

The Vanuatu Tourism Adaptation System – Supplementary material

Johanna Loehr

Griffith Institute for Tourism, Griffith University, Southport, Australia

The following tables were developed as part of a PhD on reducing climate change risk to South Pacific tourist destinations holistically. As part of the project, the Vanuatu Tourism Adaptation System (TAS) was developed to better understand climate risk to destinations in Vanuatu and how it can be reduced. The below tables provide additional information on the selection and development of variables that make up the system as well as feedback loops that influence system behaviour.

For further information, contact Johanna Loehr via johanna.loehr@griffithuni.edu.au

Table 1. Climate Change and Tourism: Relevant policies and plans reviewed for the development of the TAS.

Abbreviation	Document Name
Vanuatu	
EC Act	Environmental Conservation Act
INDC Vanuatu	Intended Nationally Determined Contributions Vanuatu
NAPA Vanuatu	National Adaptation Programme of Action Vanuatu
NCCASLBR	National Climate Change Adaptation Strategy for Land-Based Resources (2012-2022)
NICMF	National Integrated Coastal Management Framework and Implementation Strategy for Vanuatu 2010
Tafea PTP	Tafea Provincial Tourism Plan
VCC&DRRP	Vanuatu Climate Change & Disaster Risk Reduction Policy 2016-2030
VNOP	Vanuatu National Ocean Policy
VNSDP	Vanuatu National Sustainable Development Plan 2030 (The People Plan)
VISP	Vanuatu Strategic Infrastructure Plan 2015-2024
VSTAP	Vanuatu Strategic Tourism Action Plan
Samoa	
INDC Samoa	Intended Nationally Determined Contributions Samoa
NAPDMS	National Action Plan for Disaster Management Samoa
NAPA Samoa	National Adaptation Programme of Action Samoa
NTCCS Samoa	National Tourism Climate Change Strategy Samoa
Samoa TSP	Samoa Tourism Sector Plan 2014-2019
TDA4 Savaii	Tourism Development Area 4 Eastern Savaii Management Plan
Others	
Fiji NCCP	Fiji National Climate Change Policy 2012
SRDP	Strategy for Climate and Disaster Resilient Development in the Pacific 2016

Table 2. Variables influencing risk in a Vanuatu tourism context derived from policies and plans, academic literature, interviews and a stakeholder workshop.

		Variable	Description	Plans and strategies	Academic references	No. of inter views
Community & Culture	1	Customary land ownership	Land that is community or family owned and passed on through customary titles.	Tafea PTP; EC Act; VSTAP; NTCCS Samoa	Daly et al., 2010; Scheyvens & Momsen, 2008b; Warrick et al., 2016	/
	2	Social & gender equality	Equal opportunities for all.	SRDP 2015; VCC&DRRP; NAPA Samoa	Cinner et al., 2018; Kuruppu & Willie, 2015	/
	3	Population growth	Rate at which local destination population grows.	VISP; NICMF; NAPA Vanuatu; Tafea PTP; NAPA Samoa; NTCCS Samoa; Fiji NCCP	Crichton & Esteban, 2017; Kurniawan et al., 2016; Kuruppu & Willie, 2015; Millen et al., 2014; Nunn et al., 2014	1
	4	Land management process	Strength of land management processes.	NICMF; NCCASLBR	/	*
	5	Traditional knowledge	Integration/incorporation of traditional knowledge into technical knowledge when addressing climate risk.	VCC&DRRP; VNOP; TDA4 Savaii; INDC Vanuatu; NCCASLBR; VNSDP; NTCCS Samoa; SRDP	Daly et al., 2010; Hay & Mimura, 2013; Kuruppu & Willie, 2015; Millen et al., 2014; Warrick et al., 2016	1
	6	Social networks	Strength of social interaction across space, at a variety of scales.	VCC&DRRP; Tafea PTP; TDA4 Savaii; VNSDP; NTCCS Samoa	Barnett, 2001; Becken et al., 2014; Chien-Yu Tsao et al., 2016; Daly et al., 2010; Jing et al., 2015; Parsons et al., 2017; Scheyvens & Momsen, 2008b; Warrick et al., 2016; Whitney et al., 2017; Wisner et al., 2004	2
	7	Food & natural resource security	The level of secure access to food and other natural resources including drinking water and building material.	NAPA Samoa; NAPA Vanuatu; VNOP	Parsons et al., 2017; Warrick et al., 2016	7
Finance	8	Government resources	Amount of resources available to the government.	VSTAP; NTCCS Samoa	Klint et al., 2012	3
	9	Availability of climate change funding in tourism	Amount of money available to address climate change in tourism, can be public or private.	INDC Vanuatu; NTCCS Samoa; NAPA Vanuatu; NAPA Samoa; TDA4 Savaii; Samoa TSP	Becken 2005; Hess & Kelman 2017, Jian et al. 2015; Jiang et al. 2012, Klint et al. 2012; Moreno & Becken, 2009; Wong et al. 2013, Perch-Nielsen, 2010; Parsons et al., 2017	6
	10	External climate change funding	Access to climate change funding derived from external sources.	NTCCS Samoa; NAPA Vanuatu; INDC Vanuatu; VCC&DRRP; NCCASLBR; NAPA Samoa; INDC Samoa; Samoa TSP; SRDP	Crichton & Esteban, 2017; Jian et al. 2015; Jiang et al. 2012; Kuruppu & Willie, 2015; Nunn et al. 2014; Pelling & Uitto, 2001; Warrick et al. 2016; Wong et al. 2013	4
	11	Assets/capital	Access to capital/assets at businesses/individual level in	/		8

