



# Managed retreat and coastal climate change adaptation: The environmental justice implications and value of a coproduction approach

Fiadh Tubridy<sup>a,b,\*</sup>, Mick Lennon<sup>b</sup>, Mark Scott<sup>b</sup>

<sup>a</sup> Department of Geography, Maynooth University, Maynooth, Co. Kildare, Ireland

<sup>b</sup> School of Architecture, Planning and Environmental Policy, University College Dublin, Belfield Dublin 4, Ireland

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## ABSTRACT

Due to the effects of climate change, coastal areas and communities around the world will be increasingly impacted by diverse hazards including sea-level rise, flooding and eroding shorelines, leading to increasing displacement of people. Managed retreat is one potential adaptation strategy to proactively plan for large-scale climate-related displacements. There is, however, evidence that in many cases managed retreat has had problematic social impacts and that it has frequently been implemented through top-down models of planning. In response, this article reviews the literature on managed retreat to identify the limitations of current practices and the challenges for a more environmentally just approach. Based on this review, the article argues that a coproduction approach would provide a means to help address key planning challenges in this field. This involves collecting local knowledge of the risks posed by climate hazards and/or retreat, creating a connection between local knowledge and institutional mechanisms for supported relocation and facilitating community-led processes of retreat and redevelopment. The key contribution of the article is its analysis of the value of a coproduction approach from the perspective of achieving a more environmentally just approach to managed retreat.

## 1. Introduction

As noted in the 2014 IPCC report, due to the effects of climate change coastal areas around the world will increasingly suffer the impacts of sea-level rise, more frequent and intense storms and increasing rates of coastal erosion, leading to the large-scale displacement of people. One widely referenced estimate is that climate change impacts (both coastal and otherwise) could lead to the displacement and migration of up to 200 million people by 2050 (Environmental Justice Foundation, 2009) while according to the IPCC (2014) sea-level rise alone could displace between 72 and 187 million people by 2100. One potential means to effectively plan for such large-scale displacements is through “managed retreat”, referring to the proactive movement of people and settlements away from at-risk areas. According to evidence collected by Hino et al. (2017), 1.3 million people have already been relocated through managed retreat projects over the past three decades. Indeed, in the USA 40,000 properties have been bought out and demolished or relocated by the state since 1989 as a means to reduce exposure to natural hazards (Mach et al., 2019).

However, there is a growing critical literature on managed retreat

which demonstrates that managed retreat initiatives often have problematic social, economic and cultural implications, particularly for those relocated (Dannenbergh et al., 2019) and, further, that these impacts tend to be most acutely felt by low-income or otherwise marginalised groups (Siders, 2019b). This literature also shows that managed retreat is frequently imposed through expert-led models of planning characterised by a reductive focus on financial costs and benefits (Maldonado, 2014; Blunkell, 2017; Paprocki, 2019). The approach to planning for managed retreat arguably exemplifies the concept of the “the climate gap” (Gaillard, 2012, pp. 261–262) which refers to “the gap between the large amount of attention given to climate change on the international scene and the everyday concerns of vulnerable communities”, resulting in adaptation strategies which are “disconnected from local realities, including people’s needs, the cultural fabric and the traditional system of governance”. In response, the aim of this article is to identify how these limitations might be overcome and how managed retreat could be carried out in a more equitable, or ‘environmentally just’ manner.

The article draws on the environmental justice literature to conceptualise equity in this context. While it is widely acknowledged that environmental justice can be defined in different ways and has

\* Corresponding author at: Department of Geography, Maynooth University, Maynooth, Co. Kildare, Ireland.

E-mail address: [fiadh.tubridy@mu.ie](mailto:fiadh.tubridy@mu.ie) (F. Tubridy).

different dimensions (Schlosberg, 2004; Holifield, 2015), this article is concerned with distributive and procedural justice, albeit primarily focusing on the latter. This focus on procedural justice builds on the review's analysis of key limitations of planning in the context of managed retreat which include 'procedural' questions of decision-making, expertise and participation. Following a conventional definition of distributive environmental justice, this is understood as equal distribution of resources and environmental conditions irrespective of class, race or other forms of social or cultural difference (Fraser and Honneth, 2003), while procedural justice refers to "meaningful participation in environmental decision-making processes... particularly by people of colour and low-income communities" (Holifield, 2012, p. 592). In response to evidence of procedural injustices, the article discusses the value of a coproduction approach to managed retreat which, as defined by Armitage et al. (2011, p. 996) refers to "a collaborative process of bringing a plurality of knowledge sources and types together" to address complex and long-term problems "in which neither science nor local knowledge is sufficient by itself".

