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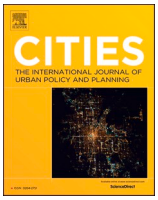

Adaptive landscapes: Planning, property, and informality under climate change

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ABSTRACT

Climate change is transforming landscapes and land use practices. As the state territorializes climate risk via land use planning instruments, it transforms the operation of legal rights. In the Global North, this is generally understood as imposing constraints on private property rights. In the Global South, the literature focuses on the way planning instruments create or transform property rights. Using case studies from the Philippines, this paper demonstrates that, in property orders marked by high levels of informality, the land use planning process does not *constrain* state-given property rights, nor only create or attenuate rights. Instead, it can transform entire property orders, displacing long-term systems of informal land tenure derived from possessory interests and reifying state-sanctioned forms of title. This reordering of systems has significant consequences for the emergent, nominally climate-resilient landscape and the operation of state power.

1. Introduction

Between 1993 and 2015, sea levels in certain parts of the Philippines rose around 6-7 mm each year –about double the highest average global rate of rise (Philippines Government DOST, 2024). Under high-emissions projections, the country expects a 20 cm sea-level rise arounds the archipelago by the end of this century (Hilario & Guzman, 2018), with a concurrent a surface-air temperature increases of near around 3.82 degrees Celsius during summer (World Bank, 2024). Changing rainfall patterns suggest wetter wet seasons, and drier dry seasons, with impacts on agriculture, coastal resources and ecosystems, infrastructure needs and human health (Philippines Government DOST, 2024).

How do we reshape the relationship that people have with the land on which they live, to ensure their survival under climate change?two arguments. First, the paper identifies hazard mapping and land use planning as instruments that allow the threat presented by climate change to be "rendered technical" (Li, 2007). Hazard mapping and land use planning territorialize risk (Rebotier, 2012; Sack, 1986), allowing the state to "… control objects, people, and relationships … by delimiting and asserting control over a geographic area" (Sack, 1983). In this way, risk is "rendered meaningful" (Yee, 2018, 107): it is made actionable. Climate change represents an existential threat to coastal communities in the Philippines, but land use planning facilitates a response to this seemingly insurmountable threat. The reworked landscapes, some of which are seemingly incongruous, emerge as a result.

In the second argument, the paper shows that the implementation of planning instruments in contexts of extensive property informality does not constrain so much as liberate state-sanctioned property rights through the reification of state-centric property ordering over others existing in the same geographic area. It extends existing urban studies literature which emphasises that informality may be a state law, to demonstrate that planning may change legal systems in their entirety. This is demonstrated using two case studies from the Philippines in which climate-adaptive land use planning transformed property ordering, displacing long-term systems of informal land tenure derived from possessory interests and reifying state-sanctioned title.

This approach challenges the Global North framing of planning as a constraint on state-sanctioned private property rights. This view of planning requires a presupposed context: the unitary, state-centric property order. This assumption can—for the most part—be assumed in much of the Global North. State-sanctioned rights to land might be

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encumbered by private contract or other legal interest, but, unlike in much of the world, tend not to be obviously overlaid or challenged by complex, multiple, and competing property regimes.[1] Given that climate change will impact the Global South, with its relatively high levels of informality and plural land regimes, sooner and with more intensity than the Global North, this reification of state-sanctioned land orders over long-term occupation rights and highly localized property orders is likely to be a feature of adaptation practice.

The case studies follow the implementation of climate adaptive relocation and shelter projects following Typhoon Haiyan, which required the development of new comprehensive land use plans. The Tacloban City case study is of relocation in a highly urbanized area, marked by large-scale informality and shelter insecurity. In Santa Fe, land tenure is more challenging as land titling was frozen in the 1980s, and the poor, rural municipality is marked by informal land use. In both instances, climate adaptation projects resulted in extensive commercial investment along the shoreline. This development seems incongruous with the stated goals of the projects, but makes sense when considered as a product of the epistemic and legal backdrop from which they emerge.

The arguments in this paper are my attempt of make sense of the development in the wake of Haiyan, as each return to my field sites left me increasingly perplexed by the development in highly risky conditions in the name of climate adaption. I have no doubt that, for the most part, local and national government officials genuinely sought to improve the quality of life for residents of their municipalities. They do this driven by a clear sense of the threat presented by climate change, tempered by very real economic imperatives. This paper is the fruition of several years of trying to see beyond the narratives of corruption, patron/client relationships, and dynastic politics that are offered to commonly understand the Filipino experience (see, for example Doronila, 1985; Sidel, 1999; Quimpo, 2009; Davis et al., 2024) to understand how well intended, climate-responsive interventions could drive such inappropriate development.

