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# **Re-framing island nations as champions of resilience in the face of climate change and disaster risk**

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## **Abstract**

As a home to important flora and fauna, with rich cultural roots and heritage, island communities are often characterized by their deep social ties with the natural environment. However, due to environmental degradation, impacts from climate change including slow (e.g. sea level rise) and sudden (e.g. hurricanes) onset events and the associated changes to livelihood structures and opportunities, islands throughout the world face increasing threats. In order to understand and appropriately address livelihood risks in these communities and to identify opportunities for resilience-building, there is an urgent need to shed light on the historical and cultural context of island societies and ecosystems. These approaches should build upon local and traditional knowledge and be grounded in established practices developed by island communities over centuries which continue to be heavily impacted by current political and economic trends.

This article presents several multi-scale case studies from islands around the world to offer a historically informed review of the cultural, environmental, political and economic systems and influences on island resilience. The discussion then shifts to the current state of vulnerable island populations, ecosystems and livelihoods, and opportunities for restoring and enhancing resilience through traditional and local knowledge and institutionalizing a long-term agenda to rebuild social and environmental justice. In doing so, this article demonstrates how small island communities can become inspiring champions of livelihood resilience to global environmental change. Our conclusions highlight best practices at the local, national and regional scales for addressing these challenges through education, women's empowerment, health, intergenerational knowledge sharing, food security and innovative livelihood strategies such as varied mobility tactics. These practices ultimately serve as catalysts to reduce livelihood vulnerabilities and contribute to national and community level adaptive capacity to climate change, by helping forge a stronger sense of global community between small islands and non-small islands across the world.

**Keywords:** Climate Change, Disasters, Islands, Livelihoods, Resilience

## **A. Introduction**

Island states, particularly small island developing states (SIDS) are powerful icons in the politics of climate change (Barnett and Campbell, 2010). Newspaper ‘doom and gloom’ headlines such as “Sinking islands, vanishing worlds”, “climate change washing away Pacific communities” and “threatened with extinction from rising seas” exemplify the way in which islands are framed in climate change discourse. These discourses have given rise to the widely held opinion that SIDS are most vulnerable and, particularly for the islands of the Pacific, could inevitably become uninhabitable due to climate change impacts such as sea level rise. This classification of island communities in policy documents and mainstream media as being “most vulnerable” to climate change and disasters might serve to raise awareness of their plight, or be used as impetus for global action. However, this approach can also result in unintended (and damaging) attitudes and consequences. This is illustrated by recent off the record discussions with several donors and policy-makers who have inappropriately implied it is “too late to save the islands”, given their vulnerability to current and impending climate change impacts.

In the last two decades academic research has been moving beyond such headlines, to frame island adaptation to climate change stressors and shocks as worthy of specific examination. While there is no commonality across all islands or even within regional island groupings, there is an emerging scientific appreciation of resilience and livelihood challenges unique to island communities. The unique

vulnerability of islands is tied to their small size and insularity. In order to appreciate the particular challenges that islands face, this article will explore some historical and political patterns that explain differences in livelihood securities of islands, and examine what we can learn from various case studies in order to foster livelihood resilience among small island communities. Additionally, given the positioning of islands and climate change globally, lessons from islands can be applied to address climate change impacts given that islands are often considered the “barometers of climate change” (Kelman and West, 2009, p. 2). Ultimately, without reducing the urgency at which firm action is needed for both mitigation and adaptation, this article aims to refute this framing of the islands as “too late to save”. Instead, islands must be looked to and supported as, inspiring champions of livelihood resilience and adaptation to climate change and disasters.

## **B. Conceptual Framework and Literature Review**

As noted in the IPCC Fifth Assessment Report on small islands, the literature on SIDS has been comprehensively addressing the complexity of small island vulnerability, impacts and adaptation (Nurse et al., 2014). This literature considers climate change in a multidimensional manner, as just one of several stressors on SIDS. Some of the early literature on climate migration, for example, seemed to indicate the existential nature of climate change impacts and sea level rise on islands and had not entirely recognized the capacity of islands and local communities to adapt in situ (Nurse et al., 2014). Vulnerabilities and adaptation

needs are as diverse as the variety of islands between regions and even within nation states. Therefore, a quantitative comparison of vulnerability across island nations and communities is difficult due to the paucity of generic and context specific vulnerability indicators. While generic indices of national level vulnerability are emerging, very few focus on islands. The island specific indicators that exist are limited in many regards. These limitations include a lack of data, or the use of indicators that are either not relevant or of limited quality for islands (Nurse et al., 2014). The result is that indicators of vulnerability for small islands inaccurately represent actual vulnerability.

