

Article

# Improving Development Outcomes and Reducing Disaster Risk through Planned Community Relocation

Johanna Nalau <sup>1,\*</sup>  and John Handmer <sup>2</sup>

<sup>1</sup> Griffith Climate Change Response Program (GCCRP) and Griffith Institute for Tourism (GIFT), School of Environment and Science, Griffith Sciences, Griffith University, Gold Coast Campus QLD 4222, Australia

<sup>2</sup> School of Science, RMIT University, Melbourne VIC 3000, Australia; john.handmer@rmit.edu.au

\* Correspondence: j.nalau@griffith.edu.au; Tel.: +61-7-555-27419

Received: 20 July 2018; Accepted: 28 September 2018; Published: 2 October 2018



**Abstract:** The idea of relocation as a transformative disaster risk reduction, climate adaptation, and development strategy follows the assumption that relocation reduces the vulnerability of communities. Yet, it is unclear whose and what kind of vulnerability is reduced through relocation, and which factors are important in determining the “success” of relocation efforts as strategies for development, climate change adaptation (CCA), and disaster risk reduction (DRR). Temporary and short distance relocation is highly likely to achieve increased resilience by reducing exposure, but relocation to a new area and new communities brings a range of issues. CCA and DRR use different timescales and focal points regarding relocation: CCA focuses on future mass permanent relocation and the subsequent potential loss of cultures and identities mainly due to projected sea level rise. The DRR community focuses on temporary relocation as a way to reduce exposure to a range of hazards, although it is also involved in permanent movement as a transformative way to reduce risk and enhance development. We explore these differences in this paper, with examples mainly from the Pacific Small Island Developing States where past relocations have been numerous. Better understanding and articulation of the underlying assumptions and preferences in CCA, DRR, and development discourses on planned community relocation could provide a richer context for future planning and dealing with both slow-onset and sudden disasters.

**Keywords:** disaster risk reduction; relocation; climate change adaptation; development; policy; planning

## 1. Introduction

Development-disaster risk systems are facing increasing challenges, many of which are due to the complex unprecedented nature of changing climate [1,2]. Recent climate change projections—for example, the Intergovernmental Panel on Climate Change’s Special Report on Extreme Events (SREX)—have projected increases in the frequency, intensity, and nature of extreme weather events, with significant impacts on places and people [2]. Given that the scale of projected climate change is significant, “the need to develop relocation programs would inevitably exert significant force on global and regional policy priorities” ([3], p. 457). The UK-government supported Foresight project notes that migration “can represent a ‘transformational’ adaptation to environmental change, and in many cases will be an extremely effective way to build long-term resilience” ([4], p. 10).

It is commonly assumed that relocation can reduce the vulnerability of communities—that by taking account of people’s needs [5], the process of relocation can be an important part of a transformative and adaptive development strategy. This is based on the idea that once people’s exposure to a major hazard is reduced, their resilience increases, and they are generally better off [6].

Yet, it is unclear as to whose and what kind of vulnerability is reduced through relocation, and which factors are important in determining the “success” of relocation efforts as strategies for overall development, climate change adaptation (CCA), and disaster risk reduction (DRR). Both CCA and DRR communities, in fact, view community relocation as a way to reduce vulnerability, but they use very different timescales and focus points.

Development in itself provides somewhat of a paradox, as it can increase or exacerbate disaster and climate risk, even as it meets other aims. It increases the risk most obviously through increasing the exposure to hazards. This is the case in both high- and low-income countries—although the situation of hundreds of millions in informal settlements is often seen as being especially precarious. This highlights the importance of location, and the difficulty of containing development to low-hazard areas, and that in this context, “development” is seen as top-down control. Development can also increase vulnerability through, for example, decreasing traditional coping mechanisms and livelihood security—first documented by Burton, Kates, and White [7]. However, there are important exceptions to this, such as the “villages within the city” in some southwest Pacific Island countries [8]. Increasing urbanization in China has moved many people into high-rise accommodation, which is seen to have lowered exposure and vulnerability to flooding [9]; the same trend can be observed in Indonesia through “vertical relocation”, where people have been encouraged to move to high-rises instead of continuing to live in single-dwellings on flood plains [10].

We can attempt to manage further development in high-hazard areas to restrict the growth in exposure, while aiming to manage vulnerability. Even if there was no growth in exposure, the issue of existing hazardous developments would remain. However, the reality is that there is strong growth in exposure almost everywhere [2,11], and in some cases, strong growth in vulnerability as well. Relocation can support development while reducing exposure. Temporary relocation at critical times can also be effective at supporting development in otherwise problematic areas. While not generally viewed in this way, temporary short distance relocation allows the relative safe occupation of land that is subject to flooding in many countries, rich and poor. In other words, there are different dimensions and perceptions of what relocation as a strategy is and what it can be used for.

Despite the policy relevance of the movement of people, the implications of planned community relocation have been little explored as yet [12]. In this paper, we examine factors that seem to be pertinent for successful planned community relocation within the context of development, climate change adaptation (CCA), and disaster risk reduction (DRR). Our aim is to scrutinize the different ways in which the planned relocation of communities is considered as a strategy for vulnerability reduction within CCA and DRR, and we review literature that provides insights from actual relocation processes. We will use Small Island Developing States (SIDS) from the Pacific region as a proxy or exemplar of relocation, for investigating the potential range of outcomes for development, climate change, and disaster risk reduction. Pacific SIDS in particular, provide a rich context for this exploration, given their long-term history of migration and community relocations.

The paper is organized as follows: Section 2 discusses some of the more generic issues that are related to the definitions and types of relocation efforts. Section 3 investigates the similarities, differences, and areas of convergence of climate change adaptation and disaster risk reduction communities, and how they differ in considering relocation as a strategy for vulnerability reduction—and thereby for development. Section 4 outlines several often neglected factors in relocation processes, including destination entitlements, changes in worldviews, and the identification of types of reduced vulnerability. Lastly, we reflect on the current approaches and initiatives, and we identify the potential opportunities for future development research, policy, and practice.

## 2. Relocation: Definitions and Types

Several definitions exist for relocation, which commonly relate to its temporality or permanence, or its voluntary vs involuntary nature [12,13]. Relocation is intrinsically tied to the issue of scale. Campbell ([14], p. 2) for example, identifies four general layers of relocation: “(1) proximate relocation

within customary land boundaries; (2) proximate relocation but beyond the communities' customary lands; (3) long distance relocation within national boundaries but outside internal boundaries such as beyond one's island or province, and (4) international relocation". Relocation is rarely a straight-forward process from point A to point B, but it often involves several types of relocations, depending on who is relocating, and for what purposes.

