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ORIGINAL PAPER

Disaster recovery in the western Pacific: scale, vulnerability, and traditional exchange practices

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Abstract On April 2, 2007, a 6-m tsunami struck Ghizo Island in western Solomon Islands, destroying two villages on the southern coast and killing 13 people. Despite experiencing a similar impact from the tsunami, the communities had very different recoveries. This article examines how the recovery was influenced by Melanesian practices of reciprocal exchange, known contemporarily as the *wantok* system. Our results show that as reciprocal exchange was practiced at larger organizational scales (e.g., community, regional, national), it generated dynamic and countervailing sources of resilience and vulnerability by biasing the aid distributed to each community. This biased aid allocation tended to favor individuals and groups more heavily integrated into the social exchange networks along which much aid flowed. Importantly, connection to or exclusion from these networks differs depending on organizational scale. This process reveals the importance of scale and cross-scale dynamics during the disaster recovery process. To mitigate the vulnerability of Pacific Island communities, it is vital that we identify sources of vulnerability and resilience as they face increasingly frequent disasters and are drawn into and become more reliant on larger-scale systems of governance for their recovery.

Keywords Vulnerability · Tsunami · Exchange · Cross-scale dynamics · Solomon Islands

1 Introduction

Until recently, human-environmental research has tended to focus on one specific geographic or organizational scale (e.g., community, watershed, region, globe). In many cases, analyses at different levels generate different results. For example, at the organizational

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scale of the nation-state, nations in the western Pacific tend to be politically unstable, less developed, and vulnerable to climate change and natural hazards (Mimura et al. 2007). But at the community level, livelihoods are relatively secure and adaptive capacity to cope with ecological change is high (Mercer et al. 2007; Lauer et al. 2013). When these scale issues are not recognized, policy failures can ensue. Aid donors, for example, may encourage resource-strapped national governments to design centralized environmental policies or disaster relief programs that undermine robust, local resource governance that operates at smaller spatial and organizational scales. The pervasiveness of these kinds of cross-scale issues has caught the attention of a growing number of scholars who approach human-environmental problems from multiple scales (Holling 2001; Berkes et al. 2003; Adger et al. 2005b; Lebel et al. 2005; Millennium Ecosystem Assessment 2005; Cash et al. 2006; Cumming et al. 2006; Gotham and Campanella 2011; Hanspach et al. 2014).

Recognition of cross-scale interactions is vital to conceptualizing and assessing the vulnerability and resilience that characterizes individuals and groups in human-ecological systems (Fekete et al. 2010). This is because conditions of vulnerability and resilience are not static, but dynamic and scale dependent. What renders one group vulnerable or resilient at one level, such as the local community, may have countervailing and contradictory effects at other levels, like the national or regional government. While recent research has contributed to a more holistic approach for conceptualizing and assessing vulnerability (Moser 2010; Montz and Tobin 2011; Jeffers 2013), understanding the inherent interconnections between scale and vulnerability, as well as incorporating this understanding into vulnerability assessments, needs further development.

This article engages with the scale concept by exploring how social norms of sharing resources that evolved at the community level are practiced at larger organizational scales. At the community level, many Pacific Island societies, especially Island Melanesia, exhibit significant adaptive capacity, resulting in high levels of resilience to ecological change. These robust response capacities are attributed to traditional resource management and governance practices that can encourage sustainable use of natural resources (Johannes 1978; Berkes et al. 2003; Cinner and Aswani 2007). Pacific Island governance systems involve local groups managing a holistic, watershed-based unit of an island known as *ahupua'a* (Hawaii), *vanua* (Fiji), or *poana* (from the Roviana language in Solomon Islands). By managing the landscape and seascape in this way, local resource users have multiple avenues to generate and sustain their communities, a strategy that is critical to mitigating the effects of ecological disturbances that might destroy one resource base (e.g., a tsunami destroys the marine environment), but leaves the others intact.

Importantly, traditional governance systems are underpinned by social practices of sharing and reciprocating resources among kin. In fact, reciprocal exchange is a central organizing principle of social life. When food, labor, and other resources are shared, this general reciprocation reinforces relationships. Individuals often rely on kinship networks for contributions during culturally important ceremonies that are too costly for single individuals, such as bride price payments or mortuary ceremonies (Akin 1999). To earn respect or prestige one is also obligated to support their kin in exchange, while refusal often leads to social stigmatization (Carrier and Carrier 1989; Akin 1999; Akin and Robbins 1999). These exchange systems play an important role when disasters strike by buffering the most affected households through food, labor, and information sharing (Lauer et al. 2013; Lauer 2014).

However, as globalization has drawn Pacific Island societies into larger-scale economic and social processes, villagers engage with regional and national governments and practice reciprocal exchange at these larger organizational scales. This article focuses on how social

practices of sharing resources transform at larger scales and the extent to which they confer resilience or vulnerability. In our analysis, we examine two adjacent communities in Solomon Islands that were severely impacted by a large, 6-m tsunami that struck the region in 2007. Even though the damage caused by the tsunami was similar in the two communities, they experienced vastly different recoveries. We detail how the *wantok* system, a pre-capitalist Melanesian exchange pattern, heavily influenced recovery and dynamically shaped vulnerability. Large-scale disasters like this provide a unique view into the dynamics of vulnerability and resilience. Local communities rely on regional and national governments as well international non-governmental organizations (NGOs) during disaster recovery. This stress on governments and communities can reveal underlying sources of vulnerability and resilience. In this case, study post-disaster aid distribution flowed at multiple organizational scales along *wantok* networks, a process that reveals the complexity of cross-scale dynamics during disaster recovery when reciprocal exchange is practiced at larger scales.

1.1 Scale and cross-scale dynamics

When disasters strike, institutions at all levels respond. International NGOs, national and regional governments, and local community organizations converge on the effected region in a process that brings local communities into significantly more contact with large-scale organizations than would normally occur. Disaster response and recovery is not only played out on local scales (i.e., the affected communities) and broader, supra-local scales, but is necessarily *cross-scale* since goods and services flow between different levels from government agencies and NGOs into local communities. In this sense, disasters are multilevel in that they cut across geographic and organizational scales.