			times of need, includes access to bank loans.			
	12	Private investment	Amount of money available for investment through individuals or businesses.	/	Hess & Kelman, 2017	3
	13	Access to risk transfer mechanism	Access to insurance or other risk transfer mechanisms.	VCC&DRRP; NTCCS Samoa; NAPDMS	Becken, 2005; Becken et al., 2014; Hay & Mimura, 2013; Hess & Kelman, 2017; Jian et al., 2015; Meheux & Parker, 2006; Parson et al., 2017; Pelling & Uitto, 2001	3
Governance	14	Subsidiarity of governance	Power being distributed to those institutions and groups which are most capable of making decisions, including formal and informal governance streams and may impact on how resources are distributed.	/	Kuruppu & Willie, 2015; Nunn et al., 2014; Parsons et al., 2017	1
	15	Community & industry participation	The level to which community and the tourism sector are involved in tourism adaptation, including the formulation of strategic plans & policies.	NAPA Vanuatu; INDC Vanuatu; VCC&DRRP; NAPA Samoa; NTCCS Samoa	Klint et al., 2012; Kuruppu & Willie, 2015; Warrick et al., 2016	3
	16	Tourism priority in strategic plans & availability, enforcement of supporting policies	The level to which tourism has been identified as a priority sector in government strategies and plans.	NAPA Vanuatu; INDC Vanuatu; VCC&DRRP; VSTAP; NTCCS Samoa; NAPA Samoa; Samoa TSP; TDA4 Savaii	Becken, 2005; Becken et al., 2014; Hess & Kelman, 2017; Jiang et al., 2012; Klint et al., 2012; Nunn et al., 2014	4
	17	International cooperation and influence	Level of cooperation and influence internationally by national government.	INDC Vanuatu	Pelling & Uitto, 2001; Scheyvens & Momsen, 2008b	/
	18	Effectiveness of decision-making & planning	Level of effectiveness and quality of decision-making & planning to addressing climate risk.	VNOP; NICMF; NAPA Vanuatu; VCC&DRRP; NCCASLBR	Barnett, 2001; Grothmann & Patt, 2005; Kuruppu & Willie, 2015; Nunn et al. 2014; Parson et al., 2017; Satons-Lacueva et al., 2017; Warrick et al., 2016; Whitney et al., 2017	1
	19	Fulfilment of climate change commitments & requirements	Level of fulfilment of international climate change commitments (e.g. Paris Agreement) and funding requirements (e.g. National Implementing entity (NIE) accreditation).	INDC Vanuatu; VSTAP Vanuatu, VCC&DRRP; INDC Samoa; NTCCS Samoa; SRDP	Barnett, 2001; Jiang et al., 2012	1
	20	Demand for destination tourism product	The demand & travel motivation for people to visit the destination.	VSTAP; Tafea PTP; NTCCS Samoa; Samoa TSP	Calgaro et al. 2014; Perch-Nielsen, 2010	4
Human	21	Willingness for action	People's willingness to implement adaptation actions.	/	Cinner et al., 2018; Hess & Kelman, 2017; Nunn et al., 2014; Warrick et al., 2016	3