Planned relocation in particular has not received as much as attention in the disaster literature as more temporary disaster-driven movements of people [15]. Planned relocation is "a solutions-oriented measure, involving the State, in which a community (as distinct from an individual/household) is physically moved to another location and resettled there. Under this schematic approach, evacuation is distinct from planned relocation, and it does not fall within its scope. Planned relocation may, of course, play a role following evacuations in circumstances where places of origin are no longer habitable, and continued presence in the place of evacuation is not feasible" [15].

Ferris [12] in turn identifies three different dimensions of planned relocation of communities in the context of climate change: (1) Relocation due to sudden disasters, but which are projected to increase because of climate change; (2) relocation because of slow long-term threats to livelihoods accruing from climate change; and (3) relocation due to climate change impacts that render places unlivable or nearly unlivable.

Several other definitions, scales, and types also exist in the discussions regarding the movement of people (Table 1). These terms are often used in overlap and without clear definitions, which also complicates comparisons, and strategy and policy formulation [15,16]. Some differentiate between migration as voluntary movement, and displacement as forced movement [16]. Forced migration is, for example, seen as a displacement of people due to external push and contextual factors. Environmental refugees are those who have to move due to environmental pressures and degradation [17]. Drought and desertification are the current slow-onset forces driving environmental refugees, but sea level rise and other climate-related impacts will increase this number in the future [18]. McLeman and Hunter [3] note that with slow onset processes, such as increased drought, the movement of people is currently mainly temporary. Yet, under a changing climate, limits to adaptation will become evident and many of these slow onset processes can render places unlivable, resulting in permanent relocation [19].

Biermann and Boas (2010) in turn argue that to classify someone as a climate refugee, one needs to consider the movements of people due to "sea-level rise, extreme weather events, and drought and water scarcity" [20]. This definition only addresses push factors, which can most likely be linked to anthropogenic climate change. Bukvic [21] notes nevertheless that among climate change adaptation discourse, relocation is becoming the leading term in discussions relating to climate-induced population movement.

**Table 1.** The diversity of definitions, scales, and types in relation to the movement of people.

Type	Definition
<b>Forced migration</b>	A general term that refers to the movements of refugees and internally displaced people (those displaced by conflicts) as well as people displaced by natural or environmental disasters, chemical or nuclear disasters, famine, or development projects [22].
<b>Climate refugees</b>	People who have to leave their places of living, immediately or in the near future, because of sudden or gradual alterations in their natural environment related to at least one of three impacts of climate change: sea-level rise, extreme weather events, and drought and water scarcity" [20]
<b>Dispersal</b>	"movement of residence as a strategy that is adopted to avert or to minimize economic risks, or to regulate mounting losses . . ." ([23], p. 517)
<b>Displaced people</b>	"People are considered displaced when they have been forced to leave their homes or places of residence, and the possibility of return is not permissible, feasible, or cannot be reasonably required of them" [16]
<b>Environmental refugees</b>	People who have left their homes on a semi-permanent or permanent basis, and cannot return to their homes in the near future because of climate change-related impacts [17]
<b>Planned relocation</b>	A term to describe the movement of people that occurs in a more strategic and planned manner [15].

However, environmental impacts and pressures are rarely the full story [3,24]. Many more migrate due to opportunities relating to education and skills development [25], or are displaced both voluntarily and involuntarily due to civil wars, political unrest, and poverty, and potentially now also due to projected impacts related to climate change. Often, environmental hazards intensify existing development problems in communities, and they act as a trigger for people to move to other places in their search for livelihoods [3,26,27]. This can be especially pertinent in cases where government assistance is not forthcoming, as Osterling [27] notes in the case of Peruvian communities after a major earthquake. Hazards are often the final trigger, which function as a push factor in the relocation process; often existing environmental degradation or lack of access to services are already embedded in the contextual background of communities who then decide to move [13].

Other commonly identified push factors for migration, for example in Micronesia, include the core development issues of “earnings at home, potential earnings abroad, and the costs of migration . . . poverty and hardship, unemployment, low wages, high fertility, poor health, and education services . . . ” as well as issues of conflict and governance: “ . . . conflict, insecurity and violence; . . . human rights abuse, and persecution and discrimination ” [6]. As McAdam [28] notes, it is difficult to claim that climate change is the single causal factor for migration or relocation, but it increases the magnitude of all other contextual pressures. There has, in fact, been a significant shift at the international level to see climate change displacement as a sub-set of disaster-related impacts, rather than as a separate category [28].

It is clear, however, that the communities that are most dependent on natural resources for their livelihoods are the most likely to be adversely impacted by climate change [5,29]. Therefore, relocation as an adaptation strategy often requires further adjustments in the spheres of livelihoods [5]. However, today, aid, remittances, and modern communication technology also enable communities to reside in places where they could otherwise no longer sustain themselves [30]. Changes in livelihoods, and for example, diversification of income sources through modern market- and service-based skills, can also allow a community to sustain its functionality in a degraded environment. In effect, many of the supporting systems in place, such as aid and remittances, enable communities to reside in environments which—albeit home—may be neither healthy nor sustainable [31]. Many communities are also supported by the reciprocity of extended families in the Pacific: in Samoa, small tourism businesses are able to rebuild after disasters with finances from extended family who live overseas [32]. Migration over long distances is often costly, making temporary short-term migration potentially more attractive [3]. Depending on the scale of relocation, there are increasing costs involved as well that need to be taken into account [33].

Many Pacific island countries have experienced large-scale migration throughout their history [13,16], and general migration is not a new phenomenon in the Pacific [26,33]. Many development approaches include some form of relocation, whether in terms of existing structures, community networks, or replacement/shifting of livelihoods. Issues surrounding relocation only become novel to some extent when they are applied to scientific projections of global climate change impacts [28]. This assumes that the range and frequency of hazards that compel communities to move will increase in the future [29,34]. Similarly, given such projections, development approaches also need to take a long-term proactive planning view through considering and implementing a range of measures such as labor migration, skills development, and designation of resettlement land (within-country and/or external).

Still, much of the relocation literature has focused on legal issues, potential large-scale mass migration, and relocation due to climate change impacts. The Pacific has increasingly been recognized as the most immediately vulnerable region [28,34–37]. Small atoll countries, such as Kiribati and Tuvalu, have provided vivid images of the possible inundation projected for the future [26,38]. The atoll countries have also been vocal about the plight of island nations ([28]), in particular in the United Nations Framework Convention on Climate Change negotiations, where the Alliance of Small Island States (AOSIS) has commanded significant media attention.