A growing body of research has shown how cross-scale institutional linkages may be of major significance, not only during disasters, but also in the management of natural resources (Berkes 2002; Adger et al. 2005a, b; Millennium Ecosystem Assessment 2005; Cash et al. 2006). Much of this recent research investigating scale and cross-scale dynamics is guided by resilience theory, which stresses the nonlinear, unpredictability of systems as well as the complex links and feedbacks between social and ecological systems (Holling 2001). Resilience is typically conceptualized as the ability of a system to absorb shocks without altering its fundamental structures and processes and flipping into another state and has been operationalized in a number of different ways (Holling 1973; Hughes et al. 2005; Folke 2006; Liu et al. 2007). While "scale" is defined as the geographic, analytical, or temporal dimensions employed to study a phenomenon (Cash et al. 2006). Geographic or spatial scale has attracted the most attention since biophysical processes occur over multiple spatial scales. Another important focus of studies is organizational scale, which is defined as the delimited political units such as communities, counties, states, or nations that are interlinked by a common body of statutes, laws, or regulations. Social networks, which may be relevant at the level of families, kin, language groups, or other emically defined social groupings, may cross-cut geographic and organizational boundaries and scales. Importantly, the way in which informal social networks and social practices of sharing resources transform at larger organizational scales influences the overall ability of individuals and groups to recover from disasters. For instance, while these networks may connect individuals and groups to those controlling post-disaster aid distribution at the level of the household or village resulting in increased access to aid at these scales, these same individuals may be disconnected from social exchange networks at broader levels, such as the national government. To date, few studies, with the exception of

Nanau (2011), have explored how Solomon Islands' *wantok* system manifests within the broader contexts of the nation-state and globalization as the country's inhabitants are increasingly drawn into larger-scale political, economic, and governance systems. Many questions remain about the dynamics and cross-scale interactions of social practices and informal networks. Below we explore these interactions in a case study conducted in Solomon Islands.

1.2 Study site

Solomon Islands is a linguistically and culturally diverse country characterized by dense tropical vegetation, mountainous interiors, and extensive coral reefs. Six main islands comprise most of the landmass. The country's 500,000 inhabitants are predominantly Melanesian (95.3 %), although small Polynesian (3.1 %), and Micronesian (1.2 %) minorities exist (Solomon Islands Government 2011), with the majority subsisting directly on land and marine resources. Politically, Solomon Islands has struggled since gaining independence in 1979. Weak national and regional institutions, rampant corruption, and simmering inter-island tensions, eventually led to a low-intensity civil war in 1998, leaving hundreds dead (Moore 2004; Fraenkel 2005). Subsequently, an Australian-backed, international police force intervened, which has provided a certain level of stability. Although the country has one of the lowest per capita gross domestic products (GDPs) and material living standards are low, most rural Solomon Islanders maintain reasonable subsistence security compared to other developing nations. Malnourishment is rare, and life expectancy is 63 years.

Located within the New Georgia Group is Ghizo Island (Fig. 1). Its population consists of Melanesians from surrounding islands as well as a small population of I-Kiribati, known locally as Gilbertese, who immigrated to Solomon Islands in the 1960s. Only a limited number of regions, such as in Waghena, Noro, and Honiara, have comparative concentrations of I-Kiribati. Prior to European contact, Ghizo was uninhabited because the island's small size and relatively low elevation left it largely indefensible from marauding headhunters (Jackson 1978). After colonial pacification of inter-island warfare and headhunting, the British colonial government established Gizo[1] Town as their regional administrative center. Later in the 1960s, the British relocated hundreds of I-Kiribati to areas around Gizo Town to provide much needed labor (Knudson 1964). Today Ghizo is the Western Province administrative capital and the country's second largest population center with 7000 inhabitants, half of whom live in rural villages and the other half live in Gizo Town (Solomon Islands Government 2011).

I-Kiribati concentrate in Titiana and the adjacent Nau Manda village, while Melanesians populate around 10–15 villages.[2] This article focuses on two communities located along Ghizo's southern coast, Titiana and Pailongge. Titiana is an ethnically and culturally distinct Micronesian village. The majority of its approximately 350 inhabitants (75 households) are I-Kiribati, although Melanesians have intermarried, resulting in a mixture of I-Kiribati and I-Kiribati-Melanesian households (Table 1).

West of Titiana is the Melanesian village of Pailongge, whose inhabitants mainly originate from the nearby island of Simbo. The village is in fact three small communities consisting of 33 total households. In both Titiana and Pailongge, villagers rely on a mixture of subsistence-based and cash-income livelihoods, although Titiana is much more

[1] Ghizo refers to the island, while the town on the island is spelled Gizo.

[2] Villager statements differ from government census data regarding the number of villages.

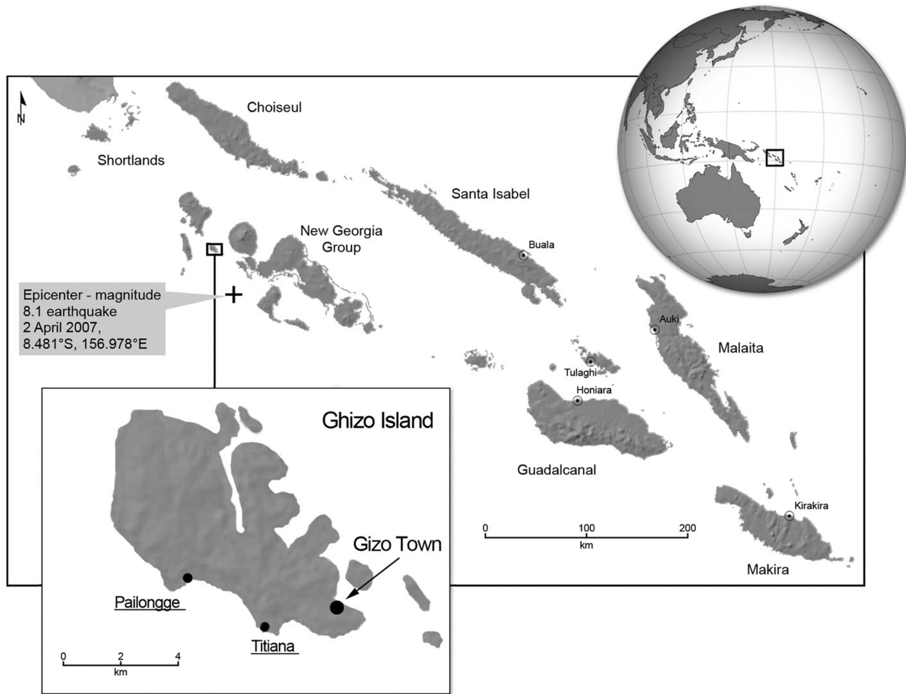

Fig. 1 Solomon Islands with *inset* of Ghizoand study site villages

Table 1 Household composition in Titiana and Pailongge villages ($n = 74$)

Household composition	Titiana (%)	($n = 51$)	Pailongge (%)	($n = 23$)
I-Kiribati	45.1	(23)	0	(0)
Melanesian	0	(0)	91.3	(21)
Mixed (I-Kiribati–Melanesian)	41.2	(21)	8.7	(2)
Other	13.7	(7)	0	(0)

* Other category includes mixed households with the following compositions: Micronesian–Micronesian/Polynesian ($n = 2$); Micronesian–Polynesian (1); Micronesian–New Zealand (1); Micronesian–Papua New Guinea (Non-Solomon Island Melanesian) (1); Micronesian/Melanesian/Australian/Chinese–Melanesian (1); Micronesian–Micronesian/English (1)

immersed in and dependent on the cash economy than Pailongge. Small-scale, commercial fishing dominates the economy of Titiana, while in Pailongge, villagers earn income by selling garden produce in Gizo Town's central market.