Alongside its overall aim, the specific objectives of the paper are, first, to identify the limitations of previous examples of managed retreat and, second, to discuss what might constitute a more environmentally just model of managed retreat, both in terms of practical questions of planning and in terms of procedural issues related to decision-making and the integration of expert and community perspectives. Methodologically, the paper is based on a review and synthesis of the literatures on managed retreat and coproduction. The studies of managed retreat included in the review are those which discuss environmental justice issues either directly or indirectly, for example by highlighting the implications for disadvantaged groups. The review follows a thematic rather than bibliometrics-based approach with the aim of incorporating key papers in these fields rather than providing a comprehensive review. It draws on studies of managed retreat in both the Global North and South, although this is skewed by the fact that much research hitherto has focused on the United States. In terms of its structure, Section 2 first defines and discusses the potential advantages of managed retreat. Sections 3 and 4 synthesises recent literature on the distributive and procedural justice limitations of previous examples of retreat. Sections 5 and 6 then discuss the practical planning requirements for an environmentally just model of managed retreat including questions of decision-making, expertise and coproduction. The key contribution of the article is its analysis of the value of a coproduction approach from the perspective of achieving more environmentally just managed retreat.

## 2. Defining managed retreat

Managed retreat is a well-established concept in literature and policy on coastal management, but one whose primary objectives have varied over time. Previously policy and practice, particularly in the UK, have focused on the creation of wetland habitats and recreating or offsetting habitats lost to development elsewhere (Milligan et al., 2009). Such cases have involved relocation of coastal defences, changes of land use from agriculture to wetland habitat and have often been carried out by conservation organisations such as the Royal Society for the Protection of Birds (RSPB). Accordingly, there has been a lesser focus on natural hazard mitigation as illustrated by the fact that managed retreat projects in the UK have typically not involved the relocation of homes and people (Esteves, 2014). More recently, managed retreat has been adopted as a strategy to manage climate change-related hazards, both coastal and otherwise (anonymised for review, 2020). Accordingly, the definition of managed retreat in this article follows that provided by Hino et al. (2017, p. 364) as, "a deliberate intervention intended to manage natural hazard risk involving "the abandonment of land or relocation of structures" carried out by "an implementing or enabling authority". Within this framework managed retreat can involve a range of practical actions including limitations on the use of structural protection (such as in the case of Fairbourne in Wales, UK) and restrictions on development as well

as the acquisition and relocation or abandonment of property (Greiving et al., 2018; Ajibade, 2019).

The resonance of retreat has co-evolved with recognition of limitations of conventional approaches to the management of coastal climate hazards involving engineering defence structures, seawalls, groynes or beach nourishment. According to the IPCC (2019), such forms of protection often constitute what is termed 'maladaptation' because they can have actively counterproductive effects through increasing rates of flooding and erosion along adjacent coasts. In addition, there are significant financial costs and it is argued that it is not feasible to continue to provide total protection even in places where natural hazard risks have previously been minimised (Ledoux et al., 2005; Alexander et al., 2012). Other drawbacks of structural coastal defences include negative impacts on the amenity and ecological value of the coastline due to reductions in wetland habitats and damage to beaches (Few et al., 2007a). Moreover, coastal defences are viewed as socially inequitable by Cooper and McKenna (2008) because they are thought to privilege the interests of coastal dwellers above those of groups who are spatially or temporally distant but who are nonetheless affected by coastal management choices through, for example, impacts on the amenity value of the coast.

For these reasons, there is increasing attention to alternative forms of non-structural adaptation measures such as managed retreat. Indeed, according to the United Nations Environment Programme (2016), managed retreat has co-benefits such as improved biodiversity, long term cost-effectiveness, benefits for tourism and recreation through the creation of new undeveloped coastal spaces and the provision of further ecosystem services such as improvements to water quality. The idea of multiple or interrelated social, environmental and economic benefits is also referenced in Ledoux et al. (2005), Milligan et al. (2009) and Siders et al. (2019). However, as described in the subsequent sections, there is also extensive evidence that managed retreat can have problematic social, economic and cultural implications and raises questions of distributive and procedural environmental (in)justice.

## 3. Distributive (in)justice: exacerbating loss through poorly planned managed retreat

In terms of how environmental justice issues have been conceptualised in discussions of managed retreat, much debate has focused on the financial property losses for those relocated away from the coast (Milligan et al., 2009). This issue is dealt with differently across countries. In the UK, for example, guidelines and enabling legislation necessary for the acquisition of property in at-risk areas have not been developed (Few et al., 2007a) and there has typically been no compensation provided for property lost or devalued due to decisions not to protect areas of the coast (Esteves, 2014; Blunkell, 2017; Storey, 2019). In contrast, in the U.S., managed retreat is effectively synonymous with 'property buyout programmes', whereby state agencies purchase and then demolish or relocate vulnerable properties (Bronen, 2015). In such cases "pre-storm fair market value" is often provided for properties (Koslov, 2016, p. 376; Lynn, 2017). This is linked to the constitutional protection of private property in the U.S. (Kim and Karp, 2012) as well as the existence of a subsidised flood insurance system which provides a financial incentive to reduce the number of at-risk properties (De Vries and Fraser, 2017).