	22	Visitor perceptions	Visitor experience & satisfaction.	VSTAP; Tafea PTP; TDA4 Savaii; NTCCS Samoa	Moreno & Becken, 2009; Parsons et al., 2017; Wong et al., 2013	2
	23	Perceived benefit of adaptation (vs cost)	Perceived outcomes and cost effectiveness of adaptation actions.	NAPA Vanuatu; NTCCS Samoa; NAPA Samoa	Crichton & Esteban, 2017; Grothmann & Patt, 2005; Hess & Kelman, 2017; Santos-Lacueva et al., 2017	/
	24	Aspirations & values	Aspirations & values held by community & individuals.	VCC&DRRP; TDA4 Savaii	Kuruppu & Willie, 2015; Nunn et al., 2014; Parsons et al., 2017; Pelling et al., 2014; Warrick et al., 2017	/
	25	Risk perception	Subjective understanding of risk & risk management which is influenced by past experiences.	NAPA Vanuatu	Grothmann & Patt, 2005; Hay & Mimura, 2013; Kuruppu & Liverman, 2011; Meheux & Parker, 2006; Moreno & Becken, 2009; Santos-Lacueva et al., 2017; Whitney et al., 2017	3
Information & Education	26	Human & institutional capacity	Capacity to make decisions and act within institutions, businesses and communities.	NAPA Vanuatu; INDC Vanuatu; INDC Samoa; VSTAP; Tafea PTP; VCC&DRRP; NTCCS Samoa; SRDP	Becken, 2005; Becken et al., 2014; Cinner et al., 2018; Hay & Momura, 2013; Jiang et al., 2012; Moreno & Becken 2009; Perch-Nielsen, 2010; Santos-Lacueva et al., 2017; Warrick et al., 2016	8
	27	Investment in R&D	Amount of investment into tourism and climate change research and development.	NAPA Vanuatu; SRDP	/	1
	28	Information, knowledge & education	Access to/availability of information and education to create knowledge and awareness.	NAPA Vanuatu; VSTAP; INDC Vanuatu; VCC&DRRP; Tafea PTP; TDA4 Savaii; NTCCS Samoa; NAPA Samoa; SRDP	Barnett, 2001; Becken, 2005; Becken et al., 2015; Crichton & Esteban, 2017; Daly et al., 2010; Hay & Mimura, 2013; Jiang et al., 2015; Klint et al., 2012; Kuruppu & Willie, 2015; Nunn et al., 2014; Patsons et al., 2017; Pelling & Uitto, 2001; Perch-Nielsen, 2010; Santos-Lacueva et al., 2017; Warrick et al., 2016; Whitney et al. 2017; Wong et al. 2012; Wong et al. 2013	14
	29	New technology	Access to new technologies, e.g. renewable energy technologies, need identified through e.g. technological needs assessment.	INDC Samoa	Cinner et al., 2018; Moreno & Becken, 2009; Pelling & Uitto, 2001; Perch-Nielsen, 2010	1
Natural Environment	30	Appeal of natural attractions	The level of appeal/attractiveness of a destination to visitors.	VSTAP Vanuatu; Tafea PTP; Samoa TSP; NAPA Samoa; NTCCS Samoa; Fiji NCCP	Jiang et al. 2012; Perch-Nielsen, 2010; Santos-Lacueva et al., 2017; Scheyvens & Momsen, 2008b	3
	31	Health of ecosystems	Level of biodiversity, habitat availability, diversity, and flexibility.	NAPA Vanuatu; VCC&DRRP; NTCCS Samoa; NAPA Samoa	Becken 2005, Kurniawan et al. 2016, Santos-Lacueva et al. 2017, Perch-Nielsen 2010, Whitney et al. 2017	4
	32	Conservation	Commitment and level of conservation of ecosystems.	NAPA Vanuatu; INDC Vanuatu; VSTAP; TDA4 Savaii; NTCCS Samoa; SRDP	Scheyvens & Momsen, 2008b	3