Resilience and livelihood challenges unique to island communities are usually associated with the small size of their land based ecosystems; concentration of population and activities in small areas which intensifies stress conditions; high frequency and variety of natural disasters; and the close coupling of terrestrial, coastal and marine systems which results in fast spreading impacts among systems. There are a range of opinions, however, about how islands and local communities have successfully adapted to past weather variability and climate change (Nurse et al., 2014). Some researchers indicate that past changes have had a 'crisis effect' on prehistoric societies in much of the Pacific Basin (Nunn, 2007).

At the same time, other researchers note that past experiences of extreme events have built up island resilience (Adger and Brown, 2009; Barnett, 2001; Cinner et al., 2012; Kuruppu and Liverman, 2011; Le Masson and Kelman, 2011; Tompkins et al., 2009). These studies determine island

resilience by various factors including a belief in their own capacity; familiarity with the environment and an understanding of what is needed to adapt; a high capacity to anticipate change and prepare strategies; self-awareness of human impact on the environment; a willingness to change occupation to increase livelihood diversity; and strong social capital tied to island networks and support systems. Other scholars, such as Kelman and West (2009), have suggested that some of the characteristics of islands provide advantages and opportunities for addressing climate change related challenges. These include: tight kinship networks; unique heritage; a strong sense of identity and community; innovative livelihood strategies; remittances from islander Diasporas; and extensive historical local knowledge and experience dealing with environmental and social changes over time.

This article builds on this research history, exploring the livelihood resilience of islanders in the context of drivers of exposure and vulnerability. This article specifically recognizes that livelihood systems are situated within and influenced by social, natural, financial, physical, institutional and political structures and norms. We posit that the drivers of exposure and vulnerability for islanders include the legacy effects of colonialism and neo-colonialism; environmental degradation and climate change; poor governance and justice mechanisms; and poverty and limited livelihood opportunities. Drivers of resilience, as explored throughout this article, include traditional and local environmental knowledge, including local early warning systems; innovative livelihood

diversification initiatives; increasing women's empowerment through integrated development programming; creative food and water security systems; place based adaptation; and community engagement. These dimensions all ultimately help to reframe islands from vulnerable, to viable and resilient agents of change.

### **C. Methods**

This article discusses a range of sites including the Caribbean (Dominican Republic and Trinidad and Tobago), the Pacific (Fiji, Hawai'i and Vanuatu), as well as the Philippines, Madagascar and Sri Lanka. The methodology involved a structural review of relevant case studies that included the following research methods: (1) desktop reviews of relevant literature and programme evaluations; (2) roundtable workshops with experts in the field; (3) focus group discussions; (4) household surveys and interviews with men, women and young people in the local communities on the islands; and (5) interviews with government, donors and civil society organizations. Each case study section discusses their particular processes and methodologies. From these methodologies and case study findings four key dimensions of results arose, which are summarized in the following section.

### **D. Results**

Given the complexity of island ecosystems and their particular vulnerabilities, we address island livelihood strategies in four key dimensions:

1. Harnessing traditional and local environmental knowledge, in particular examining how

traditional knowledge in the Pacific provides insights in preparing and responding to climatic hazards;

2. Recognizing migration, remittances and relocation as a livelihood strategy to improve resilience, examining how islanders in the Caribbean and Sri Lanka maximize their livelihood resilience through these mobility tactics;
3. Building the resilience of women islanders through integrated development, addressing the particular vulnerability of women from the Philippines and Madagascar;
4. Promoting resilient island food systems in Sri Lanka and the Philippines.

### **1. Harnessing Traditional and Local Environmental Knowledge to Prepare for and Respond to Climatic Hazards: Evidence from the Pacific**

Indigenous people have long utilized knowledge of their surrounding environment to respond to and cope with acute extreme weather events, as well as gradual environmental change (Macchi et al., 2008; Salick and Ross, 2009; Turner and Clifton, 2009; Weatherhead et al., 2010). With climate change set to pose significant challenges for livelihoods to be sustained in both the short- and long-term, such knowledge should be recognized as a critical part of the collective response to climate change impacts. As communities in island nations are encouraged to adapt to the impacts of climate change, their knowledge of coping with and managing local environments is emerging with considerable importance in the adaptation and disaster risk management fields

(Berkes and Jolly, 2001; Ifejika Speranza et al., 2010). Since the turn of the century, numerous studies have emerged to demonstrate the role and value of Indigenous knowledge to: complement or add value to scientific climate data (King et al., 2008; Lefale, 2010); provide culturally and locally appropriate solutions to community-based climate change adaptation (Berkes et al., 2000; McNamara and Westoby, 2011); and monitor local climatic and seasonal patterns (Riedlinger and Berkes, 2001).