1.3 Data collection

Thirteen weeks of social science research was conducted during annual visits to Ghizo in 2011 and 2012. Institutional review board approval for this research was granted by the San Diego State University Research Foundation. Informed consent was obtained from all

participants in the study. We obtained a research permit from Solomon Islands' national government and support letters from the Western Province provincial government and Titiana community leaders.

In collaboration with local Titiana and Pailongge assistants, we conducted two different household surveys comprised of structured and semi-structured questions as well as focus group interviews. The authors developed household survey questionnaires based on 10 years of ethnographic research in the region. The surveys were conducted in Solomon Islands Pijin or, with the help of research assistants, in the informant's indigenous language when necessary. In 2011, surveys were conducted in Titiana ($n = 34$), Nau Manda ($n = 6$), and Pailongge ($n = 11$). Sampling was random, but spatially stratified among village settlement areas to ensure representative samples. The 45- to 60-min surveys focused on demographics, livelihoods, tsunami impact, aid received, and factors that contributed to or hindered recovery. Building on this preliminary research, we conducted another round of household surveys in 2012 in Titiana ($n = 51$) and the three Pailongge communities ($n = 23$). To spatially stratify the sample, we performed household population counts in each settlement area and randomly selected 75 % of those households that were present[3] during the 2007 tsunami. We interviewed approximately 78.5 % of the eligible Titiana households ($N = 65$) and 74.2 % of Pailongge households ($N = 31$). The 50- to 80-min surveys examined how factors, such as the Solomon Islands government, NGOs, social networks, Micronesian or Melanesian status, the *wantok* system, and subsistence activities, shaped aid distribution and recovery in Titiana and Pailongge.

Focus group interviews complemented household surveys. We conducted three focus group interviews in Titiana with five to six participants each. We selected participants based on: (1) Melanesian–Micronesian status, (2) religious affiliation, and (3) potential for participation. Our preliminary research indicated that household composition (e.g., Melanesian or Micronesian status) and church affiliation influenced post-disaster aid distribution and recovery. We defined household composition as "I-Kiribati," when both household heads were I-Kiribati, or, "I-Kiribati-Melanesian," when one household head was I-Kiribati and the other Melanesian. The 60- to 120-min focus group interviews were digitally recorded in addition to hand-written notes. Do to logistical constraints, we were not able to conduct focus group interviews in Pailongge.

We also conducted key informant interviews in Ghizo and the capital, Honiara. We interviewed stakeholders who were extensively involved in the recovery process such as local village leaders, the staff of three NGOs [Save the Children ($n = 1$), Oxfam ($n = 2$), World Vision ($n = 3$)], and government workers. Interviews with local villagers were unstructured and topics ranged widely from Solomon Islands' socio-political system, elections, land tenure, and the tsunami to traditional I-Kiribati and Melanesian culture, leadership, migration, and subsistence. Interviews with various NGOs and government workers were open ended and focused on each institution's role in post-disaster mitigation, aid distribution, recovery, and any topics informants found pertinent.

Document analysis was also conducted that involved the review of: (a) Solomon Islands' national newspaper; (b) a Special Audit Report of tsunami recovery funds produced by the Solomon Islands Office of the Auditor General (Office of the Auditor General 2010) documenting government use of tsunami victim funds in great detail; and (c) court documents related to a court case against the (now former) prime minister for misuse of tsunami relief aid.

[3] A number of households were established after the tsunami, and we excluded them from the survey.

1.4 Data analysis

Household surveys generated quantitative data related to sources of vulnerability, such as demographics, minority–majority status, kinship affiliations, and subsistence practices; and recovery, including losses from the tsunami, aid received, and the *wantok* system's influence on aid distribution. We performed Chi-square and Fisher's exact test, using MyStat 12 statistical software to identify significant differences in recovery between Titiana and Pailongge. Qualitative data were generated from all data collection techniques. We transcribed individual and group interviews from notes and analyzed transcriptions for patterns allowing us to identify relationships between Melanesian or Micronesian status, social (*wantok*) networks, vulnerability, disaster impact, aid distribution, and recovery.

2 Results

2.1 The *wantok* system and disaster recovery

When the tsunami struck early in the morning on April 2, 2007, its swift, turbulent waters destroyed or heavily damaged nearly every possession, canoe, and structure owned by most Titiana and Pailongge villagers. One of the most severe impacts was in Titiana. The rushing water and debris that swept through their village claimed 13 lives, many of them small children, who were unable to flee, swim, or hold onto their parents. Despite the tsunami's similar physical impact in the nearby Melanesian village of Pailongge, no deaths occurred here (Table 2). Moreover, the recovery process was uneven. Numerous NGOs and sources of external aid flowed into Solomon Islands. Many villages on Ghizo and other islands received aid in the form of reconstructed houses or the replacement of fishing equipment and canoes. Pailongge, for example, received 15 complete wooden houses with labor included. In contrast, Titiana received comparatively little aid.

Many local residents were convinced that the distribution of aid was heavily influenced by what Solomon Islanders call the *wantok* system. The word *wantok* is a Solomon Islands Pijin term that literally means people that are of "one talk" and speak the same language. Individuals who consider themselves *wantoks* favor and help each other for mutual benefit, a form of reciprocal exchange that is related to a broad pattern of pre-capitalist social organization found throughout the Pacific (Akin 1999). With over 80 % of Solomon

Table 2 Tsunami's initial impact and recovery aid in Titiana and Pailongge

Region	Population		Deaths	Destroyed/damaged houses	Houses rebuilt by NGOs
	Raw	Households			
Solomon Islands	515,870	91,251	52	5519	–
Ghizo*	3630	675	33	435	40
Titiana	350	75	13	75	5
Pailongge*	320	65	0	59	20

* Ghizo data exclude Gizo town

* Pailongge data are for entire Pailongge region ($\sim$7 communities)

Islands' population living in small, rural villages who speak languages unique to each region, notions of generosity and reciprocal obligations continue to underpin basic norms and values of sociality. Rural Solomon Islands households share food, labor, and other resources, and relationships with kin and the wider community tend to be prioritized over self-centered activities such as profit making, resource accumulation, and entrepreneurship directed toward individual or household benefit. In a country with few social services, sharing and reciprocity function as a social safety net that redistributes wealth, land, and other resources.