Risk Framework	33	Mitigation actions	Actions that reduce GHG emissions to reduce the magnitude of climate change.	IPCC Framework; NAPA Vanuatu; INDC Vanuatu; VCC&DRRP; VNOP; NCCASLBR; INDC Samoa; NAPA Samoa; NTCCS Samoa; Samoa TSP	Becken, 2005; Barnett, 2001; Crichton & Esteban, 2017; Jiang et al. 2012; Klint et al., 2012; Wong et al. 2012; Santos-Lacueva et al., 2017; Wong et al., 2013;	10
	34	Exposure	Exposure of things of value in locations that could be affected by climate change.	IPCC Framework; INDC Vanuatu; VCC&DRRP; NCCASLBR; VISP; NTCCS Samoa; NAPA Samoa	Becken et al., 2014; Calgaro et al., 2014; Daly et al, 2010; Hay & Mimura, 2013; Jian et al. 2015; Moreno & Becken, 2009; Parson et al., 2017; Pelling & Uitto, 2001; Perch-Nielsen, 2010; Santos-Lacueva et al., 2017; Warrick et al., 2016; Whitney et al. 2017	4
	35	Success implementing adaptation actions	Actions of adjustments to reduce or avoid harm from climate change and exploit opportunities.	IPCC Framework; NAPA Vanuatu; INDC Vanuatu; NAPA Samoa; INDC Samoa; NCCASLBR; NTCCS Samoa; Samoa TSP	Barnett, 2001; Becken et al., 2014; Crichton & Esteban, 2017; Jian et al., 2015; Klint et al., 2012; Kuruppu & Willie, 2015; Nunn et al. 2014; Parson et al., 2017	14
	36	Hazard	Physical events, trends or impacts which may lead to loss.	IPCC Framework; NAPA Vanuatu; INDC Vanuatu; VCC&DRRP; VSTAP; NCCASLBR; TDA4 Savaii; NTCCS Samoa; NAPA Samoa	Barnett, 2001; Becken, 2005; Becken et al., 2014; Crichton & Esteban, 2017; Meheux & Parker, 2006	13
	37	GHG emissions	The amount of GHG emissions produced by the destination.	NAPA Vanuatu; INDC Vanuatu; VCC&DRRP; NAPA Samoa; INDC Samoa	Perch-Nielsen, 2010; Crichton & Esteban, 2017; Klint et al., 2012	2
	38	Vulnerability	The tendency to be negatively affected.	IPCC Framework; VCC&DRRP; Vanuatu; INDC Vanuatu; NCCASLBR; INDC Samoa; NCCASLBR	Barnett, 2001; Becken et al., 2014; Crichton & Esteban, 2017; Hay & Mimura, 2013; Moreno & Becken, 2009; Santos-Lacueva et al., 2017	5
	39	Climate risk to destination	The potential of consequences from climate change to a tourism destination.	IPCC Framework; Vanuatu NAPA; INDC Vanuatu; NTCCS Samoa; TDA4 Savaii; Fiji NCCP	Becken, 2005; Becken et al., 2014; Calgaro et al., 2014; Chien-yu Tsao & Chin-cheng Ni, 2016; Crichton & Esteban, 2017; Meheux & Parker, 2006	8
Tourism & Development	40	Energy price	Energy price paid by business per guest night.	/	Santos-Lacueva et al., 2017	2
	41	Marketing	Budget for and quality of marketing campaigns.	VISTAP Vanuatu; Samoa TSP	Moreno & Becken, 2009; Wong et al., 2013	3
	42	Sustainability of development	Sustainability of development as per the SDGs.	Tafea PTP; VISTAP; VNSDP; VNOP; NICMF; EC Act; Vanuatu NAPA; VCC&DRRP; NCCASLBR; Samoa TSP; NTCCS Samoa; NAPA Samoa	Barnett, 2001; Becken, 2005; Ruiz-Ballesteros, 2011; Scheyvens & Momsen, 2008b	/