Focusing specifically on communities in the Pacific Region, there are numerous examples of how local and traditional knowledge has provided tangible and effective ways of preparing for and responding to extreme rapid onset events and long-term environmental change. Island communities have historically utilized coupled local and traditional environmental knowledge and governance systems, enabling comprehensive coping and adaptive capacities and strategies via place based livelihood and natural resource management strategies (McNamara et al., 2014; Henly-Shepard, 2013a,b, 2014, 2015). Such strategies facilitated food and water security, including integrated land-to-sea resource management monitored by cultural protocols (Henly-Shepard, 2014), biodiversity and critical ecosystem protection and management, and intergenerational knowledge and practice sharing. Local early warning systems have been forged that incorporate local and traditional ecological knowledge with technological governmental early warning mechanisms, through participatory community resilience processes and cross sector negotiations. As such, the role and inherent value of this coupled knowledge

and governance structures should be better recognized and integrated within adaptation and risk reduction forums (Henly-Shepard, 2014).

With strong connections to, and a sense of identity entrenched in their surrounding local environment, many island communities illustrate their intrinsic resilience and internal adaptive capacities that have been developed over generations. As described by Bridges and McClatchey (2009, p. 140): “Over many generations these atoll cultures have survived major, unpredictable and locally devastating changes that are of the same magnitude as those expected from climate changes.” Such experiences and knowledge, which are deeply embedded in practice and belief systems (Berkes, 2008), form part of a critical resource that deepens our understanding of local climatic conditions and helps in devising appropriate and effective community-based strategies to cope with, and adapt to, extreme acute events and long-term climatic shifts.

Based on fieldwork in Fiji and Vanuatu in 2012 (McNamara and Prasad, 2014), extensive knowledge sets were revealed by local community members relating to coping strategies for coastal erosion and sea level rise, cyclones, flooding and droughts; all of which will be briefly discussed in turn. In response to coastal erosion, these communities have relocated their houses further inland, built stone seawalls (using cement, dead coral and rocks) and planted grasses and trees, such as *Chrysopogon Zizanioides* (vetiver grass) and *Barringtonia Asiatica* (fish poison tree), along the coastline and foreshore to minimize further coastal erosion and saltwater encroachment. In

terms of cyclones, various strategies have been adopted by local communities to cope and recover. Prior to a cyclone event, the women of the villages collect preserved canned foods; emergency items, such as, torches, radios and kerosene; and water supplies. Meanwhile the men secure the houses, livestock and plantation crops (by pruning the crops such as cassava and yaqona prior to the cyclone to reduce the surface area of the leaves exposed to strong winds). Any matured crops or fruits from trees are also collected and cooked in an underground oven pit (*lovo*) which preserves them for over a week. Following such an event, crops that mature quickly – such as, kumala, corn and certain varieties of cassava – are planted immediately to help with any food shortages while gardens are rebuilt.

Communities throughout the Pacific are often impacted by droughts and water shortages. Across Fiji and Vanuatu, local communities have developed innovative ways of securing their food and water supplies during these difficult times. In Fiji, farmers plant certain crops before the start of the dry season such as kumala (sweet potato), tivoli (wild yam), kawaai (yam), uvi (yam), giant swamp taro and wild cassava, as they are known to survive seasons with low rainfall and provide a secure source of food. Similarly in Vanuatu, communities grow food crops that are known to be drought-resistant, including tavioka (cassava), tivoli and certain varieties of bananas and various wild yams (such as saaina and suwip) that survive dry conditions. In Hawai'i, farmers and ranchers have also been impacted by droughts leading to crop and livestock losses. In response, adaptation strategies have included modifying crops to drought-

tolerant varieties, changing livestock types or grazing areas, reducing stock numbers, or making temporary changes to livelihoods (Henly-Shepard, 2013a).