Much of this discussion emphasizes the close linkages between climate change-exacerbated disasters and the development in the Pacific, and suggests that relocations due to such disasters (and to climate change projections) might become frequent in the region already by the 2040s [34]. Such disasters can halt or set back development. Fiji has identified 676 coastal communities in potential need of relocation, out of which 42 need to be relocated within the next decade [39]. Campbell et al. [35] also list 86 cases of existing community relocations in the Pacific, which highlights the historical movement of people in the region. However, one needs to be careful when proposing relocation as a development strategy for risk reduction: such language can easily be used to legitimize the movement of people away from key resources that other parties want to exploit [40]. Next, we discuss the differences, similarities, and convergence of climate change adaptation and disaster risk-reduction communities, and the common framings regarding relocation.

### 3. Development, Climate Adaptation, and Disaster Risk Reduction

Business-as-usual development approaches are no longer workable in a rapidly changing world [1]. Prudent approaches to development need to consider two major factors: how to adapt to climate change, and how to deal with disasters. For example, in the Pacific region, the new regional policy on resilience explicitly addresses all three dimensions (development, CCA, and DRR). However, CCA and DRR pose some new challenges to development, and it is worth considering how these disciplines consider relocation as a strategy.

The CCA and DRR communities are often perceived as promoting parallel but somewhat opposing viewpoints. Yet by seeking to reduce vulnerability and to enable societies to respond to a range of risks, both aim to ensure that the development process works. Both areas do this by seeking to reduce vulnerability and enabling societies to respond to a range of risks. In this section, we review the differences and similarities in their approaches to relocation as a strategy for vulnerability reduction, and investigate the lessons that they offer for resilient development policy and planning.

#### *Similarities, Differences and Convergence*

Although CCA and DRR share a common lexicon of key concepts and terms, such as vulnerability, resilience, and adaptive capacity, they differ in the use and the content of these terms. This has partly led to distinct differences in the way that research, policy, and practice are carried out [40–43]. The different approaches adopted are partly based on the different underlying scientific origins of the problems that they address. For example, DRR institutions and policies were not designed for long-term strategic policy, but for effective immediate responses [28]. Climate change adaptation, in turn, has emerged as a concern, not because of direct observations of adaptation, but due to science and projections of potential impacts accruing from climate change [28]. Over time, different organizations and institutions have acquired responsibility for each issue [44]: for example, at the international level, while CCA is addressed through the UNFCCC platform and its associated frameworks, DRR is mostly managed through the Sendai Agreement led by the United Nations Office for Disaster Risk Reduction.

Both are concerned with the possible loss of life and livelihoods; however, DRR addresses a range of risks, which are not all climate related (such as earthquakes, tsunamis), while CCA addresses climate-related risks. As a simplification, DRR is based on previous experience and current urgency [28] whereas CCA is based on scientific projections for the future, and it is expected to be included in development plans. The timescale within which each community operates is decisive with regard to the role of reflection over e.g., cultural factors and livelihoods: while DRR practitioners often need to make immediate decisions, CCA practitioners can reflect more closely on the ways to sustain a culture or forms of livelihoods, as much work often involves future scenarios and future movements of people. The urgency experienced by DRR practitioners to come up with solutions and to move people out of harm's way does not necessarily provide the time needed for robust long-term planning once a disaster or emergency strikes [6]. However, both disciplines are moving towards broadening the timescales within which they examine risks, and the extent to which they can learn from each other [44]. Some

authors have, however, questioned whether the lines dividing these communities are more theoretical than of practical value: for example, Mercer [45] reports that at a community level, there is little point from the community's perspective as to whether activities are classified as DRR or CCA.

Despite these differences, concerted efforts have been made to integrate these two communities [46]. The rationale for integration stems from the realization of the significant overlap between the fields. Closer integration can promote greater effectiveness and efficiency in the use of available resources, reduce administrative and operational burdens, and contribute more effectively to the goals of sustainable development embedded in both agendas [44,47]. Linking DRR with CCA has a number of benefits, such as increased access to a broader range of expertise, utilizing growing international funds for adaptation, and embedding a more forward-thinking approach in DRR by considering longer timeframes [28]. In addition, since most disaster risk management strategies, frameworks, and agencies are relatively well-established, they provide a rich resource for the incorporation and management of climate change adaptation that can harness the lessons learned from existing practical experience with disasters [27].

This closer integration is evident in the recent push in the Pacific to develop Joint National Action Plans (JNAPs) for climate change and disaster risk management, and the explicit recognition of climate adaptation's importance to disaster risk reduction) [44]. In the Pacific, Tonga has already developed its Joint National Action Plan on Climate Change Adaptation and Disaster Risk Management [48], as has Niue, while the Solomons has begun introducing institutional changes for such integration through the National Risk Reduction Plan for Disaster and Climate Change Risk [16]. A similar process is taking place in Vanuatu, where the National Advisory Board on Climate Change and Disaster Risk Management coordinates both agendas [14]. The post-Hyogo framework in the Pacific follows an integrated regional strategy for disaster risk management and climate change adaptation, rather than continuing with separate frameworks [49]. However, despite this recent convergence, essentially both communities of practice still carry different views on the issues of scale, timing, and extent of relocation processes [44].

In terms of relocation, the CCA community has mostly focused on the possibility of anticipatory permanent (mass) relocation from a country due to climate change impacts, such as sea level rise, and the consequences to culture, identity, and well-being [32,50]. This view often sees relocation as a permanent strategy involving possible loss of culture and identity (Table 2). The DRR community's focus has remained on current temporary relocation (often as evacuations) to nearby areas, or within the country, as a way to decrease both exposure and vulnerability. This view is somewhat more positive, as it frames relocation as a more temporary phase and strategy, which still allows for significant movement between the old and new places of living.

**Table 2.** Different views on relocation in climate change adaptation and disaster risk reduction, and their implications for development.

	Climate Change Adaptation	Disaster Risk Reduction	Implications for Development
Scale	Mass relocation of nations	Relocation of communities (but can involve hundreds of thousands)	
Timeframe	Future-oriented, permanent	Mostly immediate, non-permanent	Temporary relocation used as part of some developments, but may be inappropriate with climate change.
Push factors	Directly climate change-related; both sudden and slow on-set impacts	All extreme events	Can disrupt development if ignored.
Main concern	Loss of identity and culture, loss of traditions and livelihoods	Usually loss of lives; economically justified.	If ignored, can result in serious loss & damage
View	Negative due to the permanency of movement	Positive due to the temporality of movement	
Main options	Building new communities in new places	Building and re-building of infrastructure in the place of origin	Include in future development plans, and consider as a way of fixing existing intractable problems.