The provision of financial compensation has been criticised by authors such as Cooper and McKenna (2008, p. 299) due to the redistribution of resources from the general public to coastal dwellers who, they argue, bear a "personal responsibility" for their choice to live in an exposed location. This, however, ignores the fact that unequal exposure to hazards is not purely a matter of personal choice but rather is a product of historical processes such as housing market segregation and discrimination (Smith, 2005). Those from low-income and disadvantaged communities are less free than others to choose where they live and, therefore, to what extent they are exposed to natural hazards (De Vries and Fraser, 2017). The idea that communities have 'chosen' to live

in at-risk locations and may thus be justifiably denied compensation is flawed for this reason. More generally, it is noted by [Hardy et al. \(2017, p. 66\)](#) that “there are differences between the groups affected by sea-level rise” and the implications of losing a home (with or without compensation) will vary widely, for example between holiday-home owners and established residents. These distinctions between communities at risk from climate hazards must be considered within discussions of retreat and compensation. Thus, a more nuanced critique of the U.S. buyout programme is that compensation at market value results in the greatest transfer of resources to the richest people, referring to those with the highest value homes ([Marino, 2018](#)). In response to this issue, an adapted buyout programme is being trialled in Canada whereby the compensation provided to homeowners is capped at a maximum threshold ([Flavelle, 2019](#)), which could provide a model to be replicated elsewhere.<sup>1</sup>

Whether or not compensation is provided, it is widely acknowledged that there are potential non-financial negative implications for those relocated. These include issues such as the loss of social and family ties, negative physical and mental health impacts and difficulties accessing appropriate alternative housing ([Lynn, 2017; Dannenberg et al., 2019](#)). Research from the Global South, in particular, has highlighted the possible loss of livelihoods arising from relocation, for example where they are linked to living in urban informal settlements (a key focus of retreat initiatives) or dependent on coastal resources ([Greiving et al., 2018; Ajibade, 2019; Paprocki, 2019; Scott and Lennon, 2020](#)). Retreat can also have important cultural and psychological impacts associated with a loss of place identity and attachment which, according to [Agyeman et al. \(2009, p. 509–510\)](#), include “grief, loss and anxiety ... nostalgia, disorientation and alienation”. Importantly, there is evidence that these impacts are particularly acute amongst low-income, minority and other vulnerable groups ([De Vries and Fraser, 2012; Siders, 2019b](#)) and, in the case of cultural impacts, for indigenous peoples for whom culture and heritage can be intimately associated with particular places ([Burley et al., 2007; Maldonado, 2014](#)).

#### 4. Procedural (in)justice: exacerbating loss through exclusion from decision-making

Corresponding to a procedural environmental justice perspective, it is important to consider the structural and institutional factors and the models of expertise which could explain the issues described above ([Holifield, 2015](#)). In fact, the literature on managed retreat does highlight very significant inequalities of influence over decision-making. At the most basic level, there are examples of managed retreat in the Global South which involve forced displacement, such as the buffer zones and moratoriums on redevelopment imposed unilaterally following the Indian Ocean tsunami in 2004 or mass evictions of informal settlements ([Ajibade, 2019; Scott and Lennon, 2020](#)). Authors such as [Klein \(2007\)](#) and [Paprocki \(2019\)](#) highlight that such top-down plans are often formulated in non-democratic forums by agencies such as the World Bank and can function to progress large-scale development interests. Although the equivalence should not be overstated, there is also evidence that even where managed retreat proceeds through property buyouts in the Global North, these can involve forms of coercion such as compulsory purchase to bypass the need for consent ([Lynn, 2017](#)) or more subtle forms of coercion such as “legal tools and social pressure tactics” ([De Vries and Fraser, 2012, p. 21](#)). There can also be financial pressure to relocate, for example where permission to rebuild is contingent on purchasing flood insurance ([Paprocki et al., 2019](#)) or meeting certain standards in terms of flood resilient construction ([Gibbs, 2016](#)), measures which are likely to result in the disproportionate

relocation of low-income groups.

Some retreat programmes do involve some degree of community consultation or participation in decision-making. In the UK, since the inception of the system of shoreline management plans in the late 1990s, the primary planning instrument for decision-making regarding managed retreat, there has been a requirement for consultation with stakeholders such as property owners. However, there are technical and structural obstacles to effective community engagement. For this reason, according to [Mcglashan and Williams \(2003\)](#), participation in coastal management in the UK has generally been limited to institutional actors and local stakeholders have been excluded. Based on another case study in the UK, [Blunkell \(2017\)](#) highlights the need to take account of socio-economic differences between communities in order to understand their varying ability to resist proposals for managed retreat. The author (2017: 504) argues that the current approaches to consultation in the UK “run the risk of differentiating between communities on socio-economic grounds. Those who can muster the resources to build alliances and apply resources such as time, money, occupational skill and political nous can better grab the attention of policy-makers”.