Too much water, on the other hand, can cause significant challenges for these island communities. Seasonal flooding is often a natural characteristic of island communities, but changes in the built environment has made flooding more of a hazard than a natural part of the ecosystem and way of life (Henly-Shepard, 2013a). In preparation for any future flooding events, some local communities have built their houses on stilts and any new houses are built on higher ground to avoid the risk of flooding. Community members also dig nearby channels to minimize the damage of floodwaters to their crops, assist those affected to move their household items to higher ground, and help rebuild damaged houses and gardens once the waters subside.

These findings illustrate how local Indigenous knowledge can and should be utilized to facilitate disaster risk reduction responses and climate change adaptation initiatives at the local level. In this light, higher-level policy activities need to be cognizant of, and value, the role of this knowledge, local social networks and associated resources in disaster risk and climate change planning efforts.

## **2. Recognizing Migration, Remittances and Relocation as Livelihood Strategies to Improve Island Resilience: Evidence from the Caribbean and Sri Lanka**

The key focus of the concepts of cultural medical ecology, particularly in island



nations, is the idea that geopolitical relationships and influences from colonial and neo-colonial times have impacted systemic and individual capacity for adaptation and continuous readjustment processes (Colomeda, 1999). The legacy of colonialism and slavery extend into present day on many Caribbean islands, as evidenced by the disparate social structures of the political economy and severe environmental degradation from poor natural resource management. These effects have often aggravated the lack of livelihood opportunities and severe poverty, malnutrition, poor water and sanitation.

On the island of Hispaniola, these factors have, to varying degrees, influenced the mass migration of Haitians to the Dominican Republic for work and survival. The lack of access to public health education and resources and inadequate nutrition and housing has led to a high incidence of HIV/AIDS and Tuberculosis among other health afflictions. This coupled with institutionalized racism and human rights abuses against Haitians within the Dominican Republic, has led to dire living situations particularly within Haitian migrant plantations.

A community-based study within one Haitian migrant plantation in the Dominican Republic shows clear linkages between public health and human rights abuses perpetrated both within and upon the Haitian migrant community (Henly-Shepard, 2003). Migration was reported as the top – if not the sole – coping livelihood strategy to improve survival for residents, despite living in dilapidated migrant housing with inadequate water and

sanitation, malnutrition, human rights abuses including domestic violence, kidnapping and violent deportation perpetrated by police, among other atrocities. Many residents reported being HIV positive or having AIDS, which was a common comorbidity with Tuberculosis among other illnesses, related to poor water and sanitation facilities and malnutrition (Henly-Shepard, 2003).

The inextricable linkages established between the respect, protection and fulfilment of human rights, environmental degradation and the capacity of people to have adequate basic services and public health (Henly-Shepard, 2013c), illustrate the fragile tipping points experienced in island nations and communities. As such, there is an inherent need for the identification and prioritization of root causes of vulnerability, many of which are historically grounded in racial, cultural and economic disparities and injustices which may take generations to overcome. This colonial legacy has facilitated work-related migration and the subsequent development of Caribbean enclaves and support networks in receiving states, ultimately contributing to Caribbean islanders' maximization of migration as an extraterritorial livelihood strategy. For Caribbean peoples, the complex patterns of short- and long-term international movements of emigration and circulation (temporary, reciprocal movement) maximize livelihood opportunities and contributions to life in the homeland.

An analysis of the life stories of one hundred Trinidadian migrants revealed that island migration as a livelihood strategy can take various forms (De Souza, 1998). These forms include: (1) seasonal,

mobile livelihood circulation driven by economic factors; (2) return visitation, which categorizes repetitive visits of Caribbean emigrants; (3) long-term return migrants, who are making their final return decision; and (4) the transnational movement of Caribbean circulators living “between two worlds” (De Souza, 1998, p. 232). Livelihood maximization tied to migration is also inherent in the use of island remittances. For the Caribbean, remittances include flows of capital and goods that allow for better livelihoods. These are primarily used for consumption but they also allow for investment in housing, land and in the wellbeing of others. Remittances promote the development of human capital and growth of social and cultural capital stocks in local communities (Potter et al., 2004). Remittances are particularly important for SIDS – the aggregate amount of remittances received in 2012 was \$8.9 billion (UNDESA, 2014). Among island states with available data, the Dominican Republic and Jamaica received the largest absolute amount of remittances. However, Haiti, Guyana<sup>1</sup> and Samoa received the highest contribution of remittances as a share of their Gross Domestic Product (GDP). These strategies – different mobility patterns and remittances – are important components of how islanders adapt to the limitations of their islands and demonstrate an effective adaptation strategy through opening up choices for people to deal with uncertainties.