However, as Solomon Islands slowly urbanizes and the central government gains influence, these older forms of reciprocal exchange take on new and varied forms. Our household surveys revealed that Titiana and Pailongge villagers' definitions of *wantok* were fluid, malleable, and dependent upon the specific scale and context in which they were defining it (Table 3).

At the level of the community, *wantok* may be defined differently than at the level of the household, village, island, national government, or country. A Melanesian informant explained that *wantok* means "relative" in English, but it may also include non-kin who are from the same village or area. Overall, *wantok* is a flexible, polysemous concept, whose meaning is modified at different spatial and organizational scales. As one Titiana informant summarizes, "The term *wantok* is flexible, and it could refer to everyone in the Solomons or friends. There is *no limit or bar* on *wantok.*" Just as the *wantok* concept expands and contracts at various spatial and organizational scales, it is also adapted and redefined within different contexts. Individuals may expand or contract who they define and include as their *wantok* in order to potentially access a broader range of support and resources through social exchange networks. Elected officials, for example, attempt to expand their network of *wantoks* to garner votes and build up a political base.

2.2 The *wantok* system and the central government

To assess how the *wantok* system shaped aid distribution within the central government, we asked Titiana ($n = 51$) and Pailongge ($n = 23$) villagers on household surveys: "*Did the wantok system have any effect on the way aid/help/food/infrastructure was distributed by the government following the 2007 tsunami? Explain.*" Among Titiana villagers, 84.3 % stated yes, 13.7 % said no, and one was unsure (2 %) (Fig. 2). In contrast, only

Table 3 How Villagers in Titiana and Pailongge Defined the Term "*Wantok*"

Definition	All villager responses $n = 102$)	Titiana villager responses ($n = 67$)	Pailongge villager responses ($n = 35$)
"One talk" (same language)	32.4 % (33)	38.8 % (26)	20 % (7)
"One blood"; "one line" (relatives)	29.4 % (30)	29.9 % (20)	28.6 % (10)
Same place (geographic area)	11.8 % (12)	6 % (4)	22.9 % (8)
"One color"; "one race" (same ethnicity)	10.8 % (11)	14.9 % (10)	2.9 % (1)
People you know/help	6.7 % (7)	4.5 % (3)	11.4 % (4)
Other	8.8 % (9)	5.9 % (4)	14.2 % (5)

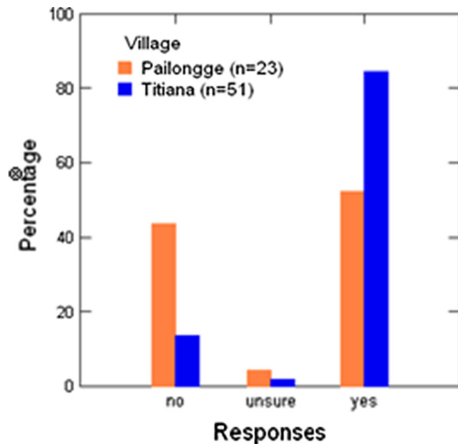

Fig. 2 Answers to the question: "Did the *wantok* System influence how the government distributed aid?"

52.2 % of Pailongge informants stated yes, 43.5 % said no, and one was unsure (4.3 %). These results suggest that the *wantok* system influenced government aid allocation in both villages, but to different degrees. A two-way frequency table and Chi-square analysis demonstrated statistically significant differences between Titiana and Pailongge, yielding a value of 8.381, $p < .004$. Moreover, Fisher's exact test—a similar, but more conservative statistical test designed to deal with smaller sample sizes—generated a value of $p < .006$, revealing similarly significant results, showing that Titiana villagers recognize the *wantok* system's influence on government aid allocation at a significantly higher rate than Pailongge villagers.

Qualitative data generated from surveys, key informants, and focus group interviews suggest the *wantok* system affected government aid distribution in ways that were biased, unequal, and not proportional to disaster impact. Thus, areas less affected by the tsunami received equivalent or larger aid amounts relative to the most affected areas, like Titiana (see Table 2). Many Titiana villagers interviewed attributed this outcome to the fact that certain government officials controlling aid distribution kept some of it and/or allocated it to their own *wantok* before distributing the remainder to Titiana. For instance, after the tsunami, the country of Kiribati sent money specifically for I-Kiribati victims, yet, Titiana never received it. Although we were unable to verify this specific donation, a government report (Office of the Auditor General 2010) documents several unaccounted for aid donations. When one villager inquired about the funds sent from Kiribati, the Solomon Islands government replied that, "It was lost in the bank," suggesting that the national government diverted substantial aid amounts away from intended recipients.

According to our household surveys, biased national aid allocation also affected Pailongge. For example, in Titiana and Pailongge, some informants said that a prominent Member of Parliament (MP)[4] was responsible for distributing aid from the national

[4] At the national level, Parliament consists of 50 Members, elected every 4 years by the people within their respective constituencies. Members of Parliament then elect the Prime Minister, who in turn selects his cabinet members. The Prime Minister also appoints ministers, who are responsible for heading the 20 or so different ministries, such as the Ministry of Fisheries and Marine Resources, the Ministry of Home Affairs, and the Ministry of Finance and Treasury. At the local level, government is divided into 10 administrative regions, including the nine provinces (Central, Choiseul, Guadalcanal, Isabel, Makira-Ulawa, Malaita, Rennell and Bellona, Temotu, Western) and the capital, Honiara. Elected provincial officials and assemblies head each province, while Honiara is overseen by Honiara's Town Council.

government to his constituency, Ghizo-Kolombangara. These informants perceived an unfair distribution of aid between Ghizo and Kolombangara Islands, in which the MP helped Kolombangara comparatively more because that was his home island, implying he has family, political supporters and *wantok* there. Some Titiana informants stated that Kolombangara households received completed houses, solar panels, outboard motors and canoes, while Titiana households primarily received food, relief supplies, and some building materials supplied by Oxfam. Titiana informants asserted that having no *wantok* or I-Kiribati people in the government negatively affected their recovery and if they had I-Kiribati government representatives they would have received more help. Some Pailongge villagers also recognize *wantok* favoritism at the national level. For instance:

> Aid came from overseas and then some people within the government and parliament kept some aid and money for themselves—in their pocket—and helped their own *wantok* which is a problem. If you have a good MP [Member of Parliament] or government official then the *wantok* system is not a problem… (Pailongge, male, 80).