Relocation as a temporary measure to reduce exposure is orthodoxy in DRR. The logic is that people removed from harm's way are much safer—i.e., people that are relocated are no longer exposed to the hazard [28]. The DRR literature on relocation is preoccupied with how to get people to move, and the issues and problems surrounding temporary relocation (evacuation). The action of temporary relocation is seen normatively as a good (albeit often precautionary) approach. However, permanent relocation is viewed with caution—although the field of DRR has had much experience with the approach. This is especially the case where flood risk management is concerned, where communities and towns have been moved and continue to be moved.

Climate change adaptation raises in turn a growing concern that without precautionary efforts to safeguard such components as culture, values, and well-being, any adaptation process, including relocation and migration, will ultimately fail [50–52]. The overriding concern with issues of identity, culture, and sense of place can at times overshadow the questions of 'appropriate' resilience as when tipping points and thresholds are bypassed precisely because of adaptation strategies and subsequent policy outcomes. Population movements because of climate change impacts are, in other words, broadly viewed in negative terms among the climate change community [20]. The spatial dimension considered relates often to long-distance relocation.

A review of climate change and DRR policy frameworks in the Pacific, however, found that these frameworks paid scant attention to displacement issues [16]. In cases where displacement, migration and relocation were discussed, almost no attention was given to the re-establishment of communities and their livelihoods in new places of living. In cases where the analyzed National Adaptation Plans of Action (NAPAs) under UNFCCC discuss relocation, it is mostly at the village and community levels, as a last resort adaptation strategy, and a within-country process rather than across national borders. The main challenges to the use of relocation as an adaptation strategy, especially in the Pacific, lie in the issues of land rights, land availability, and land tenure [16]—both for those relocating, and for the host communities. Below, we discuss a range of factors, which impact on the success of relocation planning and programs, all of which are highly relevant in thinking about how to plan for transformative strategies that can lead to true risk reduction and increased well-being at the individual, household, and community levels.

#### **4. Relocation: Entitlements, Worldviews, and Vulnerability**

Current and past studies in the Pacific suggest that forced and involuntary permanent mass relocation is likely to cause problems, both for those who relocate, and for those already living in the areas adjacent to assigned areas [13]. Here, we discuss several issues associated with relocation of communities, and we examine those factors, which seem crucial for these contemporary efforts to reduce vulnerability and exposure.

##### *4.1. Planning for Entitlements: The Missing Link?*

While much of the DRR and CCA literature has focused on examining structural relocation (e.g., new housing structures for relocated settlements), relocation also poses new demands on environmental knowledge and the pursuit of livelihoods in a new location. Connell [13] for instance argues that the question of how livelihoods will be secured in the new environment is often neglected, yet for communities, this is a crucial factor in determining the outcomes of the relocation process.

Many migrants might find that access to services, employment, and even to land is very restricted. Birkmann [5] reports that while relocated communities in Phu Hiep in the Mekong Delta (Vietnam) were better off in terms of decreased exposure to flooding, they faced significant difficulties in the new location in terms of social and economic issues, including chronic poverty. The structure of the new community also hindered some of the previous livelihoods, such as keeping livestock, with severe impact on the capacity to maintain food security in the new place. In India, some relocated communities found their new places of settlement to be nonviable for agriculture, whereas others failed to gain access to fishing livelihoods and faced opposition from local inhabitants based on their

religion ([53]). Gaillard [54] notes that in the Philippines, relocation of uphill Aeta communities into low-lying areas partly erased their practice of traditional medicine due to the lack of medicinal plants in the new location and increased access to free Western health services.

In some cases, restricted access to a range of entitlements can result in heightened re-migration back to the original place of residence where this is still possible. For example, in Papua New Guinea following a forced relocation from an area of volcanic activity to the mainland, Manam islanders (Madang Province) decided that migrating back to the islands, now partly devastated by volcanic activity, was a better option than staying on mainland with reduced rights and constant conflicts with mainlanders over livelihoods and land [13]. Lack of access to key cultural resources actually decreased community members' social networks. Traditionally, the villagers used shelled nuts in maintaining generosity and hospitality. In the new place of living, the villagers did not have access to the nuts or to many other resources, such as building materials. Hence, reduced access to resources has multiple impacts including reduction in maintaining social networks [55].

In the case of relocated communities due to volcanic hazards in the Philippines, several challenges emerged in relocation processes relating to entitlements and planning [6]. For example, while the new site was 'safer' and decreased people's fears about environmental hazards, the related livelihoods available were mostly market-based (small shops, service industry), which were in stark contrast to the old site, which was sustained by mostly agricultural livelihoods. A constant flow of people remains back and forth between the new site for relocation and the old site where most agricultural land remains; men in the families could spend the working week in the old site and only return 'home' for Saturday or Sunday. Here, relocation has not been a one-off process, but rather a continuous process between different locations.

In this case, the government and the donors' focus remained on moving people out of harm's way, but this did not link to opportunities for livelihoods in the new site. While people were provided with new houses in the new site with the support of the government and aid agencies, electricity was not provided, and the new market-based livelihoods were not adequate to become robust alternatives for those community members whose skills mostly remained in the agricultural sector [6]. This links also to the question of when and how 'success' in relocation has been attained, and what parameters can be used to evaluate the actual completion of a relocation. Relocation thus should not be seen as a clear 'one-off event' [13] but rather as a complex continuous process, which impacts on a range of entitlements and rights in the long-term. Yet, most communities adapt to new situations and contexts, and they can learn new skills and practice new livelihoods.

In contexts where strong traditional land ownership, use, and rights are inherently critical [56], relocation can be highly problematic. For example, in the Solomon Islands, resettlement processes are a recurring source of violent protests when government decisions to relocate populations from other islands impact on current landownership arrangements in more urbanized destination areas [57]. This has led to a degree of reluctance by government actors to consider relocation as an alternative in disaster risk management. For example, in trying to formulate a disaster risk management plan for the volcanic island of Savo in the Solomon Islands, relocation and resettlement issues were not taken onto the agenda by national level actors, due to the previous difficulties and conflicts experienced in relation to relocation, although relocation was rated as one of the most pressing issues for the local communities involved [57].