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<sup>1</sup> Even though Guyana is not an island and geographically is part of South America, it has an important cultural, social and regional role among the Caribbean islands. Its social ties are closest to the Caribbean islands and it hosts the secretariat of the Caribbean Community and Common Market (CARICOM).

Migration is not always a permanent departure from the island, but a potential strategy to build resilience and in many cases, prepare for an eventual return.

While there is no definitive evidence that ties island migration to anthropogenic climate change (Nurse et al., 2014), relocation has been used as a vulnerability reduction strategy to floods and landslides on various islands such as Sri Lanka. Research has revealed that the forced relocation of people living in landslide and flood prone areas was used as a vulnerability reduction strategy by the Government of Sri Lanka (Fernando and Punchihewa, 2013). Various factors, however, have undermined the success of such relocation policies including: forcing people to live far from their previous settlements; forcing people to live in unplanned settlements without individual (water or electricity) or common (road access or a community centre) basic needs; lack of provision of good quality housing; lack of employment opportunities; conflicts between host and relocated communities; and lack of access to common property resources. Such factors can cause some relocated families to move back to their previous places re-exposing them to hazards (Fernando, 2012a). Pre-knowledge of the harsh conditions in new settlements can encourage families to risk remaining in hazard prone areas until they receive good quality houses with proper facilities in these new settlements (Fernando, 2012b). In this context, it is vital to stress the need for a people-centred relocation policy with a commitment to building resilient communities, to minimize relocation failures in the future (Fernando, 2013). To allow islands like Sri Lanka to enhance the success of climate

adaptation measures, such as the planned relocation of coastal communities, governments should closely engage with the communities who are likely to be relocated. Despite the many complexities of relocation, if done appropriately, it might reduce people's exposure to sea level rise and other coastal hazards and also strengthen people's asset portfolio to successfully cope with risks and stressors to secure their livelihoods.

### **3. Building the Resilience of Women through Integrated Development Programmes: Evidence from the Philippines and Madagascar**

As primary food producers and family caregivers, island women are disproportionately affected by climate change, environmental risks and disasters (Bortolao, 2014; PIFS and SPC, 2012). However, generally women islanders continue to be at the fringe of discussions about these issues despite their specific concerns, knowledge, experiences and insights. Research suggests that rights based, voluntary family planning can improve individual and community level assets, capacity, flexibility and mobility, thereby improving resilience, especially among women (De Souza, 2014). Studies have found that family planning can improve adaptive capacities at the individual and household level in several ways. Firstly, by helping women and families to determine their desired family size, family planning allows them to plan for emergencies, create safety nets and evacuate and migrate more safely and easily. Secondly, family planning improves maternal health outcomes by reducing closely spaced, high risk births and decreasing domestic workloads.

Finally, improved climate change adaptability can come from a woman's increased perception of self-efficacy and having control over familial, socio-economic and psychological spheres. For example, Thurairajah et al. (2008) found that being actively involved in household decision making, including reproductive health decisions, empowered women during disaster recovery.

Through better health and education opportunities, women have been able to achieve improved resilience, become more flexible in their adaptive strategies, gain greater access to higher wage-earning work, and have greater participation in climate change response efforts and environmental stewardship. More broadly, both individuals and households become more resilient to environmental fluctuations and climate change events when women can advance their economic and social standing and feelings of self-efficacy and empowerment, thereby improving adaptability to climate change as well as the quality of climate change responses.

Integrated development programmes often distinguish themselves by involving women in environmental programming. These programmes help diversify the livelihoods of women and increase their participation in local decision making (De Souza, 2014). Based on a review of project documentation, interviews with project staff and reviews of project evaluations, De Souza (2014) noted that the conservation group, Blue Ventures, is working with local communities in remote, semi-nomadic areas along the south-western coast of Madagascar, to build women's resilience through integrated

development programmes. These integrated programmes link conservation efforts with family planning service provision. Having established a locally managed marine area, they subsequently added a health and family planning component to their work in response to local demand. Through its conservation and health programmes, Blue Ventures is providing services and information to community members, and training and workshops for peer educators. These initiatives support livelihood diversification (through seaweed and sea cucumber farming for women, which allows octopus stocks to regenerate) and better health outcomes (through better access to health staff and services). These programmes are also fostering island resilience by building trust and strengthening community support networks. When Cyclone Haruna hit the area in 2013, Blue Ventures was able to deliver emergency aid when no one else could – a fact that Medical Director Dr. Vik Mohan attributes not only to their infrastructure, but also to the trust it has built with community members, particularly through its outreach to women in the community.