Although the MP mentioned above was responsible for distributing disaster funds to both islands in his constituency, several informants suggest Kolombangara received more.

Although we could quantify local perceptions about how the *wantok* system influenced national government aid distribution, it was more difficult to empirically verify how aid allocation actually flowed through *wantok* exchange networks. Severe fund misallocation, however, was documented in a government report called the *Special Audit Report: Tsunami and Earthquake Relief Fund within the National Disaster Council (NDC) under the Ministry of Home Affairs* (Office of the Auditor General 2010). The report's primary objective was to determine the use and the recipients of disaster funds. It analyzed all tsunami and earthquake disaster funds received from April to December 2007—totaling around SBD$39 million (~ USD$5.3 million)—and provides a detailed account of the lack of accountability and transparency and the misuse and misappropriation of funds. One example from the report shows that out of the $8.3 million provided in a regional disaster fund account, 73 of 121 total payments were processed with no documentation, resulting in 21 % of the total expenditure being unaccounted for. Furthermore, of the $6.6 million in a disaster relief and rehabilitation account, 27 of 45 total payments were not documented, resulting in 41 % of the total expenditure being unaccounted for. According to the report, approximately $4.5 million of the $14.9 million was utterly undocumented and unknown. Because the audit report meticulously traces disaster funds and details donors, contribution amounts, bank account numbers, deposits, and withdrawals, questionable or fraudulent uses of the funds can often be linked to the specific parties involved. Although the Office of the Auditor General finished the report in 2008, it was not officially published until December 2010 and has yet to be discussed in Parliament. Because these misallocations were never traced or investigated, we could not independently determine the amount of aid that reached the study communities of Titiana and Pailongge.

2.3 The *wantok* system and the provincial government

Surveys and interviews suggest biased aid practices may have also occurred at regional scales such as the provincial government and other regional agencies, shaping aid distribution on both inter- and intra-island scales. On an inter-island scale, villagers in both Titiana and Pailongge explained how *wantok* favoritism negatively affected their recovery. Aid distribution in the Western Province carried out by organizations, such as the National

Disaster Council or Ghizo disaster committee workers, was thought to be funneled to the *wantok* of some of these workers in areas outside Ghizo. Titiana informants stated school supplies and other rehabilitation aid intended for Ghizo ultimately were diverted to other provinces and islands.

On an intra-island scale within in Ghizo, Titiana villagers stated that they received less compared to the *wantok* of Gizo Town power brokers. They asserted that they received less because there are no Micronesians in the provincial government who controlled aid distribution on Ghizo. Even though Titianans were heavily impacted by the tsunami, having the most fatalities, many people in other areas who had *wantok* allocating aid received higher quality and quantities of aid.

Wantok favoritism on Ghizo may have negatively affected Titiana and Pailongge villagers. Moreover, Titiana villagers feel they were further disadvantaged relative to Pailongge on an intra-island scale. Titiana interviews and focus groups suggest that Ghizo's provincial government official disbursed comparatively more aid to Pailongge than Titiana and that Pailongge also received higher quality aid, including milk, coffee, and canned meats, while Titiana received cheaper food stuffs such as canned tuna. Informants said a provincial member helped Pailongge more because most Pailongge villagers politically support and voted for him, whereas most in Titiana do not. Notably, several Pailongge villagers also work, or have worked, for the provincial member. As one Titiana villager summarizes, "if you don't vote for the winning candidate, you must wait until their term is over to receive help" (female, 49). In contrast, during interviews, Pailongge villagers did not assert they received less aid than Titiana from their provincial member, although no focus group was conducted in Pailongge. Furthermore, surveys revealed some Pailongge villagers perceived their provincial member as a source of help. Unfortunately, we were not able to verify through official documents or records the specific recipients of aid at the regional level, and thus, we could not test whether these perceptions matched the actual flow of aid.

2.4 Non-governmental organizations

Based on interviews with NGO workers, NGOs like World Vision and Save the Children were aware that the *wantok* system may influence their projects, whereas this is unclear for Oxfam, suggesting their Ghizo project was susceptible to *wantok* favoritism. Specifically, Oxfam hired local staff members to help implement their project, all of whom were Melanesian. According to interviews in Titiana and Pailongge as well as with an individual heading Oxfam's housing rehabilitation project on Ghizo at the time, local staff looked for their "friends" on the list of beneficiaries and disproportionately helped them over others. In this way, more timber, food aid, and possibly even entire houses were channeled toward their own *wantok*. Because local staff members were all Melanesian, the beneficiaries of this biased aid distribution were predominantly Melanesian.

Furthermore, the substantial aid one Pailongge community, Pailongge proper,[5] received from the Papua New Guinea Salvation Army was perceived by many to be related to *wantok* favoritism. The Papua New Guinea Salvation Army built 15 complete houses in Pailongge proper, one for each household, resulting in 20 complete houses built by NGOs in Pailongge and five in Titiana out of approximately 100 completely destroyed houses between both villages. Informal interview ($n = 19$) data from Pailongge suggest several

[5] Pailongge proper is our own term used to distinguish the settlement area known as Pailongge from the broader region (composed of multiple settlements) also known as Pailongge.

reasons why the Papua New Guinea Salvation Army ultimately built houses in Pailongge proper. One primary reason centers on land disputes; other potential reasons involved political or *wantok* favoritism, while approximately one quarter of informants were unsure. The Salvation Army initially planned to build on Rendova Island (an island to the southeast of Ghizo), but a land dispute stalled the project. Most Pailongge informants acknowledge land tenure as the reason behind why the Salvation Army built in Pailongge proper, where a kin group headed by a chief owns a clearly defined territory. However, it remains unclear why the NGO came to Pailongge proper rather than another area where land ownership was also secure. We asked Pailongge villagers, "*Why did the Salvation Army come to Pailongge proper and not another area or community?*" Responses involved five main reasons, which all revolved around political and *wantok* favoritism (Table 4).

2.5 Households, communities, and the *wantok* system

To an extent, Titiana and Pailongge villagers similarly perceive that the *wantok* system caused biased aid distribution at national, provincial, and NGO scales. Despite these similarities, Titiana villagers perceived this process at these scales at a higher, statistically significant rate. In Titiana, surveys reveal 84.3 % of villagers explicitly stated that the *wantok* system affected aid distribution at the government level while all but one "unsure" informant (98 %) acknowledge the *wantok* system's influence at one level or another. In contrast, only 52.2 % of Pailongge villagers recognize the *wantok* system's influence on government aid distribution and others recognize it only at the level of the village (34.8 %) or not at all (8.7 %). For example,

> 'Within [the] government wantok system had no affect; however, within the community, leaders spoiled aid distribution … and did not share it [aid] equally and gave more to own families' (Pailongge, Male, 42).