This conclusion is supported by other international examples such as [Hayward's \(2008\)](#) study of conflicts over the protection of beachfront property in New Zealand. [Hayward \(2008, p. 57\)](#) argues “‘uncritical’ procedures of local consultation do not necessarily improve the fairness of planning outcomes” and rather can “advantag[e] well-resourced property owners”. Albeit in a different context of a community seeking to gain financial support for managed retreat in the form of property buyouts in New York, [Koslov \(2019\)](#) finds that relatively affluent, white and politically influential communities are more likely to be able to persuade policy-makers to support their relocation. In contrast, the indigenous Alaskan communities researched by [Shearer \(2012\)](#) are faced with very different prospects due to complex administrative barriers which preclude them from accessing support for relocation. These conclusions echo the wider literature on participatory planning whereby well-resourced communities and interests tend to have greater influence over policy outcomes ([Scott et al., 2012](#)). They further support the idea that more transformative and empowering approaches to community engagement are required in this context, an issue which is addressed in [Section 5](#) through the discussion of coproduction.

##### 4.1. Cost-benefit analysis

A further important critique of decision-making regarding managed retreat relates to significance accorded to cost-benefit analysis ([Maldonado, 2014; Ajibade, 2019; Siders, 2019b](#)). In basic terms, various studies have highlighted the problematic results of reliance of cost-benefit analysis as a tool to direct where managed retreat programmes should take place ([De Vries and Fraser, 2017; Lynn, 2017; Loughran and Elliott, 2019; Siders, 2019b](#)). These authors highlight that the use of cost-benefit analysis can result in initiatives disproportionately taking place in lower-income areas because these have the lowest property values and, therefore, can provide a greater reduction in risk for a given financial investment. In a U.S. context, given the intimate connections between race, income and housing, this has been linked to a high proportion of buyouts taking place in majority black neighbourhoods. As documented by [Loughran and Elliott \(2019\)](#), the problematic implications of this dynamic include disproportionate outmigration from these areas, leading to dereliction and erosion of the local government tax base. There is also evidence that the presumed “objectivity” of cost-benefit analysis can mask the role of “subjective value judgements” ([Siders, 2019, p. 248](#)), linked to the stigma of historically disadvantaged or minority areas, in decision-making regarding where buyouts should occur.

A second important critique of cost-benefit analysis is that it fails to fully account either for the direct impacts of climate-related hazards, or for the impacts of managed retreat on the communities affected. Both climate-related hazards themselves and processes of relocation have a

<sup>1</sup> It is recognised that this might not be legally possible in all contexts, for example, in the U.S. due to the legal requirement that ‘just compensation’ be provided to property owners (see [Kim and Karp \(2012\)](#)).

wide range of social, cultural and psychological impacts but these are often neglected by cost-benefit analyses which typically focus on quantifiable, financial losses and, as described by Maldonado (2014, p. 73), do not consider “the costs of what it means when fishing families are moved inland, local knowledge is lost and mental stress results from being removed from the only way of life one has ever known”. This can have different problematic implications because, in some instances, a failure to account for the social impacts of climate hazards can be linked to a lack of state support for relocation (Bronen, 2015). Alternatively, it is possible that a failure to take sufficient account of the social costs of relocation can result in inappropriate proposals for retreat (Siders, 2019b). These issues reflect what is termed in the environmental justice literature the ‘incommensurability’ of market and non-market values, referring to the argument that many social and environmental values are not reducible to their monetary price and require assessment through more democratic and deliberative methods (Martinez-Alier et al., 1998). More generally, the limitations of cost-benefit analysis highlight a broader issue of the inadequacy of existing reductive and expert-led decision-making frameworks and the need for alternative approaches.

#### 4.2. Expert-led adaptation planning

The predominance of reductive models of decision-making and expertise in the context of managed retreat initiatives allows for parallels to be drawn with the broader literature on the politics of climate adaptation (Adger et al., 2006; Byskov et al., 2019), particularly that concerned with questions of decision-making and expertise (Gaillard, 2012; Rice et al., 2015; Hardy et al., 2017). A key concept in this literature is that of the “climate gap”, referring to the often stark divide between expert and community perspectives on risk, vulnerability and adaptation priorities (Gaillard, 2012). Drawing on a case study of Kiribati, Gaillard (2012) argues that international adaptation experts and planners have focussed exclusively on the direct biophysical effects of climate change, circumvented established democratic governance structures and have proposed adaptation measures which have failed to address (and have even diverted attention and resources away from) more pressing local priorities such as education and health services. This analysis resonates with the preceding critiques of decision-making in the context of managed retreat in the sense that there is equally a wide gap in that context between the quantifiable, financial risks emphasised in expert assessments and the much broader range of socio-economic and cultural implications for communities.

According to Hardy et al. (2017, p. 69), the climate gap plays out in the management of coastal climate hazards through an overemphasis on understanding “the physical, ecological and economic impacts of inundation rather than how sea-level rise may affect everyday lives on the coast”. They argue that this reductive perspective entails viewing coastal climate hazards as a purely technical issue, rather than as a complex socio-ecological phenomenon. The latter perspective would require, in the case described, understanding the histories of slavery and racial discrimination which led to a particular minority coastal community living in an isolated, ‘at-risk’ location and, ultimately, to an attempt to remedy these historic injustices and the vulnerabilities to sea-level rise which they have created. In the case described by Hardy et al. (2017), the climate gap is thought to be the result of the underrepresentation of vulnerable, disadvantaged or racialized groups in scientific and official fora, whether at the broad scale of academic and professional disciplines or at the local scale of public meetings.

