navigation • Coastal Zone Management	• Multiplier effects • Foreign Direct Investment • Infrastructural Investments[10]

Note: Quantifiable costs and benefits in black and non-quantified costs and benefits in red

[9] Direct investments by cruise ship companies
[10] Indirect investments by the government to the economy stimulated by growth in tourism industry

QUANTIFIED BENEFITS

Due to time and data constraints, this analysis only quantifies four current benefits highlighted in black. This makes any cost-benefit ratio derived in the latter part of this analysis highly conservative.

UNQUANTIFIED POTENTIAL BENEFITS

There are a number of additional potential benefits associated with updated navigational charts that are not quantified due to lack of sufficient information to quantify their monetary value. While not monetized, these benefits are potentially significant and still relevant to the overall analysis. Some of these benefits are summarized in the section below.

Disaster risk management and climate change

Vanuatu is located in the Pacific ring of fire and is also frequently hit by hydro meteorological hazards such as tropical cyclones. There are on average 23 tropical cyclones per decade that take place in Port Vila (CSIRO, 2011). The geographic isolation of Vanuatu's islands and the modest infrastructure used for the majority of household buildings, means that the population is vulnerable to these hazards.

Table 7 below summarises the hazardous events that have been recorded in Vanuatu over the last 600 years. This is a minimum estimate, as the information collection on natural hazard events has only been implemented relatively recently.

Table 7: Natural hazards events recorded

Event	Frequency	Houses Destroyed	Houses Damaged	Affected	Losses (Vatu)
Gale	56	-	-	-	-
Tropical Cyclone	540	-	-	-	40,000,000
Landslide	7	92	510	2,675	-
Storm	45	-	-	-	-
Storm surge	1	-	-	-	-
Volcanic Activity	280	-	-	-	-
TOTAL	929	92	510	2,675	40,000,000

Source: DesInventar, 2014

Although data is also limited on the consequences of natural hazard events, their frequency gives some indication of the vulnerability of populations to these hazards. For all islands without air access, or those that have airports damaged during hazardous events, emergency goods and care must be delivered by boat. If large international vessels delivering heavy goods such as water and food cannot dock in Vanuatu, precious time will be wasted whilst smaller boats collect goods and passengers from the larger ships in order to bring them to shore. Although it is not possible to quantify these humanitarian costs in monetary terms, these effects should still be taken into account.

Hydrographic surveys of Vanuatu's port areas can also be used to aid disaster mitigation. Storm surge and tsunami models depend on hydrographic data in order to be able to predict the form and magnitude of coastal hazards. These models can then inform hazard resistant urban planning to reduce the population's vulnerability during natural hazard events.

In the future, hydrographic surveys and electronic charts may become ever more valuable resources as climate change will impact the magnitude and frequency of hazard events. According to the Commonwealth Scientific and Industrial Research Organisation (CSIRO) the frequency and intensity of days of extreme heat is expected to increase over the twenty first century. There is already significant variation in rainfall per annum and the rainfall experienced during the wet season is projected to increase over this century, along with the frequency and intensity of extreme rainfall days. The dry season is projected to see less rainfall (CSIRO, 2011). It is possible that these changes in climate will produce higher frequency of floods and droughts. So the ability of governments to implement disaster mitigation and reduction activities using hydrographic information could become ever more vital in the future.

4.2 Analysis

The quantifiable direct costs and benefits are summarized in the table below, projected for the next five years. The projections are based on the sectoral analysis, and assume that visitor expenditure, berthing and landing fees and import duties will increase by 3% per year, in line with inflation. These streams of cost and benefits were discounted using an annual discount factor of 10%. All analysis tables can be found in Appendix B.

COST-BENEFIT RESULTS

The table below displays the results of the analysis. A sensitivity analysis has been undertaken in order to provide upper and lower bound estimates. Throughout the sensitivity analysis the most conservative benefit estimates have been used.