Similarly, in the Philippines, Save the Children (SAVE) established a successful partnership with the local government units in the municipality of Concepcion to ensure that integrated programming would be mainstreamed and sustained within local government activities (De Souza, 2014). Concepcion is located in Iloilo province, western Isaias region. The municipality has 25 *barangays* (local wards), 11 of which are located on small islands. In 2000, Concepcion was ranked as the poorest municipality in Iloilo.

Surveys indicated that 5,598 households (87 per cent of households in the municipality) lived in poverty. SAVE's People and Environment Co-Existence Development Project aimed to improve the health of families and communities by addressing population growth and the degradation of coastal resources. The project was premised on the idea that couples who have an unmet need for contraception are likely to take action to address their needs if reproductive health services are available to them and if they understand the links between a growing population, the local environment and their quality of life.

After SAVE and the municipal government identified the *barangays* to work with and agreed on the general goals of improving reproductive health and coastal resource management, they then built partnerships with the *barangays* themselves. Garnering the commitment of the *barangays* happened in two steps. First, SAVE carried out workshops with *barangay* leaders that strengthened their skills in mobilizing community members and involving women in development planning and project decision-making. Second, SAVE continued working directly with municipal leaders so that their plans would gain budgetary and policy support and be aligned with the annual municipal development plan.

The result was that both levels of local government – the *barangays* and the municipality – held each other accountable, creating mutual and sustained support and commitment. “It was the mayor and key municipal staff and not SAVE, who made sure the *barangay* local government unit supported the

partnership,” noted Rene Sobremonte, the municipal planning development coordinator (De Souza, 2014). SAVE staff indicated that these collaborations continue today, even after the programme has ended. The sustainability of such programmes helps build island community resilience above and beyond the partnership with NGOs and development actors such as SAVE and allows local governance structures to emerge. This is particularly important for islands like the Philippines, where there is a high level of insularity and devolved governing structures.

#### **4. Promoting Resilience Island Food Security Systems: Evidence from Sri Lanka and the Philippines**

Climate change is posing several threats to food security in island nations (FAO, 2008). Ocean warming and acidification, spatial changes in precipitation patterns and frequent cyclones are projected to have devastating effects on the food sector, ranging from loss of the coral reefs and mangrove forests, to reduced agricultural yields and loss of arable land and freshwater. Recognizing that subsistence and commercial agriculture are vital to local food security and earning export revenues on islands, it is important that adaptation measures to build resilience of food systems will help avoid economic losses in agriculture, forestry and fisheries.

Sri Lanka is a middle income level country with a total population of 20,277,597 – a significant proportion (77 per cent) of which work in the rural sector (Department of Census and Statistics, 2012). Although Sri Lanka’s contribution to global warming is low, the country is

highly vulnerable from the impacts of climate change such as the variability and unpredictability of rainfall patterns, increased frequency and intensity of floods, droughts and landslides, sea level rise and increased temperatures (Ministry of Environment, 2010). The main income sources of the rural population (agriculture, livestock production and inland fisheries) are highly dependent on rainfall patterns. Most of the paddy lands are cultivated in the dry agro-ecological zone depending entirely on rain water for cultivation under two main seasons: *yala* (April to September) and *maha* (October to March). The *maha* season is highly exposed to droughts and this situation is expected to increase (Mahfuz and Suphachol, 2014). Unexpected floods due to North-East monsoon rains can destroy paddy lands and when this occurs, livestock farmers and fishermen cannot work for up to three weeks. For instance, during 2010-2011, 380 hectares were cultivated in the northern, eastern and north central provinces in the *maha* season and 23 per cent of the gross expected harvest was destroyed due to floods in the flowering and harvesting stages (Petersson et al., 2011). In addition to the agriculture sector, other sectors including, coastal and marine resources, energy, health and water are also vulnerable to climatic changes (Mahfuz and Suphachol, 2014).