The concept of the climate gap is also closely related to O’Brien et al.’s (2007) identification of different understandings of vulnerability and risk in adaptation research and planning. The authors (2007: 75) distinguish between “outcome vulnerability”, which views individuals and communities as varying solely in terms of the extent to which they are exposed to climate hazards, and “contextual vulnerability”, which views vulnerability as the outcome of ‘multiple stressors’ including pre-existing socio-economic, institutional and technological

determinants which can be exacerbated by climate change. Further, each of these understandings evokes different knowledge practices and adaptation responses. While in the case of outcome vulnerability, the emphasis is on understanding and managing biophysical hazards through technical means; understanding vulnerability as contextual suggests the need to both understand and alter the specific social context in which climate change occurs which could involve responses not typically defined as ‘adaptation’ such as “poverty reduction, diversification of livelihoods, protection of common property resources [and] strengthening of collective action” (O’Brien et al., 2007, 80).

This distinction can be usefully applied in the context of managed retreat wherein initiatives have not taken account of the multiple determinants of vulnerability, such as the fragility of social networks or of place-specific cultures and livelihoods, which are not alleviated (and are often in fact exacerbated) by relocating people or communities away from the coast. Hence, the idea of vulnerability as a general characteristic of people and groups (which is distinguished from the more limited idea of ‘vulnerability to climate change’) suggested by O’Brien et al. (2007) is potentially useful in this context. This understanding of vulnerability recognises that negative outcomes for such groups can arise both as a direct result of climate hazards themselves but that these same groups are also vulnerable to inappropriate adaptation strategies including ill-conceived managed retreat initiatives due, for example, to a lack of political influence or the financial means to relocate independently.

Overall, this literature shows that there is a gap between expert knowledge regarding climate change and adaptation, and on the other hand, local understanding of the specific realities, vulnerabilities and risks that people face. The relevance of this critical literature to managed retreat highlights the need for alternative decision-making frameworks in this sector and for new understandings and ways of assessing vulnerability and risk which account for the specific challenges in different contexts and for different groups. Building upon the above analysis, the following section identifies and discusses examples of more environmentally just practices and identifies principles which could inform an alternative model of decision-making regarding managed retreat.

#### 5. Improving managed retreat: scheme design

What might constitute a more environmentally just model of managed retreat has not previously been outlined in detail but it is nevertheless possible to gather examples from the existing (but disparate) literature on this topic. The following section discusses these examples and, following the approach of Cooper and McKenna (2008) and Hino et al. (2017), their implications for those relocated and for ‘society’ more broadly, while remaining attentive to the differences within these groups. The implications for residents of the areas to which people relocate are also briefly discussed.

The delivery of wider social benefits requires a ‘strategic approach’ (Siders et al., 2019) including coordination and management of a wide range of issues to avoid conflict with other social and economic objectives. A strategic approach would include considering the implications for housing availability and affordability, which could be undermined by managed retreat and the associated loss of housing stock (Few et al., 2007b; Braamskamp and Penning-Rowsell, 2018). Where buyouts and managed retreat programmes are targeted also requires careful consideration to avoid creating new or exacerbating existing socio-spatial inequalities which can arise if retreat occurs in already disadvantaged areas, leading to dereliction and erosion of the local government tax base (Loughran and Elliott, 2019). The evidence also suggests the need for some degree of control over where people relocate because otherwise movement is often to nearby areas equally at risk of flooding, meaning that the overall benefits are significantly undermined (Loughran and Elliott, 2019). Furthermore, a degree of control is required because unmanaged or autonomous climate migration has been linked to



processes of “climate gentrification” whereby there is increasing demand for property on higher-ground or otherwise protected from climate hazards, leading to the displacement of established communities (Keenan et al., 2018; Kaswan, 2019). A further important means to achieve wider social (and ecological) benefits is that of ensuring that spaces created through retreat are not redeveloped (De Vries and Fraser, 2012). This point is important because there are various examples of plans for profit-driven redevelopment of such spaces (Koslov, 2016; Ajibade, 2019). In contrast, Siders et al. (2019, p. 762) argue that such spaces should “be used and maintained for local benefit” (see also Elkin and Keenan (2018) and Köpsel and Walsh (2018)). One particular positive vision for the future of such spaces is provided by Rosetta Elkin’s idea of a “public shoreline” involving a buffer zone on US coastlines that would provide coastal protection and biodiversity benefits while also ensuring public access (Love, 2019; Siders, 2019a).