Table 8: Results

	Lower bound (conservative		Upper bound (conservative)	
	USD	Vatu	USD	Vatu
Total discounted costs	4,248,663	411,695,455	1,441,176	139,650,000
Total discounted benefits	386,536,210	37,455,358,794	386,536,210	37,455,358,794
Net Present Value (NPV)	382,287,547	37,043,663,340	385,095,034	37,315,708,794
Benefit Costs Ratio (BCR)	91		268	

As the table shows, a very high net present value of 37.04 billion vatu ($382 million) can be expected, even when minimum benefits and maximum costs are assumed. This very high net present value justifies the project investment in hydrographic surveys for Vanuatu. *The direct benefits which will* accrue *to the Vanuatu economy in a 'with project' scenario (if electronic charts are produced) far outweigh the costs.*

The benefit cost ratio in the “worst case scenario” is 91, meaning that for every vatu spent on conducting the hydrographic surveys and producing the electronic charts, the government can expect to receive 91 vatu in return. In this same scenario, the total expected value to Vanuatu (benefits minus costs) of implementing this project is over 37 billion vatu (383 million USD) over the next 6 years (2014-2019).

SCENARIO (SENSITIVITY) ANALYSIS

The basic analysis uses minimum estimates for the benefits that would accrue if this project goes ahead. If the unquantified benefits were to be included in the analysis the net present value and benefit cost ratios would increase far above the values reported here. This analysis is also robust to all changes in the discount rate. Whether the rate is 0% or 100%, the benefits outweigh the costs of producing electronic charts.

Chapter V: Conclusion

In the case of Vanuatu, this analysis confirms that the benefits of conducting hydrographic surveys and then producing electronic charts far outweigh costs in all possible scenarios. The net present value of the investment over the next 5 years is 37.04 billion vatu ($382 million). The benefit cost ratio in the "worst case scenario" is still 91, meaning that for every vatu spent on producing the hydrographic surveys and then the electronic charts, the government can expect to receive 91 vatu in return. In this same scenario, the total expected value to Vanuatu (benefits minus costs) of implementing this project is over 37 billion vatu (383 million USD) over the next 6 years (2014-2019). On the contrary, if this project does not go ahead, Vanuatu may not be able to sustain some of its current revenue streams, nor would it be able to capitalize on these additional benefits that would further deepen its tourism sector and its economy as a whole.

Given that the majority of benefits quantified in this analysis are from the tourism industry, this analysis also highlights the vulnerability of the Vanuatu economy to any change that may adversely impact the tourism sector, including changes in the maritime sector.

Based on the analysis for Vanuatu, other PICTs are likely to receive overall benefits from updating their hydrographic surveys and producing electronic charts. The benefits would mainly accrue through the non-disruption of commodity trade, and where applicable, may also include strengthening of the existing cruise tourism industry and the potential to promote cruise tourism.