Despite these attitudes and potential pitfalls, the Solomon Island's National Adaptation Program of Action recognizes the need to start drafting legislative and regulatory mechanisms, to enable relocation and resettlement schemes to provide avenues for such processes, because of projected climate change [58]. This is not merely an issue for the future: shortage of water and the degradation of agricultural lands has already seen communities relocate in the Western, Guadalcanal, Temotu, Malaita, Choiseul and Makira provinces, as well as in Honiara. Also, low-lying communities such as Ontong Java, Sikaiana, and Reef Islands and settlements built on water such as Kwai, Ngongosila, and

Lau are already facing increasing difficulties due to changes in the environment [58]. Hence, some form of transformation is likely to take place in the future.

A major factor in enabling or constraining the success of relocation is whether the community is moved to government-owned land, or whether the land occupied is already owned by other communities. In the case of one of the earliest government-led relocations in Vanuatu (the Maat community), Tonkinson [59] notes that one of the factors enhancing its success was that the land was allocated by the government, and it was later purchased by the community itself. Tonkinson [59] outlines several important features of the success of this relocation to the main island, Efate. First, the community members were able to locate available land in Efate, while maintaining a similar village setting and governance structure as in the island of Ambrym, where they came from. The similar landscape of Efate enabled villagers to continue with the same subsistence livelihoods, but with increased access to cash cropping and paid wage labor that guaranteed the investments and development of the village. Second, the community retained their culture and traditions, as they had minimal contact with other groups living in Efate. Third, better access to schools, health services, and water supply increased their sense of well-being. Fourth, relocated community members purchased their land communally, which decreased conflicts over land ownership in the community. Fifth, the new village on Efate had reportedly no sorcery. This was a significant factor for permanent relocation as the new village was perceived to be safer than returning back to Ambrym, where sorcery was seen as a constant threat. Therefore, evaluating the success of relocation efforts needs to take into consideration a broader set of issues.

Yet, even moving within customary boundaries is not simple. In Fiji, the village of Vunidogoloa had to be relocated (the process starting in 2006) due to salt water intrusion, flooding, and heavy rainfall, all of which made it difficult to manage living close to the shore. The village was moved within customary boundaries to higher ground, but for many villagers, the move had profound impacts on their identity, with some describing the relocation as a funeral process [60]. Here, the relocation, even if within customary land boundaries, was a highly emotional process, including having to move the village cemetery.

#### 4.2. *Changing Worldviews*

Transformation in the context of development is not only restricted to structures or livelihoods alone. The history of the Anglican mission in Melanesia illustrates that when communities moved from the bush to the coast, this involved not only learning new skills such as fishing, but also changes in societal structures due to access to education and services [61]. The social structure of the communities changed as the new coastal Christianized communities consisted of several different tribal groups who had previously lived in isolation, practicing their own cultural ways. These changes also impacted ultimately on worldviews associated with particular practices; relocation of communities thus brought broader social change in terms of new livelihoods, the social structure of communities (brought communities in contact with Western decision-making structures) and worldviews (moving from indigenous to Christian beliefs) [61]. Relocation can also change the existing traditional governance systems: for example, in the Philippines, relocation altered the internal community governance structures and introduced new roles and responsibilities to leaders by linking high status not with age as previously, but by the strength of personal political ties [54].

In countries such as Fiji and Vanuatu where land is regarded as sacred and it is directly tied to one's social status and identity, losing land can be perceived as losing security, since often one's mana (power) remains with the specific land or in the structures on that land [14]. Changes in worldviews due to relocation can also increase exposure in instances where oral traditions and knowledge of coastal hazards have given way to other types of knowledge. Ballu et al. [62] report that in Tegua (north Vanuatu), with the loss of oral tradition and beliefs in black magic (as previously seen as causing coastal hazards), people now appear less aware of 'dangers from the sea'. The previous settlement locations on Tegua have been at a much higher elevation and the changing knowledge structure of the

villagers due to e.g., the introduction of Christianity, could be one possible factor in the decrease in awareness and the subsequent movement towards lower altitudes [62].

Several factors influence whether cultural transformation takes place among migrants: “the migrants’ history of mobility, the role of outside agencies in the relocation and its aftermath, the strength of commitments to traditional values, contact with and changing perceptions of the homeland, and the relative weight of economic and non-economic factors in the migrants’ self-assessment” [59]. In cases where relocation can be described as communal movement [14], where a group of people permanently moves to another area together, often the essential political, social, and cultural structures prior to relocation, including worldviews, can be sustained. Relocation can thus establish the same community with same structures, albeit in a new physical location and in a new environment.

Yet, not all issues related to relocation are necessarily negative. Temporary relocation in the context of disaster risk reduction can become permanent because of better access to services and education; for example, in Vanuatu, several communities moved away from the island of Ambrym to Port Vila (Efate) because of volcanic eruptions. Few have returned due to enhanced access to services, employment, and education opportunities close to the capital city [13].

## 5. Discussion and Conclusions

This paper has examined the different ways in which relocation can be defined, and the range of dimensions and issues that need to be considered in planned community relocation. We find that relocation as a transformative development strategy has been viewed differently across disaster reduction and climate adaptation policy and practice. The timescales issues pertinent to each community differ: while CCA community has the ‘luxury’ of reflecting over future changes, the DRR community is often faced with immediate decisions, which demand tangible action in highly volatile environments imbued with political sensitivity [28]. However, recent policy convergence suggests that the integration of these disciplinary communities and related agendas is on its way [42,44,49], as perhaps best evidenced in the Pacific in the integration of the main regional frameworks. Added to this mix is the recent push to explicitly integrate both CCA and DRR with development, yet such integration is not well understood. There lies an opportunity in better understanding how all these three policy and practice communities can interact and contribute to co-benefits, especially at the local level.

We argue that in this time of convergence, there needs to be a change in how planned community relocation is understood in two major ways. First, we need to acknowledge that relocation does not necessarily always reduce the vulnerability of a community simply from physically moving people to a new location. People’s vulnerability can increase due to the way in which new settlements are planned and designed (or are not), and the kinds of impacts that this has on people’s livelihoods and resource access. Therefore, hazards and risks consist also of a range of socio-economic, political, and cultural dimensions [5,13,14,27,34]. This is where a strong focus on development outcomes can assist in creating transformative pathways that reduce disaster risk and enable more robust climate adaptation, especially in SIDS where such policy agendas and strategies need to be considered simultaneously [16,32]. A key consideration should be that the current development pathways that often underlie vulnerability and exposure in the first place are not replicated in the new place of settlement.