In terms of the implications for those relocated, the availability of financial compensation for property loss has been a key topic of concern in the literature on managed retreat with compensation identified as a prerequisite for a fair programme of managed retreat (Few et al., 2007a). However, it is also clear that this should not be regarded as the sole requirement for an environmentally just programme given that financial losses are often not the most important impact (Binder et al., 2019). As suggested by the above review, it is arguably more important to address the broader social, economic and cultural impacts of retreat programmes for those affected, given that these issues most acutely affect already disadvantaged communities. From this perspective, key issues include ensuring access to employment and appropriate housing (Lynn, 2017; Ajibade, 2019) and facilitating collective processes of relocation, which has been identified as being of particular importance for indigenous communities (Maldonado, 2014). This evokes a holistic vision of retreat as, not solely escaping a hazard, but as necessarily involving reconstruction and redevelopment elsewhere. As described by Love (2019), “if paired with affordable housing, community investment, and employment, moving away from the coasts could promise survival but also better quality of life”. Other measures to minimise the social impacts of retreat include the provision of practical and psychological support available during the relocation process (Lynn, 2017; Dannenberg et al., 2019; Martin, 2019). It has also been suggested that creative practices, for example the creation of memorials or archives, might alleviate feelings of loss and the broader cultural and psychological impacts (Rush, 2018). According to Zavar (2019, p. 136), memorials could “serve as a form of recovery for an impacted community”. However, a survey of buyout sites in the U.S. revealed found that these have only been built in a very small number of places.

Overall, while these different principles and examples provide important indications of what might constitute a more environmentally just approach to managed retreat, there will evidently be varying requirements and priorities in different cases. In order to fully address the needs of the different communities undergoing relocation, there is clearly a need for fundamental changes in approaches to planning, decision-making and community participation. These procedural requirements for an environmentally just approach are discussed in the remaining sections of the article.

## 6. Improving managed retreat: procedural dimensions and coproduction

Previous sections of the article have discussed the limitations of reductive, expert-led models of planning associated with the reliance on cost-benefit analysis and gap between expert and community perspectives on risk and vulnerability. However, the literature also includes proposals for alternative approaches to decision-making and practical examples thereof. In terms of principles, these include the idea that communities should have control over “substantive” decisions regarding whether to retreat or to be protected in place (Blunkell, 2017), as apparent in De Vries and Fraser’s (2012, p. 3) proposal that property

buyouts should be a “true voluntary mitigation program ... in which a community, including marginal groups, meets with authorities to share, negotiate and control decisions”. Relevant principles further include the idea of supportive relationships between state agencies and communities whereby relocation would be community-organised but supported and financed by the state, given that coastal climate hazards generally exceed the capacity of communities to manage in isolation (Maldonado, 2014; Karlsson and Hovelsrud, 2015). Empirical examples are provided by a democratic vote in favour of relocation by the Alaskan community of Shishmaref (Agyeman, 2009), the example of community mobilisation in favour of relocation in New York after Hurricane Sandy (Koslov, 2016, 2019), and one instance of “environmentally and socially just retreat” associated with the Pasig River Restoration project in Manila (Ajibade, 2019). According to Ajibade (2019, p. 313), this latter result was due to “extensive consultation with affected stakeholders” wherein “the relocation and livelihoods of informal settlement families [had] equal importance as the environmental aspect of the restoration”.

These examples provide potential guidance or high-level principles on alternative approaches to managed retreat, though unresolved questions still remain. For example, there is a need to increase understanding of climatic hazards and their potential impacts on different communities and thus empower these communities to make informed decisions regarding relocation. There is, further, a need to develop institutional mechanisms and decision-making frameworks to identify when or at what point the risks (including both biophysical and social dimensions) are too great and relocation should take place (Ferris, 2012; Bronen, 2015; Greiving et al., 2018). There remain complex questions related to the integration of different forms of knowledge and the relationship between expertise and power, given that, as previously discussed, there is currently a gap between the everyday concerns of vulnerable groups and expert definitions of risk and exposure which typically form the basis for action. The remainder of the article discusses the model of coproduction as one potential means to address these issues.

### 6.1. Coproduction and managed retreat

The concept of coproduction can be understood in different ways with one important interpretation in the environmental justice literature being a ‘descriptive view’ of coproduction (Lemos et al., 2018). This refers to “the co-production of knowledge and social values” (Forsyth, 2008, p. 762), in other words the fact that environmental knowledge is constructed in a manner that reflects or legitimises the social order. In contrast, a ‘normative view’ of coproduction (Lemos et al., 2018) proposes coproduction as a conscious choice which is generally, as in this article, linked to a normative agenda of facilitating the participation of disempowered groups in shaping knowledge production and actual planning processes. The analysis here draws on discussions of coproduction in the environmental justice (Corburn, 2003; Lane et al., 2011; Braun, 2015; Rice et al., 2015) and planning literatures (Albrechts, 2013; Watson, 2014; Perry and Atherton, 2017) which address issues of community participation in the production of knowledge (as well as of plans and final outcomes) as a means to transform the role of communities in governance processes and achieve more equitable outcomes. The understanding of coproduction in this article follows that provided by Armitage et al. (2011, p. 996) as “a collaborative process of bringing a plurality of knowledge sources and types together”, which evidently foregrounds the coproduction of knowledge. However, following Watson (2014), a more expansive definition of coproduction as extending across all stages of planning and implementation is also identified as relevant in some circumstances. Drawing on various examples of coproduction, including a small number specifically concerned with managed retreat (Bronen, 2015; Boonyabancha and Kerr, 2018; Galuszka, 2019), it is argued a coproduction approach could address key procedural challenges by recognising the value of local knowledge, integrating local knowledge and formal decision-making and facilitating

community-led relocation and redevelopment.