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Appendix

Appendix A – Cruise Ship Passenger Statistics

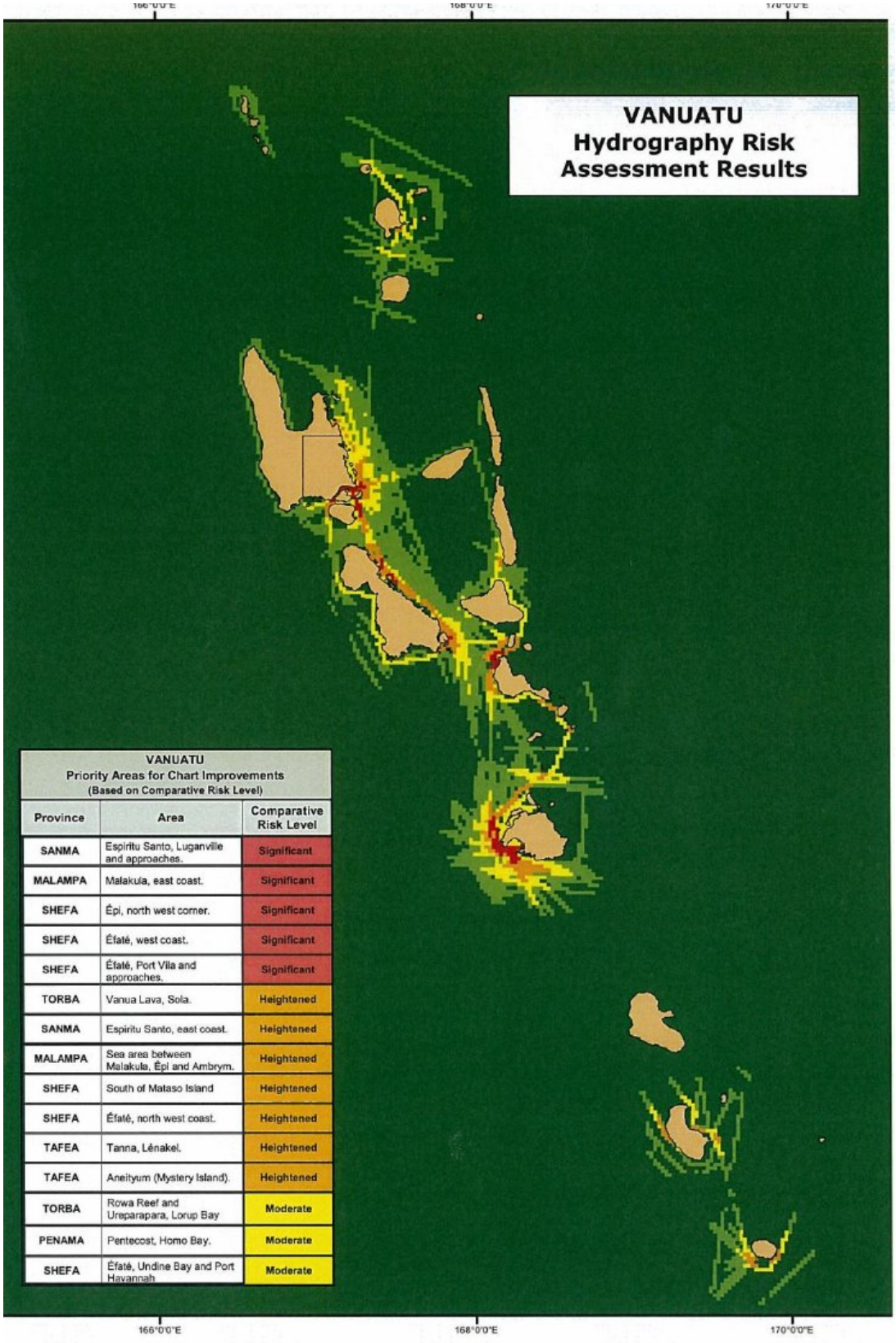
Table A.1: Vanuatu Cruise Passenger Arrivals, 2006 - 2016

Year	Number of Cruise Visitors
2001	52,758
2002	45,832
2003	51,995
2004	30,961
2005	61,414
2006	85,922
2007	85,737
2008	106,138
2009	124,818
2010	140,468
2011	154,938
2012	213,243
2013	242,646
2016	500,000*
Average Annual % Change (**2006-2013**)	16.49%

*projected
Source: VNSO, Dec 2013; TRIP Consultants, 2011; Department of Tourism

Appendix B – ECDIS Requirements and Vanuatu Hydrography Risk Assessment Results

Figure B.1: Priority Areas for Hydrographic chart improvement



VANUATU
Priority Areas for Chart Improvements
(Based on Comparative Risk Level)

Province	Area	Comparative Risk Level
SANMA	Espiritu Santo, Luganville and approaches.	Significant
MALAMPA	Malakula, east coast.	Significant
SHEFA	Épi, north west corner.	Significant
SHEFA	Éfaté, west coast.	Significant
SHEFA	Éfaté, Port Vila and approaches.	Significant
TORBA	Vanua Lava, Sola.	Heightened
SANMA	Espiritu Santo, east coast.	Heightened
MALAMPA	Sea area between Malakula, Épi and Ambrym.	Heightened
SHEFA	South of Mataso Island	Heightened
SHEFA	Éfaté, north west coast.	Heightened
TAFEA	Tanna, Lénakel.	Heightened
TAFEA	Aneityum (Mystery Island).	Heightened
TORBA	Rowa Reef and Ureparapara, Lorup Bay	Moderate
PENAMA	Pentecost, Homo Bay.	Moderate
SHEFA	Éfaté, Undine Bay and Port Havannah	Moderate