Second, in a world where some places of origin might cease to exist, that is, the crises cannot be reversed and there is no land to go back to, DRR needs to rethink its view on the temporality of relocation. In some cases, sudden relocations will become permanent, and hence they will require a new way of thinking how to manage community relocations. This is where sustainable development and climate change adaptation can assist in providing long-term perspectives for the practice of DRR [28]; a view that incorporates both slow-onset changes with sudden disasters.

As Moser and Boykoff [63] also note, it is rarely enough to assess and focus on one risk. Increasingly, attention should be paid to a multitude of risks and changing risk profiles. One approach

could be to use destination vulnerability and exposure assessments, which consider new and potential emerging risks for the to-be-relocated community in the area of the suggested relocation. Such assessments could include socio-economic, political, and cultural dimensions including existing land rights and entitlements, the extent of existing services, the cultural context, access to the labor market and potential for pursuing particular livelihoods, and geophysical risks. The role of remittances in the context of migration and climate change is also still not well understood, and more focus is needed on how informal networks are supporting communities' adaptive capacities in relocation processes [32].

In cases where responsibility allocation is unclear, different expectations on who should do what and for how long can constrain a successful relocation process. Identifying thresholds of when to undertake transformative policies and strategies is also an area of further research [1], as is the concept of adaptation limits [64]: when does a community really need to plan for relocation in the face of increased extreme events and climate change impacts? Mapping and investigating the range of adaptation limits that interact and come into play in relocation processes can provide also highly useful information about the emotional experiences and the range of factors that influence well-being. The concept of transformation itself as part of development, disaster, and climate discourse also needs more interrogation: for example, for indigenous groups, even the word “transformation” brings up negative connotations, given the colonial histories and the forced removal of people from their lands [65].

Ultimately, the question that needs to be posed is: when does relocation become ‘successful’ adaptation, or in this case, transformation? Answering this question will require more thorough analyses of the current, albeit small-scale relocations occurring continuously, in particular, in the Pacific, and drawing lessons as to the correct balance of the sharing of responsibilities and the role that community relocation plays in the development–disaster risk system. This also includes outlining the types of transformations that best reduce risk, while increasing community resilience and positive development outcomes, but also investigating the subjective dimensions of wellbeing [66] as part of understanding “success”. We are confident that there is an emerging body of ‘lessons learned’ from recent planned relocation of communities, which provide insights into how planned community relocation as an adaptation strategy, can be utilized in responding to a multitude of goals and agendas for vulnerability reduction, reduced exposure, and development outcomes.

**Author Contributions:** Conceptualization, J.N. and J.H.; Writing—Original Draft Preparation, J.N. and J.H.; Writing—Review & Editing, J.N. and J.H.

**Funding:** Johanna Nalau’s contributions were supported by a private charitable trust that wishes to remain anonymous.

**Acknowledgments:** In this section you can acknowledge any support given which is not covered by the author contribution or funding sections. This may include administrative and technical support, or donations in kind (e.g., materials used for experiments).

**Conflicts of Interest:** The authors declare no conflict of interest.

## References

1. Nalau, J.; Handmer, J. When is transformation a viable policy alternative? *Environ. Sci. Policy* **2015**, *54*, 349–356. [[CrossRef](#)]
2. Field, C.B.; Barros, V.; Stocker, T.F.; Dahe, Q. *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: Special Report of the Intergovernmental Panel on Climate Change*; Cambridge University Press: Cambridge, UK, 2012. [[CrossRef](#)]
3. McLeman, R.A.; Hunter, L.M. Migration in the context of vulnerability and adaptation to climate change: Insights from analogues: Migration and adaptation to climate change. *Wiley Interdiscip. Rev. Clim. Chang.* **2010**, *1*, 450–461. [[CrossRef](#)] [[PubMed](#)]
4. Foresight. *Migration and Global Environmental Change: Future Challenges and Opportunities*; Final Project Report; The Government Office for Science: London, UK, 2011.
5. Birkmann, J. First- and second-order adaptation to natural hazards and extreme events in the context of climate change. *Nat. Hazards* **2011**, *58*, 811–840. [[CrossRef](#)]