Table 4 Answers to the question: *Why did the Salvation Army come to Pailongge proper and not another area or community?* ($n = 19$)

$n = 19$	Explanations
(4)	1. The aid was directed to Pailongge proper via political favoritism because most villagers there politically support, vote and work(ed) for a Ghizo Provincial Member
(4)	2. The Salvation Army asked the Member of Parliament (MP) for Ghizo-Kolombangara where to build. The MP directed them to Pailongge proper because they had land tenure, or, because a Pailongge proper villager, who lives in Honiara and is related to Pailongge village leaders, directed the MP there
(2)	3. This same Pailongge villager mentioned above either contacted the Salvation Army or talked with the Ghizo-Kolombangara MP. Notably, a Pailongge proper villager added that, "[the aforementioned Pailongge villager] is my *wantok* and he told the Salvation Army to go to April 2 [a settlement area in Pailongge proper]. So sometimes *wantok* is good because they think of their own people" (male, 50)
(2)	4. "Someone" from Pailongge proper directed the Salvation Army to their kin group
(1)	5. Simbo-Rendova's MP referred the Salvation Army to Pailongge. Pailongge has tangible kinship, linguistic, and geographic ties to Simbo
(1)	6. The Salvation Army prayed to god, who sent them to Pailongge
(5)	7. Unsure

In Titiana, many villagers also acknowledged individuals practiced *wantok* favoritism once aid reached the village, placing certain households and individuals at an advantage or disadvantage. Villagers controlling aid allocation and/or their *wantoks* likely benefitted from this unequal distribution. Villagers perceived that those controlling aid distribution kept some food, supplies, housing material, or other forms of aid for themselves and/or their *wantok*. For example, community committees in Titiana would bring aid back from Gizo, but sometimes keep the best clothing, food, and other items for themselves or their relatives before distributing what many Titiana villagers referred to as the "leftovers" to remaining community members. Those not involved in village aid distribution or not socially connected to these *wantok* exchange networks, felt that they frequently received lower quality or quantities of aid.

Community level *wantok* networks not only influenced aid allocation, but also general recovery efforts. In other words, *wantok* networks influenced the material and nonmaterial help individuals received. Specifically, surveys conducted in Titiana ($n = 51$) and Pailongge ($n = 23$) suggested that individuals' intra-village social connections influenced things such as their ability to acquire food, water, and rebuild their homes (Table 5). For instance, informants that consider their *wantok* an "advantage" to their household's recovery regarding agriculture/food/crops availability generally explain their *wantok* shared food with them, or, they shared with each other. Conversely, informants consider their *wantok* a "disadvantage" when their *wantok* did not share, and/or frequently relied on them for food—often making the informant's own food supply short. A middle ground also exists, in which *wantok* are seen as an advantage and disadvantage. For example, one

Table 5 Answers to the Question: "How did your *wantok* affect the following aspects of your household's recovery?" ($n = 74$)

Aspect	Village	Advantage	Disadvantage	Both	No affect
Agriculture/food/ crop availability	Pailongge	17.4 % (4)	52.2 % (12)	8.7 % (2)	21.7 % (5)
	Titiana	43.1 % (22)	19.6 % (10)	5.9 % (3)	31.4 % (16)
Water supply	Pailongge	13.0 % (3)	56.5 % (13)	0	30.4 % (7)
	Titiana	25.5 % (13)	43.1 % (22)	0	31.4 % (16)
Housing	Pailongge	34.8 % (8)	52.2 % (12)	0	13 % (3)
	Titiana	39.2 % (20)	21.5 % (11)	2 % (1)	37.3 % (19)
Fishing	Pailongge	30.5 % (7)	39.0 % (9)	0	30.5 % (7)
	Titiana	45.1 % (23)	21.5 % (11)	2 % (1)	31.4 % (16)
Land availability	Pailongge	26.1 % (6)	17.4 % (4)	0	56.5 % (13)
	Titiana	25.5 % (13)	19.6 % (10)	3.9 % (2)	51 % (26)
Money	Pailongge	13.0 % (3)	26.1 % (6)	8.7 % (2)	52.2 % (12)
	Titiana	21.6 % (11)	21.6 % (11)	0	56.9 % (29)
Community cooperation	Pailongge	4.3 % (1)	34.8 % (8)	34.8 % (8)	26.1 % (6)
	Titiana	27.5 % (14)	23.5 % (12)	2.0 % (1)	47.1 % (24)
Average for all categories	Pailongge	19.9 %	39.8 %	7.5 %	32.9 %
	Titiana	32.5 %	24.3 %	2.3 %	40.9 %
Range for each category	Pailongge	4.3–34.8 %	17.4–56.5 %	8.7–34.8 %	13–56.5 %
	Titiana	21.6–45.1 %	19.6–43.1 %	2–5.9 %	31.4–56.9 %

Titiana villager describes that when he had enough his *wantok* came and ate; but, when he did not his *wantok* helped him—"balance," he says.

More broadly, informants expressed that the *wantok* system tends to function smoothly and provide a safety net for community members in contexts that do not involve the cash economy. Take housing. When a villager builds a house he or she can rely on their *wantok* to help them with the labor. The owner of the house will then reciprocate by sharing his or her labor at a later date. But when the *wantok* system articulates with the cash economy it tends to be viewed as a burden because it stifles individual accumulation and profit earning. The strong obligation to share resources undermines a villager's ability to accumulate savings or build up a small business. For example, one informant stated that when he goes to Gizo Town for a large bag of rice, he ultimately only can buy a few kilos because his *wantok* will ask him for cash so they can also buy rice. As these examples suggest, the *wantok* system is simultaneously an advantage and disadvantage, a help and a burden, and a source of both resiliency and vulnerability.

It is important to note that aid distribution was influenced by factors other than government misuse and the *wantok* system. For example, one Titiana man explained that because he was a school teacher, his household received a new house, which was funded by the government to provide housing for public service workers. Thus, in this instance, aid received and ultimate recovery was strongly influenced by this man's occupation, rather than the *wantok* system. Paraphrasing his words, he mentioned that the tsunami was somewhat of a blessing in disguise in the sense that they received this house, resulting in an improved livelihood after the tsunami.