43	Preferred weather for tourism	Ideal weather for tourism as per the climate index for tourism.	Samoa STP	Perch-Nielsen, 2010; Santos-Lacueva et al., 2017	1
44	Tourism benefits	Monetary benefits derived from tourism.	VSTAP; TDA4 Savaii; NAPA Vanuatu; INDC Vanuatu; VCC&DRRP; Samoa TSP; NTCCS Samoa	Chien-yu Tsao & Chin-cheng Ni, 2016; Crichton & Esteban, 2017	5
45	Human activity in coastal zone	Amount of people and infrastructure located in coastal zone.	NTCCS Samoa, NICMF	Becken et al., 2014	/
46	Quality of infrastructure	Includes tourism specific infrastructure such as bungalows as well as infrastructure more broadly (roads, energy infrastructure etc.).	VSTAP; Tafea PTP; NAPA Vanuatu; INDC Vanuatu; VCC&DRRP; VISIP; TDA4 Savaii; NTCCS Samoa; Samoa Tourism Sector Plan; NAPA Samoa	Becken, 2005; Hess & Kelman, 2017; Jiang et al., 2015; Kurniawan et al., 2016; Moreno & Becken, 2009; Parsons et al. 2017	7
47	Poverty	Lack of income and access to resources.	VSTAP	Hay & Mimura, 2013	/
48	Diversification & flexibility	Diversification of livelihood opportunities and tourism products, flexibility to change strategies.	TDA4 Savaii, NTCCS Samoa, NAPA Samoa, Fiji NCCP	Barnett, 2001; Chien-yu Tsao & Chin-cheng Ni, 2016; Cinner et al., 2018; Hartman, 2015; Jian et al., 2015; Moreno & Becken, 2009; Whitney et al., 2017	1
49	Local ownership/ participation in tourism business	The level of local ownership of or participation in tourism businesses.	/	Scheyvens & Momsen, 2008b	/
50	Tourism numbers	The number of tourists visiting a destination over a certain period of time.	VSTAP; Samoa TSP; Tafea PTP	/	1
51	Spending per tourist	The amount of money spent per tourist while visiting a destination.	VISTAP; Samoa TSP	/	*

*Variable added based on feedback in workshop

Table 3. Feedback loops identified in the TAS.

Name	Variables involved in feedback
Reinforcing	
R1	Increase in mitigation actions, increased fulfilment of commitments and funding requirements, increased availability of external climate change funding, increased climate change funding in tourism, increased effectiveness of decisions & planning, increasing mitigation actions.
R2	Increased availability of climate change funding in tourism, higher investment in R&D, higher access to information, knowledge & education, improved human & institutional capacity, higher cooperation & influence with international bodies, increased availability of climate change funding in tourism.
R3	Higher sustainability of development, increased mitigation actions, higher fulfilment of climate change commitment and requirements, increased access to external climate change funding, increased availability of climate change funding in tourism, increased investment into R&D, increased information, knowledge & education, increased human & institutional capacity, enhanced sustainable development.
R4	Higher tourism benefits, higher government resources, higher availability of climate change adaptation funding in tourism, higher investment in R&D, higher access to new technologies, higher sustainability of development, lower energy prices, higher tourism benefits.
R5	Increased tourism benefits, increased assets/capital, increased risk transfer mechanism, increased tourism benefits.
R6	Higher tourist numbers, higher tourism benefits, increased marketing, higher demand for destination tourism product, higher tourist numbers.
R7-a R7-b	Higher tourism benefits, higher assets/capital, higher private investment, higher quality of infrastructure, higher visitor perceptions, (a) higher tourism spending/ (b) higher demand and higher tourist numbers, higher tourism benefits.
R8	Higher tourism benefits, reduced poverty, increased diversification & flexibility, increased implementation & effectiveness of adaptation, reduced vulnerability, reduced climate risk, reduced risk perceptions, higher visitor perceptions, higher spending per tourist (or increased demand for destination, higher tourist numbers), higher tourism benefits.
R9	Reduced climate risk to the destination, increased health of ecosystems, improved food and natural resource security, reduced poverty, increased diversification & flexibility, increased success implementing adaptation actions, reduced vulnerability/exposure, reduced climate risk.
R10	Reduced climate risk, increased access to risk transfer mechanism, increased tourism benefits, reduced poverty, increased diversification & flexibility, increased success implementing adaptation actions, reduced vulnerability/exposure, reduced climate risk.
R11	Increased government resources, increased availability of climate change funding in tourism, increased effectiveness of decision-making and planning, increased success implementing adaptation actions, reduced vulnerability, reduced climate risk to the destination, reduced risk perceptions, improved visitor perceptions, increased demand for destination, increased tourist numbers, increased tourism benefits, increased government resources.
R12	Increased availability of climate change funding in tourism, increased effectiveness of decision-making and planning, increased success implementing adaptation actions, reduced vulnerability, reduced climate risk to the destination, reduced risk perceptions, improved visitor perceptions,