6. Usamah, M.; Haynes, K. An examination of the resettlement program at Mayon Volcano: What can we learn for sustainable volcanic risk reduction? *Bull. Volcanol.* **2012**, *74*, 839–859. [[CrossRef](#)]
7. Ferris, E. *Protection and Planned Relocations in the Context of Climate Change*; Brookings-LSE Project on Internal Displacement, Division of International Protection, August 2012, PPLA/2012/04; UNHCR: Geneva, Switzerland, 2012.
8. Burton, I.; Kates, R.; White, G. *The Environment as Hazard: Second Edition*; Oxford University Press: New York, NY, USA, 1996.
9. Jones, P. *The Emergence of Pacific Urban Villages: Urbanization Trends in the Pacific Islands*; Asian Development Bank: Mandaluyong City, Metro Manila, Philippines, 2016.
10. UNISDR. *Global Assessment Report on Disaster Risk Reduction 2015: Making Development Sustainable: The Future of Disaster Risk Management*; United Nations Office for Disaster Risk Reduction: Geneva, Switzerland, 2015.
11. Setiadi, R.; Nalau, J. *Can Urban Regeneration Improve Health Resilience in a Changing Climate?* IIED and the Rockefeller Foundation: London, UK, 2015.
12. Mechler, R.; Bouwer, L.; Schinko, T.; Surminski, S.; Linnerooth-Bayer, J. *Loss and Damage from Climate Change—Concepts, Methods and Policy Options*; Springer International Publishing: Cham, Switzerland, 2019.
13. Connell, J. Population Resettlement in the Pacific: Lessons from a hazardous history? *Aust. Geogr.* **2012**, *43*, 127–142. [[CrossRef](#)]
14. Cambell, J. International Relocation from Pacific Island Countries: Adaptation Failure? In Proceedings of the Environment, Forced Migration & Social Vulnerability, International Conference, Bonn, Germany, 9–11 October 2008.
15. UNHCR. *Planned Relocation, Disasters and Climate Change: Consolidating Good Practices and Preparing for the Future*; The UN Refugee Agency, The Nansen Initiative, Norwegian Refugee Council, Internal Displacement Monitoring Centre (IDMC): Sanremo, Italy, 2014.
16. NRC/IDMC. *Neglected Displacement: Human Mobility in Pacific Disaster Risk Management and Climate Change Adaptation Mechanisms*; Norwegian Refugee Council/Internal Displacement Monitoring Centre: Geneva, Switzerland, 2013.
17. Myers, N. Environmental refugees: A growing phenomenon of the 21st century. *Philos. Trans. R. Soc. B Biol. Sci.* **2002**, *357*, 609–613. [[CrossRef](#)] [[PubMed](#)]
18. Gemenne, F.; Brucker, P.; Ionesco, D. *The State of Environmental Migration 2011*; Institute for Sustainable Development and International Relations (IDDRI)/International Organization for Migration (IOM): Geneva, Switzerland, 2012.
19. Biermann, F.; Boas, I. Preparing for a Warmer World: Towards a Global Governance System to Protect Climate Refugees. *Glob. Environ. Politics* **2010**, *10*, 60–88. [[CrossRef](#)]
20. Bukvic, A. Identifying gaps and inconsistencies in the use of relocation rhetoric: A prerequisite for sound relocation policy and planning. *Mitig. Adapt. Strateg. Glob. Chang.* **2015**, *20*, 1203–1209. [[CrossRef](#)]
21. What Is Forced Migration?—Forced Migration Online n.d. Available online: <http://www.forcedmigration.org/about/whatisfm> (accessed on 30 August 2018).
22. Torry, W.I.; Anderson, W.A.; Bain, D.; Otway, H.J.; Baker, R.; D’Souza, F.; O’Keefe, P.; Osterling, J.P.; Turner, B.A.; Turton, D.; et al. Anthropological Studies in Hazardous Environments: Past Trends and New Horizons [and Comments and Reply]. *Curr. Anthropol.* **1979**, *20*, 517–540. [[CrossRef](#)]
23. McLeman, R.; Smit, B. Migration as an Adaptation to Climate Change. *Clim. Chang.* **2006**, *76*, 31–53. [[CrossRef](#)]
24. Pacific Institute for Public Policy. *The Micronesian Exodus*; Pacific Institute of Public Policy: Port Vila, Vanuatu, 2010.
25. Connell, J. Small Island States and Islands: Economies, Ecosystems, Change and Migration. In *Migration and Global Environmental Change Foresight*; Government Office of Science: London, UK, 2011; Volume DR16.
26. Osterling, J.P. The 1970 Peruvian Disaster and the Spontaneous Relocation of Some of Its Victims: Ancashino Peasant Migrants in Huayopampa. *Mass Emerg.* **1979**, *4*, 117–120.
27. McAdam, J. *Climate Change, Forced Migration, and International Law*; Oxford University Press: Oxford, UK, 2012.
28. Handmer, J.; Dovers, S. *Handbook of Disaster Policies and Institutions: Improving Emergency Management and Climate Change Adaptation*, 2nd ed.; Earthscan from Routledge: London, UK; Sterling, VA, USA, 2013.
29. Handmer, J.; Mustelin, J. *Is Relocation Transformation?* University of Oslo: Oslo, Norway, 2013.

30. Wartho, R.; Overton, J. The Pacific Islands in the World. In *Strategies for Sustainable Development: Experiences from the Pacific*; Overton, J., Scheyvens, R., Eds.; University of New South Wales: Sydney, Australia, 1999; pp. 33–47.
31. Parsons, M.; Brown, C.; Nalau, J.; Fisher, K. Assessing adaptive capacity and adaptation: Insights from Samoan tourism operators. *Clim. Dev.* **2018**, *10*, 644–663. [[CrossRef](#)]
32. Campbell, J.; Warrick, O. *Climate Change and Migration Issues in the Pacific*; United Nations Economic and Social Commission for Asia and the Pacific, Pacific Office: Bangkok, Thailand, 2014.
33. Weir, T.; Virani, Z. Three linked risks for development in the Pacific Islands: Climate change, disasters and conflict. *Clim. Dev.* **2011**, *3*, 193–208. [[CrossRef](#)]
34. Cambell, J.; Goldsmith, M.; Koshy, K. *Community Relocation as an Option for Adaptation to the Effects of Climate Change and Climate Variability in Pacific Island Countries (PICs)*; Asia-Pacific Network: Kobe, Japan, 2005.
35. Kelman, I. Hearing local voices from Small Island Developing States for climate change. *Local Environ.* **2010**, *15*, 605–619. [[CrossRef](#)]
36. Mimura, N.; Nurse, L.; McLean, R.; Agard, J.; Briguglio, L.; Lefale, P.; Payet, R.; Sem, G. Small Islands. In *Climate Change 2007: Impacts, Adaptation and Vulnerability*; Contribution to the Working Group II to the Fourth Assessment Report on the Intergovernmental Panel for Climate Change; Parry, M., Canziani, O.F., Palutikof, J.P., Van Der Linden, P.J., Hansen, C.E., Eds.; Cambridge University Press: Cambridge, UK, 2007; p. 30.
37. Mortreux, C.; Barnett, J. Climate change, migration and adaptation in Funafuti, Tuvalu. *Glob. Environ. Chang.* **2009**, *19*, 105–112. [[CrossRef](#)]
38. Fiji News. Sea-level rise threatens 676 communities 2014. Available online: <http://fijilive.com/news/2014/01/sea-level-rise-threatens-676-local-communities/56298>. Fijilive (accessed on 2 October 2018).
39. Conway, D.; Mustelin, J. Strategies for improving adaptation practice in developing countries. *Nat. Clim. Chang.* **2014**, *4*, 339. [[CrossRef](#)]
40. Ireland, P. Climate change adaptation and disaster risk reduction: Contested spaces and emerging opportunities in development theory and practice. *Clim. Dev.* **2010**, *2*, 332–345. [[CrossRef](#)]
41. Moench, M. Adapting to climate change and the risks associated with natural hazards: Methods for moving from concepts to action. In *The Earthscan Reader on Adaptation to Climate Change*, 1st ed.; Schipper, E.L.F., Burton, I., Eds.; Routledge: London, UK; Sterling, VA, USA, 2009; pp. 249–280.
42. Schipper, E.L.F. Meeting at the crossroads?: Exploring the linkages between climate change adaptation and disaster risk reduction. *Clim. Dev.* **2009**, *1*, 16–30. [[CrossRef](#)]
43. Thomalla, F.; Downing, T.; Spanger-Siegfried, E.; Han, G.; Rockström, J. Reducing hazard vulnerability: Towards a common approach between disaster risk reduction and climate adaptation. *Disasters* **2006**, *30*, 39–48. [[CrossRef](#)] [[PubMed](#)]
44. UNISDR. *At the Crossroads: Climate Change Adaptation and Disaster Risk Reduction in Asia and the Pacific—UNISDR*; United Nations Office for Disaster Risk Reduction- Regional Office for Asia and Pacific (UNISDR AP): Geneva, Switzerland, 2011.
45. Mercer, J. Disaster risk reduction or climate change adaptation: Are we reinventing the wheel? *J. Int. Dev.* **2010**, *22*, 247–264. [[CrossRef](#)]
46. Birkmann, J.; von Teichman, K. Integrating disaster risk reduction and climate change adaptation: Key challenges—scales, knowledge, and norms. *Sustain. Sci.* **2010**, *5*, 171–184. [[CrossRef](#)]
47. Gero, A.; Méheux, K.; Dominey-Howes, D. Integrating disaster risk reduction and climate change adaptation in the Pacific. *Clim. Dev.* **2011**, *3*, 310–327. [[CrossRef](#)]
48. Kingdom of Tonga. *Tonga Joint National Action Plan (JNAP) on Climate Change Adaptation and Disaster Risk Management 2010–2015*; Kingdom of Tonga: Nukualofa, Tonga, 2010.
49. Pacific Community (SPC); Secretariat of the Pacific Regional Environment Programme (SPREP); Pacific Islands Forum Secretariat (PIFS); United Nations Development Programme (UNDP); United Nations Office for Disaster Risk Reduction (UNISDR); University of the South Pacific (USP). *Framework for Resilient Development in the Pacific: An Integrated Approach to Address Climate Change and Disaster Risk Management (FRDP): 2017–2030*; Pacific Community (SPC); Secretariat of the Pacific Regional Environment Programme (SPREP); Pacific Islands Forum Secretariat (PIFS); United Nations Development Programme (UNDP); United Nations Office for Disaster Risk Reduction (UNISDR); University of the South Pacific (USP): Suva, Fiji, 2016.