2.6 Immigrant status and the *wantok* system

According to survey respondents, Titiana's status as a tiny Micronesian minority among a predominantly Melanesian population had significant and tangible effects on their recovery. All focus groups stated that "Solomon Islanders," also referred to by participants as "Islanders," "Melanesians," or "blacks," ethnically discriminate against I-Kiribati people. This ethnic marginalization is encapsulated by the phrase "floating coconuts"—a label Melanesians of the Western Province use to describe I-Kiribati people, who they say "floated" to Solomon Islands on a coconut and who belong to Kiribati, not Solomon Islands.

Although Titiana is mainly comprised of I-Kiribati, many villagers have intermarried with Solomon Islands Melanesians, making Titiana an ethnically heterogeneous community (see Table 1). To explore if household ethnic composition influenced aid received and overall recovery, we asked focus groups how having a Melanesian and I-Kiribati household head or two I-Kiribati household heads influenced their recovery and the aid they received. Furthermore, we asked I-Kiribati households if they thought their recovery would have been different, better, or worse had they had an I-Kiribati and Melanesian household head. Likewise, I-Kiribati–Melanesian households were asked the reverse. Focus group #2, composed of mixed households, stated that having a Melanesian in their household did not positively influence their recovery or aid received. Participants said the government treated everyone in Titiana the same; therefore, everyone residing in Titiana experienced the effects of marginalization.

In contrast, focus group #3, composed of I-Kiribati households, stated the composition of their household did affect their recovery. These focus group participants said that because they are I-Kiribati, they are not part of Solomon Islanders' *wantok* system, thus they received less help from the government. Participants suggested that "intermarriage"

with Solomon Islanders (Melanesians) was a possible solution to the ethnic discrimination practiced by the government and other power brokers. Focus group #1, composed of all I-Kiribati, also suggested "intermarriage" as a solution to ethnic discrimination.

3 Discussion and conclusion

3.1 Reciprocal exchange and multi-level aid distribution

Our results suggest that across different organizational scales (e.g., national, regional, NGO, community), the *wantok* system had an uneven influence on the recovery of Solomon Island communities. Specifically, aid distribution was shaped by deeply embedded patterns of social organization and exchange encapsulated in the *wantok* system. Rather than victims receiving aid based on the relative effect of the tsunami, those controlling aid allocation tended to preferentially help their own *wantok*. Accordingly, an individual's connection to or exclusion from these *wantok* networks strongly dictated the amount households received, hindering or bolstering their overall recovery, vulnerability, and resiliency.

These social ties, however, were not consistent across organizational levels. Rather than a static system of established, nepotistic relationships, the *wantok* system is fluid. Depending on context and organizational scale, those defined as *wantok* can expand and contract as individuals in positions of political power attempt to leverage their network of social relationships to their advantage. This dynamic aspect of the *wantok* system, however, has nonlinear characteristics in that the advantages gained at one organizational level may be undermined at other organizational levels. At the level of the national or central government for example, *wantok* favoritism put Titiana and Pailongge at a disadvantage relative to other communities. The national representative for the Ghizo-Kolombangara administrative district helped Kolombangara comparatively more than Ghizo because he was born and raised in Kolombangara and thus has deeper social ties to the island than Ghizo. Thus, Ghizo, in comparison with Kolombangara, was at a disadvantage, making both Titiana and Pailongge more vulnerable to the disaster.

At the provincial or regional level, the *wantok* system influenced aid allocation on both inter- and intra-island scales, but with different implications for each village. Titiana and Pailongge were both rendered vulnerable on an inter-island scale. As the largest town center in the Western Province, Gizo Town served as a hub for the delivery and subsequent distribution of regional disaster aid. The Solomon Islanders that controlled this distribution originate from diverse areas across the country and they tended to divert aid away from Ghizo and toward other islands where they had closer social ties. Interestingly, one might think Ghizo would derive advantages from the aid delivered there. However, because it was only recently populated under British colonialism and is technically full of immigrants, peoples' kinship, linguistic, and geographic ties to Ghizo are shallow relative to other nearby islands. Thus, Ghizo did not stand to benefit from the effects of *wantok* favoritism in the same way as other islands.

Although biased aid distribution rendered both Titiana and Pailongge more vulnerable on an inter-island scale, it appears to have further disadvantaged Titiana on an intra-island scale. Ghizo's provincial government member is purported to have helped Pailongge comparatively more than Titiana. Based on statements made by residents from both villages, it is reasonable to conclude that if this provincial member practiced favoritism

during disaster relief, it placed Titiana, rather than Pailongge, at a disadvantage. Conversely, Pailongge's socio-economic and political connections to the provincial government member may have been advantageous for certain Pailongge households, enabling them to recovery faster from the disaster.

At the NGO level, individuals in both villages were negatively affected when local Melanesian Oxfam staff preferentially helped their own *wantok*. Additionally, both Titiana and Pailongge villagers outside the settlement area of Pailongge proper were disadvantaged because they were not connected to the *wantok* networks that likely channeled the housing aid to Pailongge proper. Beyond this, *wantok* favoritism at the NGO level further disadvantaged the immigrant village of Titiana. All NGO aid distribution shaped by *wantok* favoritism was channeled through Melanesian dominated socio-political networks, thus precluding the Micronesian village of Titiana from receiving it. Therefore, while biased NGO aid distribution may have negatively affected both Titiana and Pailongge, it was only Pailongge villagers that also benefited from it.

Once aid reached the community, residents perceived that *wantok* favoritism continued to influence how it was shared among households and individuals, but informants were ambivalent about the extent to which households were advantaged or not by the *wantok* system. This may be due to the fact that at the community level the *wantok* system is less malleable, resulting in a more equal distribution of aid resources once they reached the community. On nearby Simbo Island, a similar process occurred during the 2007 tsunami, where there was no reported food hording and villagers readily shared resources and labor during the recovery (Lauer et al. 2013; Lauer and Matera 2016).

Although the *wantok* system's influence on aid distribution affected both Titiana and Pailongge, the articulation of the *wantok* system and Titiana's immigrant status left this community comparatively more vulnerable to the disaster. As immigrants in the context of a still functioning pre-capitalist social and exchange system based on deep ties to shared kinship, homeland, and native language, Titiana was less connected to *wantok* networks along which much aid ultimately flowed. This is especially true at larger scales above the community level, as evidenced by the higher and statistically significant rate at which Titiana villagers recognize the *wantok* system's influence on government aid distribution relative to Pailongge. Additionally, intermarried, I-Kiribati–Melanesian households held no advantage over strictly I-Kiribati households. In other words, the government gave aid to communities, not individuals or households within communities, and Titiana was, in general, marginalized relative to Melanesian villages like Pailongge.