While not specifically concerned with managed retreat, the work of Corburn (2003) provides insights on the value of a coproduction approach in the context of environmental risk assessments. In Corburn's (2003) analysis, coproduction is distinct from a conventional approach to community participation because, in the latter model, community members may be deemed qualified to discuss political issues, but the scientific knowledge base is viewed as beyond discussion or contestation. In contrast, according to Corburn's (2003: 423) definition of coproduction, "all publics are understood as potential contributors to all aspects of environmental-planning decisions because hard distinctions between expert and lay, scientific and political order, and facts and values are rejected". Thus, there are clear parallels with Maldonado's (2014, p. 75) argument which, although it does not use the term coproduction, recommends a multiple knowledge approach to managed retreat involving "the incorporation of multiple knowledges – traditional ecological knowledges and knowledges of native and non-native scientists". The specific case investigated by Corburn (2003), that of community participation in surveying environmental health hazards in Brooklyn, New York, involved community groups collaborating with environmental health professionals and "filling in the gaps" in generic expert risk assessments by taking account of context-specific hazards and vulnerabilities such as those linked to culture-specific health and dietary practices, thereby reflecting a consciousness of the importance of 'contextual vulnerability' (O'Brien et al., 2007). According to Corburn (2003), these practices ultimately contributed to distributive and procedural environmental justice by highlighting the hazards that disadvantaged communities face and ensuring these groups could participate in decision-making. Importantly, Corburn's study also provides insights into the concrete methods used to coproduce risk assessments, including community mapping exercises and community-led health surveys, focus groups and tours, which could be used in the context of managed retreat.

A further important example of coproduction in the context of managed retreat is provided by the Baan Mankong ("Secure Housing") programme in Thailand. This is an existing state-funded planning framework for the redevelopment and/or relocation of informal settlements, which has in some cases taken on the function of facilitating disaster rehabilitation and managed retreat (Greiving et al., 2018). The overall programme has resulted in improvements to the housing conditions of 104,000 households (though it is unclear how many of these involved relocation to avoid natural hazards) (Boonyabancha and Kerr, 2018). The overall approach to redevelopment follows a 'coproduction' approach involving the provision of subsidies and technical supports to community groups, which then take a primary role in the planning process by conducting community profiling, needs assessments, identifying sites for redevelopment as well as having control of project finances and oversight over the redevelopment process (Boonyabancha and Kerr, 2018). In terms of the actors involved, there is collaboration between NGOs, academia and other technical professionals, but within an overall community-led framework. It thus arguably corresponds to the model of coproduction discussed by Watson (2014, p. 69) in the sense that it provides a clear role for technical experts, "to provide the right guidance without controlling all the processes", which differs from the usual hierarchical relations between experts and communities and could provide a model to emulate in other examples of managed retreat.

The Baan Mankong programme is of further importance for several reasons, including because it highlights the potential value of using existing planning frameworks where these have been proven to adopt an inclusive approach. This institutional context is significant because it means that communities can decide whether to remain in place in upgraded housing or whether to relocate with material support, thus at least partially addressing the need for a connection between local knowledge and formal mechanisms regarding relocation and state support, although perhaps implying a once-off choice to relocate. This latter issue is addressed by Bronen (2015) who highlights the research being carried out by Alaskan tribal communities on the impacts of climate

change and argues that this could be developed into an "adaptive" framework where new information regarding changing conditions could be used to re-evaluate decisions regarding whether a relocation should occur.

A final important analysis of coproduction in the context of managed retreat is provided by Galuszka's (2019) discussion of the Oplan-LIKAS programme carried out in Manila which involved the relocation of up to 120,000 households from flood-prone areas between 2011 and 2016. According to the author, this provides an example of 'social-movement initiated coproduction of governance' in the sense that it involved a degree of conflict as well as cooperation between organised communities and the public sector, and because community groups sought to exert influence on policy and planning at the city scale rather than solely in the context of individual projects. Further, this represents both an expansive definition of coproduction as extending across all aspects of planning and implementation and an example of community-led relocation whereby communities were to be deeply involved in planning their own relocation "from forming their community associations, building their capacities, designing their housing and community, as well as negotiating with landowners and developers, to managing and maintaining their own housing and community" (Galuszka, 2019, p. 405). In fact, this issue of community participation across all stages of planning and delivery is identified as a key feature of coproduction in the Global South as a means to ensure that plans are carried through to implementation (Watson, 2014). However, the example of the Oplan-LIKAS also had important limits because, the realisation of this ambitious vision of coproduction was undermined by conflicts over resources and by an entrenched "bureaucratic and political machinery" (Galuszka, 2019, 412). This is taken to illustrate a need for flexibility and acceptance of potential delays on the part of the public sector (Galuszka, 2019).