	increased demand for destination, increased tourist numbers, increased tourism benefits, increased assets/capital, increased private investment, increased climate change funding in tourism.
Balancing	
B1	Higher climate risk to destination, higher risk perception, higher perceived adaptation benefits vs cost, increased willingness for action, higher success implementing adaptation action, reduced vulnerability/exposure, reduced climate risk to destination.
B2	Higher climate risk to destination, higher risk perception, higher perceived adaptation benefits vs cost, increased willingness for action, increased mitigation action, reduced GHG emissions, reduced hazards, reduced climate risk to destination.
B3-a	Higher vulnerability, higher access to external climate change funding, increased availability of climate change funding in tourism, increased effectiveness of decision-making and planning, increased success implementing adaptation actions, reduced vulnerability, reduced access to external climate change funding.
B3-b	Higher vulnerability, higher access to external climate change funding, increased availability of climate change funding in tourism, higher investment in R&D, increased access to information, knowledge and education, increased effectiveness decision-making and planning, increased success implementing adaptation actions, reduced vulnerability.
B3-c	Higher vulnerability, higher access to external climate change funding, increased availability of climate change funding in tourism, higher investment in R&D, increased access to information, knowledge and education, increased human and institutional capacity, increased subsidiarity of government, increased effectiveness of decision-making and planning, increased success implementing adaptation actions, reduced vulnerability.
B4	Higher tourism benefits, lower poverty, higher diversification & flexibility, higher success implementing adaptation actions, lower vulnerability, lower external climate change funding and availability of funding in tourism, lower investment into R&D, lower access to new technology, lower sustainability of development, higher energy prices, lower tourism benefits.
B5	Increase in ecosystem health, increasing sustainability of development, lower energy prices, higher tourism benefits, increased marketing, higher demand for destination tourism product, increase in tourist numbers, reduced ecosystem health.
B6	Higher tourist numbers, reduced health of ecosystem, reduced appeal of natural attractions, reduced visitor perceptions, reduced tourism demand for destination tourism product, reduced tourist numbers.
B7	Higher tourist numbers, increased human activity in coastal zone, increased exposure, increased climate risk to destination, increased risk perception, decline in visitor perceptions, reduced tourist numbers.
B8-a	Increased tourist numbers, increased GHG emissions, increased hazards, increased climate risk to destination, increased risk perception, reduced visitor perceptions, reduced demand for destination tourism product, reduced tourist numbers.
B8-b	Increased tourist numbers, increased GHG emissions, increased hazards, increased climate risk to destination, reduced ecosystem health, reduced destination appeal, reduced visitor perceptions, reduced demand for destination, reduced tourist numbers.
B8-c	Increased tourist numbers, increased GHG emissions, increased hazards, increased climate risk to destination, decline in preferred weather for tourism, reduced visitor perceptions, reduced demand for destination, reduced tourist numbers.