Paddy farmers are aware of rainfall and temperature variations, changes to the cropping calendar and sea level rise leading to coastal erosion and salt water intrusion (Chandrasiri, 2013). Accordingly, they have changed their agricultural management practices as a strategy to cope with the impacts of climate change. For instance, farmers experiment with

traditional varieties, short duration crops, biopesticides, paddy husk and bio manure to improve water retention and soil organic material levels (Hettige, 2010). Building on these grassroots management practices, researchers argue for a proper adaptation policy for the agriculture sector in Sri Lanka. This policy would include a mechanism for implementation with a commitment to successfully adapt the agriculture sector to climate change (De Costa, 2010). There is some hope, given that the national climate change adaptation strategy for Sri Lanka for the period of 2011-2016 was introduced in 2010. It aims to minimize the negative impacts of climate change on food security; improve climate resilience of key economic drivers; safeguard natural resources and biodiversity from climate impacts; make climate resilient healthy human settlements; and mainstream climate change and adaptation into national planning (Ministry of Environment, 2010).

In the Philippines, in addition to national plans there are efforts to build resilience in food security at the community level. In 2001, a local NGO, PATH Foundation Philippines Inc. (PFPI) launched the Integrated Population and Coastal Resources Management (IPOPCORM) project to tackle vulnerabilities, similar to those in Sri Lanka, among Filipino coastal communities. These vulnerabilities included rapidly shrinking fish stocks, high levels of poverty and a range of poor health outcomes. Rather than provide assistance directly to communities, IPOPCORM partnered with other NGOs and local resource user groups to build resilience through the provision of technical, financial and planning assistance in support of food security, family

planning, conservation and biodiversity goals. In 2010, PFPI assessed IPOPCORM's impact in Palawan, one of the island municipalities participating in the project. The study compared pre-project data from 2001 with post-project data in 2007 to determine the performance of three programmes: one targeting reproductive health, a second targeting coastal resource management and a third targeting both in an integrated manner. Overall results indicated that there were better food security, reproductive health and environmental outcomes at the integrated programme sites.

PFPI is now working to facilitate the development of 'Population, Health and Environment councils' through municipal ordinances, as a key part of a holistic approach to development, environmental conservation, and climate change adaptation and disaster risk reduction objectives. In the province of Leyte, the municipality of Hindang has created such an ordinance, the 'Municipal Multi-Sectoral Population Health Environment (PHE) Council' which will "integrate the PHE approach into the Municipality's annual, short, medium and long-term development plans and programmes and appropriating funds thereof" (De Souza, 2014). Such councils and additional governance structures have been effective in linking food security and population wellbeing to overall community resilience. Similar to the development of new island community-based governance mechanisms on integrated development, this approach is increasing community resilience through improved food security and health outcomes, facilitated by innovative NGOs to encourage community partnerships that are possible in the small, decentralized

island communities of the Philippines.

## E. Concluding Remarks

Recent academic research has been increasingly moving beyond ‘doom and gloom’ headlines to instead frame islands as sites of livelihood resilience to the impacts of climate change and disaster risk. This article has attempted to contribute to this body of work. The case studies used illustrate how local Indigenous knowledge and island specific strategies can be utilized to facilitate climate change adaptation initiatives and disaster risk management responses. These strategies include harnessing migration opportunities and remittances; increasing islander women’s resilience; and building reliance on island food security systems at the national and community levels. Such initiatives can also help in building livelihood resilience at the local level. In

this light, higher-level policy applications need to be cognizant of the role of such knowledge and strategies and support the value that they offer for climate change and disaster risk planning efforts. While the above case studies do not present an exhaustive list, their findings reinforce that socio-culturally institutionalized and place based practices are strong examples of island communities responding to real-time threats. This provides further impetus for these experiences to be recognized and shared globally. In this way, we urge the various policy, programmatic and research communities to move away from painting a victimizing, irreparable fate and trajectory of island communities, and instead forge thoughtfully towards an inclusive, intergenerational, justice driven, place based adaptable framework for a sustainable future, for all island, coastal and mainland communities worldwide.

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Livelihoods are the lattice upon which all human organization hangs, and some of the worst-case scenarios of global change – displacement, migration, conflict and famine – all centrally concern the problems that people face in sustaining productive livelihoods.

The 2013-2014 Resilience Academy is a group of 25 international researchers and practitioners who have recognized that dangerous global change is a threat to the livelihood systems of the world's poor. The Academy met twice, in Bangladesh and Munich, Germany, and developed a set of working papers as an evidence base for the concepts and practices that we, as a cohort of colleagues, propose for addressing this pressing challenge.