50. Adger, W.N.; Barnett, J.; Chapin, F.S.; Ellemor, H. This Must Be the Place: Underrepresentation of Identity and Meaning in Climate Change Decision-Making. *Glob. Environ. Politics* **2011**, *11*, 1–25. [[CrossRef](#)]
51. O'Brien, K.L. Do values subjectively define the limits to climate change adaptation? In *Adapting to Climate Change: Thresholds, Values, Governance*; Adger, W.N., Lorenzoni, I., O'Brien, K.L., Eds.; Cambridge University Press: Cambridge, UK, 2009; pp. 164–180. [[CrossRef](#)]
52. O'Brien, K.L.; Wolf, J. A values-based approach to vulnerability and adaptation to climate change: A values-based approach. *Wiley Interdiscip. Rev. Clim. Chang.* **2010**, *1*, 232–242. [[CrossRef](#)]
53. Mortreux, C.; Safra de Campos, R.; Adger, W.N.; Ghosh, T.; Das, S.; Adams, H.; Hazra, S. Political economy of planned relocation: A model of action and inaction in government responses. *Glob. Environ. Chang.* **2018**, *50*, 123–132. [[CrossRef](#)]
54. Gaillard, J.-C. Traditional Societies in the Face of Natural Hazards: The 1991 Mt. Pinatubo Eruption and the Aetas of the Philippines. *Int. J. Mass Emerg. Disasters* **2006**, *24*, 5–43.
55. Charbaoui, D.; Blocher, J. Limits to adapting to climate change through relocations in Papua-New Guinea and Fiji. In *Limits to Climate Change Adaptation*; Filho, W.L., Nalau, J., Eds.; Springer International Publishing: Cham, Switzerland, 2018; pp. 359–379.
56. Wickham, F.; Kinch, J.; Lal, P. *Institutional Capacity within Melanesian Countries to Effectively Respond to Climate Change Impacts, with a Focus on Vanuatu and the Solomon Islands*; Secretariat of the Pacific Regional Environment Programme: Apia, Samoa, 2009.
57. Cronin, S.J.; Petterson, M.G.; Taylor, P.W.; Biliki, R. Maximising Multi-Stakeholder Participation in Government and Community Volcanic Hazard Management Programs; A Case Study from Savo, Solomon Islands. *Nat. Hazards* **2004**, *33*, 105–136. [[CrossRef](#)]
58. Government of Solomon Islands. *National Adaptation Programs of Action 2008*; Ministry of Environment, Climate Change and Disaster Management, Government of Solomon Islands: Honiara, Solomon Islands, 2008.
59. Tonkinson, R. The paradox of permanency in a resettled New Hebridean community. *Mass Emerg.* **1979**, *4*, 105–116.
60. Charan, D.; Kaur, M.; Singh, P. Customary land and climate change induced relocation: A case study of Vunidogoloa village, Vanua Levu, Fiji. In *Limits to Climate Change Adaptation*; Filho, W.L., Nalau, J., Eds.; Springer International Publishing: Cham, Switzerland, 2018; pp. 345–358.
61. Whiteman, D.L. *Melanesians and Missionaries: An Ethnohistorical Study of Social and Religious Change in the Southwest Pacific*; Wipf and Stock Publishers: Eugene, OR, USA, 1983.
62. Ballu, V.; Bouin, M.-N.; Siméoni, P.; Crawford, W.C.; Calmant, S.; Boré, J.-M.; Kanas, T.; Pelletier, B. Comparing the role of absolute sea-level rise and vertical tectonic motions in coastal flooding, Torres Islands (Vanuatu). *Proc. Natl. Acad. Sci. USA* **2011**, *108*, 13019. [[CrossRef](#)] [[PubMed](#)]
63. Moser, S.C.; Boykoff, M.T. Climate change and adaptation success: The scope of the challenge. In *Successful Adaptation to Climate Change: Linking Science and Policy in a Rapidly Changing World*; Moser, S.C., Boykoff, M.T., Eds.; Routledge/Taylor & Francis Group: Abingdon, Oxon, UK; New York, NY, USA, 2013; pp. 123–132.
64. Filho, W.L.; Nalau, J. *Limits to Climate Change Adaptation*; Springer International Publishing: Cham, Switzerland, 2018.
65. Parsons, M.; Fisher, K.; Nalau, J. Alternative approaches to co-design: Insights from indigenous/academic research collaborations. *Curr. Opin. Environ. Sustain.* **2016**, *20*, 99–105. [[CrossRef](#)]
66. Jones, L.; Tanner, T. 'Subjective resilience': Using perceptions to quantify household resilience to climate extremes and disasters. *Reg. Environ. Chang.* **2017**, *17*, 229–243. [[CrossRef](#)]