2. Making climate change actionable by mapping and territorializing risk

Climate change challenges many of the ways we use land. For example, agricultural land use will need to change, with the production of current major crops under threat as drought, changing rainfall patterns, and the increasing frequency of rapid-onset natural disasters transform land viability (Arora, 2019; Leng & Hall, 2019). Patterns of human habitation will be impacted, with currently habitable land becoming less so and patterns of urban/rural habitation changing over time (Birkmann et al., 2010; Bulkeley & Betsill, 2013). What we see—what land use looks like—will necessarily change. These changes are both constitutive of, and informed by, landscaphalle.

Landscapes emerge from relationships with land and implicate risk, hazard, and ownership, at multiple scales. If we want to develop climate-responsive landscapes, we need to understand risk as it relates to that geographical place. For national governments, development banks, and international humanitarian organizations, mapping of hazard, risk exposure, and the relationship between risk in one place and another are often seen as precursors to climate adaption and action (see, for example, Flynn et al., 2019; Alfieri et al., 2014; Papathoma-Köhle et al., 2016). These exercises translate materially experienced space into abstract comparable units (Vandergeest & Peluso, 1995) and this enables the assertion of claims about the space, which are then enforceable by law (Anderson, 2006). The lines on the land use planning and hazard maps that delineate "safe" from "unsafe" are prerequisites to control of the same, as "boundaries, along with their communication, comprise the basic element in the construction of territories and the practice of territoriality" (Paasi, 2003). As will be no surprise, the "political economy [of] the environment" (Elden, 2005) is implicated in the mapping, imposition, and enforcement of territories of risk and hazard.

The land use planning maps presented in this paper represent the first step toward what Vandergeest and Peluso call "internal territorialization" (Vandergeest & Peluso, 1995). Sack conceptualizes territorialization as a form of geo-political control over "objects, people, and relationships" that made possible by control of geographical space (Sack, 1983). For Lefebvre, space is political, and the control of territory legitimizes certain types of violence (Lefebvre, 1991). The internal territorialization manifest through the mapping and implementation of land use plans involves the control of access and activities (Vandergeest & Peluso, 1995) and the imposition of meaning onto the land (Holmes, 2014). These practices entail both physical and epistemic violence (Santos, 2015) respectively. They provide local elites an opportunity for "control over the distribution, allocation, and ownership of scarce resources" (Soja, 1971 in Elden 2010) – in case studies presented, valuable shoreline real estate. In short, they, as with other maps, can be "understood to serve a role as instruments, or technologies, of governance" (Movik et al., 2021).

Insofar as the imposition of meaning via climate adaptive land use planning is concerned, the discourse and boundaries of risk and safety promulgated by experts and the state through maps and plans does not have to be coherent so much as it must be *persuasive* (Rebotier, 2012), an altogether different thing. As such, one measure of the success of this territorialization "can be assessed less by the verity of its representations than by the degree to which it is able to constitute a terrain within which its representations are truthful" (Blomley, 2014). If a local population accepts the underlying premise – that mapping hazard and risk and controlling how risky land is used can reduce potential climate related harm – the state is able to "render technical" (Li, 2007) potentially existential challenges arising from climatic threats.

As the case studies demonstrate, some locations present such extraordinary risk profiles that even seemingly radical landscape interventions offer relatively little in the way of long-term viability. Tacloban City, for example, sits in a bay that exacerbates the impact of storm surges (Mori et al., 2014). The flat, low topography of the habitable areas of the city leaves it highly vulnerable to sea level rise (Toda et al., 2015). Moreover, the Philippines more generally is extraordinarily susceptible to climate change (Cabrera & Lee, 2018; de Leon & Pittock, 2017; Garcia et al., 2013; Yumul et al., 2011). There is little that the Tacloban City local government can do to ameliorate the potential harms of climate change in the long term, short of relocating the City (Muir-Wood, 2013).

In of face of such risks, a mapping exercise delineating high-risk from low-risk land, or safe from dangerous land, allows the state to bound responsibility for action by producing "safe" and "risky" as categories requiring, or not requiring, intervention. Doing so represents the challenges of climate change at a scale that is (relatively) manageable. Land use management also occurs at a scale the state has the nominal authority, if not the capacity, to solve. Long-term viability, the larger question, unanswerable at the city level, remains unaddressed. The landscapes produced by the mapping and adaptation interventions presented in this paper may strike the reader as profoundly inappropriate, if their objective is to reduce climate risk. The effectiveness or appropriateness of the landscapes is, however, less important than the coherence of the narrative terrains that they inhabit.