## 7. Conclusions: our current position and charting the path ahead

Against the backdrop of intensifying coastal climate hazards, attention has shifted to questions of how and when, as well as if, individuals and communities should relocate from areas at risk. The emerging literature highlights the need to broaden the focus beyond an exclusive concern with reducing exposure to climate hazards and position retreat within broader socio-economic-political structures and systems, including: real estate markets; property rights and legal systems; residential consumer choices and mobilities; as well as management and regulation of land-use and urbanisation, including local political and planning cultures and norms and existing entrenched inequalities. There has also been increasing recognition of the need to distinguish between different models of managed retreat from top-down processes of displacement to those organised by the community and carried out with state support. In order to provide a structured review of the implications of managed retreat projects, this article has evaluated the academic literature through the perspective of environmental justice.

There is a growing literature on this topic which provides evidence of the limitations of many managed retreat initiatives carried out hitherto and their disproportionate negative socio-economic and cultural impacts on already disadvantaged groups. The key issues extend beyond financial losses to encompass a broader range of socio-economic, cultural and psychological impacts. This neglect of the full range of impacts on communities, and an overemphasis on immediate biophysical and financial losses, can be linked to procedural injustices including top-down processes of displacement, 'uncritical' approaches to stakeholder participation (Hayward, 2008), the inherent limitations of cost-benefit analysis as a means to inform decision-making and the overall predominance of expert-led planning which is often inattentive to local priorities and the social dimensions of risk and vulnerability. The review has added depth to this discussion by highlighting the relevance of critical assessments of expert-led adaptation planning in the context of

managed retreat, including the concept of the ‘climate gap’ between expert and community perspectives on risk and vulnerability.

Responding to these limitations, the aim of this article has been to identify examples and principles to inform a more environmentally just model of managed retreat, focusing primarily on procedural questions of decision-making, expertise and coproduction. Key requirements of an environmentally just approach include addressing the priorities of key stakeholder groups including communities undergoing relocation, society more broadly, and residents of areas to which people relocate. Key principles include the need for a “strategic” approach (Siders et al., 2019) whereby retreat would be coordinated at a high level of governance to minimise potential conflicts with wider social and economic objectives, for example, autonomous relocation which could threaten climate gentrification or, alternatively, undermine the benefits of managed retreat if people relocate to areas which are equally at risk. In terms of enhancing the prospects for communities undergoing relocation, there is a need for retreat to be reconceptualised as a supported, integrated process of redevelopment. It is also apparent that, if such processes of redevelopment are to meaningfully address the requirements of communities undergoing relocation, this will require significant changes in terms of decision-making and expertise.

The analysis here suggests that an approach informed by the principles of coproduction could address some of the key challenges for more environmentally just approaches to managed retreat. This would involve generating and collecting local knowledge regarding the specific risks and vulnerabilities posed by climate hazards and/or retreat in a given context, through building on methodological insights provided by previous examples of coproduction in the context of environmental risks assessments (e.g. Corburn, 2003; Lane et al., 2011). The knowledge generated could then be integrated into formal decision-making processes regarding the provision of state support for relocation. Importantly, the coproduction literature also provides important insights regarding the need for altered power dynamics between experts and communities throughout this process. An ideal model might involve technical experts taking on a supporting rather than a leading role and helping communities to navigate what will inevitably be complex processes of decision-making and planning. Furthermore, the literature on coproduction, particularly work focusing on the Global South, highlights the value in some governance contexts of expansive forms of coproduction which would extend across all stages of project planning and delivery to ensure that community-led plans for redevelopment are realised (Watson, 2014; Galuszka, 2019).

While this analysis of coproduction provides a broad set of principles to inform an environmentally just approach to managed retreat, there remain important questions and knowledge gaps which could form the basis of a future research agenda on procedural environmental justice, expertise and coproduction in the context of managed retreat. In summary, much research has focused on the USA, the institutional context of FEMA property buyout programmes and the use of cost-benefit analysis therein. Conversely, there is a lesser degree of understanding of the social implications of retreat and approaches to decision-making and expertise elsewhere, especially in the Global South. There are also knowledge gaps regarding the specific demands of environmentally just managed retreat projects including what social and psychological supports should be provided and what cultural practices could alleviate the feelings of loss associated with place detachment (Zavar, 2019). Designing and implementing such supports is likely to require community participation to account for of the specific needs of different groups. How this might work in practice remains to be explored.

Taking a broader perspective, some fundamental challenges become apparent. These include reconceiving retreat as a positive process of community (re)development; challenging current expert-led approaches to adaptation and retreat; and developing the knowledge base and resources to support alternative, more environmentally just models. Given the likely scale of future climate change-related displacement and the fact that every year projected increases in sea-level “creep higher still”

(Rush, 2018, p. 55), addressing these challenges is clearly of huge importance.

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## Conflicts of interest

The authors declare that there is no conflict of interest.

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