Source: LINZ, 2013

Table B.1: Implementation schedule for the mandatory carriage of ECDIS on ships

Ship Type	Gross Tonnage	Gross Tonnage	Implementation Date
Passenger Ships	500 GT and upwards	On or after 1 July 2012	On or after 1 July 2012
		Before 1 July 2012	Not later than the first survey on or after 1 July 2014
Tankers	3,000 GT and upwards	On or after 1 July 2012	On or after 1 July 2012
		Before 1 July 2012	Not later than the first survey on or after 1 July 2015
Cargo, ships, other than tankers	10,000 GT and upwards	On or after 1 July 2013	On or after 1 July 2013
	3,000 GT and upwards, but less than 10,000 GT	Before 1 July 2014	Before 1 July 2014
	50,000 GT and upwards	Before 1 July 2013	Not later than the first survey on or after 1 July 2016
	20, 000 GT and upwards but less than 50,000 GT		Not later than the first survey on or after 1 July 2017
	10,000 GT and upwards but less than 20,000 GT		Not later than the first survey on or after 1 July 2018

Appendix C - Cost-Benefit Analysis Tables

Table C.1: Lower bound

	2014	2015	2016	2017	2018	2019
COSTS						
Investment cost	4,673,529	0	0	0	0	0
TOTAL COSTS	4,673,529	0	0	0	0	0
DISCOUNTED TOTAL COSTS	4,248,663	0	0	0	0	0
BENEFITS						
Cruise Visitor Expenditure	28,183,942	29,029,460	29,900,344	30,797,354	31,721,275	28,183,942
Cruise berthing and land fees	28134	28,978	29,847	30,743	31,665	32,615
Cargo ship berthing fees	0	0	0	0	0	0
Import duties	55,610,289	57,278,598	58,996,956	60,766,864	62,589,870	64,467,566
TOTAL BENEFITS	83,001,473	85,491,518	88,056,263	90,697,951	93,418,890	96,221,456
DISCOUNTED TOTAL BENEFITS	75,455,885	70,654,147	66,157,974	61,947,921	58,005,780	54,314,504
NET DISCOUNTED BENEFITS (USD)	71,207,222	70,654,147	66,157,974	61,947,921	58,005,780	54,314,504
NET DISCOUNTED BENEFITS (Vatu)	6,899,979,793	6,846,386,823	6,410,707,661	6,002,753,537	5,620,760,130	5,263,075,395

Table C.2: Upper bound

	2014	2015	2016	2017	2018	2019
COSTS						
Investment cost	1,585,294	0	0	0	0	0
TOTAL COSTS	1,585,294	0	0	0	0	0
DISCOUNTED TOTAL COSTS	1,441,176	0	0	0	0	0
BENEFITS						
Cruise Visitor Expenditure	27,363,050	28,183,942	29,029,460	29,900,344	30,797,354	31,721,275
Cruise berthing and land fees	28,134	28,978	29,847	30,743	31,665	32,615
Cargo ship berthing fees	0	0	0	0	0	0
Import duties	55,610,289	57,278,598	58,996,956	60,766,864	62,589,870	64,467,566
TOTAL BENEFITS	83,002,317	85,492,387	88,057,159	90,698,873	93,419,840	96,222,435
DISCOUNTED TOTAL BENEFITS	75,456,652	70,654,865	66,158,647	61,948,551	58,006,370	54,315,056
NET DISCOUNTED BENEFITS (USD)	74,015,476	70,654,865	66,158,647	61,948,551	58,006,370	54,315,056
NET DISCOUNTED BENEFITS (Vatu)	7,172,099,598	6,846,456,442	6,410,772,850	6,002,814,578	5,620,817,286	5,263,128,914