3.2 Vulnerability analysis: toward a more dynamic, multi-scale approach

This case study illustrates how culturally specific, social and economic factors are critical for understanding disaster impact and recovery. Our findings complement a growing scholarship, suggesting that insufficient attention to the socioeconomic dimensions shaping vulnerability and resilience makes planning, policy, and mitigation of disaster impact and recovery only partial (Wisner and Luce 1993; Oliver-Smith and Hoffman 1999; Wisner et al. 2004; Adger 2006; Bolin 2007; Montz and Tobin 2011; Moser 2010; Fekete 2012; Jeffers 2013). The 2007 Solomon Islands tsunami had a near identical physical impact in Titiana and Pailongge in terms of wave height, intensity and proximity, as well as structural and property damage. Yet, the villages experienced different recoveries that were due predominantly to social factors. Specifically, the ethnic, linguistic, and geographic background of many tsunami victims influenced their connection to the *wantok* networks along which much aid flowed. It appears that those more heavily integrated into these networks,

via their *wantok* connections to those allocating aid, tended to receive comparatively more resources relative other, less integrated individuals and groups.

However, the social connections that form the basis of these exchange networks at one organizational scale may have contradictory influences at other organizational scales. As we have shown, the *wantok* networks are dynamic social processes that expand and contract as one moves from local to larger organizational scales, such as the level of the national government, provincial (regional) government, and NGOs. Therefore, we argue that the articulation of informal social networks, aid distribution, and ability to recover must be analyzed at multiple scales to more fully comprehend the complex dynamics of disasters, a finding that corroborates recent research highlighting the importance of cross-scale interactions in determining outcomes in social–ecological systems (Cash et al. 2006; Cumming et al. 2006; Gotham and Campanella 2011; Hanspach et al. 2014) and disasters (Fekete et al. 2010). Conceptualizations and applications of vulnerability analysis need to attend to how scalar processes at multiple levels generate contradictory and dynamic outcomes across different scales. Explicitly acknowledging scale in our analyses will enhance our ability to identify, quantify, predict, and possibly mitigate social vulnerability during disasters.

3.3 Local social practices and scale mismatch

For thousands of years, pre-capitalist Melanesian exchange systems have been instrumental to household livelihoods, governance, sociality, and leadership hierarchies (Akin and Robbins 1999). Although they can create tensions and conflicts, they often provide social safety nets, necessary support for large cultural events, and mechanisms for gaining social and political prestige. During times of need, these exchange systems buffer those most affected, mitigating a disaster's impact (Mercer et al. 2010; Lauer 2012). In the case of Solomon Islands, some villagers perceive the *wantok* system more as a disadvantage and burden, but many, including both those that primarily receive or give help within these networks, continue to view the *wantok* system positively. It is when reciprocal exchange is practiced at higher organizational levels in regional or national governments or in NGOs that these practices can present significant challenges. At the level of regional or national governments, social norms of sharing transform from a resilience boosting practice to vulnerability inducing nepotism and corruption. Nepotism typically is understood as undermining the efficiency and adequate functioning of Pacific Island governments and contributing to the general view that small islands states are highly vulnerable to natural disasters and the impacts of climate change and have insufficient capacity to organize disaster relief efforts (Mimura et al. 2007). However, Larmour (2012) notes that equating customary systems of sharing and reciprocal exchange in the Pacific Islands with corruption misses the point that corruption and nepotism are culturally specific concepts and that people give different meaning and weight to factors when deciding how to act, or in the case of government officials, distribute aid. A more nuanced understanding of nepotism that considers issues of organizational scale enables a more thorough analysis of how nepotism actually operates in practice. As we have shown, nepotism is part of broader social processes that has contradictory implications across scales. At the level of the national and regional governments, the consensus among Solomon Islanders was that the *wantok* system is not positive or beneficial, but at the community or household level, the *wantok* system enabled a more equal distribution of aid, buffering the impact of the tsunami. As many villagers commented, "*wantok system lo komuniti, hem oraet, hem gud. Lo gavman, hem bik problem, hem barava rabis* [the *wantok* system in the community is

alright, it's good. In the government, it is a big problem, it is extremely rubbish (bad)]." The key difference is that at larger organizational levels the pressures to reciprocate are focused on short-term advantages to gain votes rather than broader social obligations that structure long-term reciprocal ties at the community level such as labor, resources, and prestige. Our scale-focused analysis helps to reveal these nuances of nepotism.

The *wantok* system presents a situation where the scale of local social exchange networks expands at larger organizational scales and thus these networks cross-cut political or geographic space. Although these systems of reciprocal exchange enhance resilience at relatively small scales of social organization, when they are scaled up to larger scales they appear to be more corrosive and generate vulnerability. Conceptually this could be understood as a scale mismatch. Mismatch problems typically arise when resource management jurisdictions do not match the scale of biophysical processes. Traditional governance of near-shore resources, for example, has been deemed by some as inadequate to protect certain fisheries because the scale of the fishery is far larger than the governed area (Foale and Manele 2004). In the example of the *wantok* system explored in this article, it evolved at a smaller scale than which it is now practiced and within a specific social environment. At the small, community scale, Melanesian social life is quite distinct from modern, large scale, rule-of-law political or government organizations. Melanesian social organization is non-hierarchical, and traditional leadership is primarily ascribed, with only limited emphasis on genealogical reckoning (Sahlins 1963; White and Lindstrom 1997). Disputes over land, resources, or misconduct are typically mediated by traditional leaders and resolved through negotiation on a case-by-case basis. Melanesian traditional leaders are not treated as a dominating authority figure, but as caretakers of kindred groups. Without an overarching, sovereign source of political authority, participation in social life is largely consensual and voluntary. In contrast, modern, rule-of-law political organizations and government bureaucracies efficiently organize large groupings of people because they are hierarchical and authority is durable and impersonal. Thus, we are presented with a scale mismatch: practices that sustain resilience on a small scale tend to undermine resilience at larger organizational scales. And the reverse can also occur: when highly centralized regulations are imposed on small-scale governance regimes, the process tends to erode local governance and undermine community-scale resilience.

Understanding how culturally embedded social practices articulate with larger-scale processes will only become more important and relevant to reducing peoples' vulnerability in the face of natural hazards in the future. The potential for natural hazards to impact Pacific Island communities is probabilistically increasing in the context of a growing world population and increasing social stratification (García-Acosta 2002). Moreover, global climate change will only escalate the occurrence of extreme climactic events, rises in sea level, and the need for coastal population relocations, effectively increasing the chance that many resilient communities and their associated governance practices will be drawn into larger-scale social and economic processes as they try to adapt to rapidly changing conditions.

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