3. The property law implications of mapping risk

The territorialization of risk via the hazard map is also produced by

[1] I acknowledge that I speak here in broad generalities. There are obvious potential competitors to state-sanctioned property regimes in the Global North. These include the private assertion of rights against the state – for example, the Bundy ranch standoff in Nevada in the United States in 2014 – and Indigenous legal systems which regulate the human relations with land. The scale of these alternatives to state assertions of a right to control human relations with land is small when compared to the scale of land informality in the Global South.

land use planning, which is intended to respond to the risks the map asserts. It is the imposition of the plan onto mapped land and the residents of said land that results in the enactment of new landscapes. Much of the legal scholarship on planning emerges from a Global North context, where state-centric property orders effectively fill the discursive space and broad compliance with the non-interference of state-sanction rights can be assumed. The result of this a priori assumption is that discussion in the space understands land use planning as mediating between "public" and "private" rights, private rights being property rights and public rights being the broader benefit delivered through effective planning instruments. In these cases, private property rights represent an obstacle that must be overcome to implement good planning (Alexander, 2007; Alterman, 2011; Davy, 2020; Krueckeberg, 1995; Nowak et al., 2021; Van Wagner, 2014).

To go beyond the literature and provide an example in the world, so to speak, I turn to Australia. In February 2020, after a decade of severe drought and months of catastrophic bushfires across the country, metropolitan Sydney received its heaviest rainfall in 30 years. In the months following the flooding, the government of the state of New South Wales removed a restriction that prohibited councils from considering more than the 1-in-100-year flood risk when making land use determinations (Thompson, 2021). That previous maximum became the *minimum* level to be considered when making decisions about residential development (NSW Department of Planning, Industry and Environment, 2021), making less land available for development. There was resistance to the new codes, with the rules being described as "overtly heavy handed" and an "impediment" to the growth of western Sydney (Thompson, 2021). In this example, state power – expressed in the planning instruments – acts to constrain property owners. Alternative property orders, in these contexts, are rarely visible or acknowledged in popular discourse or in legal or urban planning scholarship.

These accounts make some sense in the Global North, where the state does, generally speaking, monopolise land control. In these contexts, most property relations can be reasonably understood within a more-or-less unitary property regime. However, the same cannot be assumed in the Global South or post-colonial context. In these contexts, more pluralist relational approaches to land relations are the norm (see, for example, Fitzpatrick, 1997; Bisoka et al., 2020; Adler et al., 2008; Suhardiman et al., 2021; Meinzen-Dick & Nkonya, 2007), albeit in heterogenous ways.

For example, in some contexts the state establishes and recognizes plural property regimes. In Solomon Islands, like many Pacific Island states, the constitution recognizes customary land tenure as a key source of state-recognized property rights (Monson, 2017). In other contexts, non-state property systems persist without recognition from state laws and institutions. The Philippines, like many countries in the Global South, is characterised by extremely high levels of property informality, and one in every four residents of the Manila Capital Region—about 3 million people (Singh & Gadgil, 2017: 4). Worldwide, almost one in four (23.9 %) of all urban residents live in informal settlements (UN Stats, 2021). These often very large, long-term settlements have been recognized as self-governing—with complex and enforceable internal management and transfer regimes—since Santos' work in Brazilian favellas in the 1970s (Santos, 1977). The state does not, however, 'see' or recognise these property orders. Even where the state recognizes plural land regimes derived from custom, urbanization and urban informality – a different form of ordering all together – add new layers of complexity (see, for example, Monson, 2015). Rather than the more doctrinal focus on state-sanctioned rights and privileges, property research in these contexts more commonly focuses on the relationships of power produced and ordered by state property law.

This includes a body of work that sees planning laws and their implementation as implicated in the creation and attenuation of property rights. For example, writing about India, Anaya Roy identifies urban informality as the product of the operation of law (Roy, 2005). This approach defines informality as the product of law, meaning that rather than the systems being bifurcated, each is implicated in the operation of the other. The breadth of law doing such work is significant and can include rules meant to protect informal settlers. For example, Bhan has demonstrated that although the 1956 *Slum Areas (Improvement and Clearance) Act* sought to protect informal settlers in identified 'slum' areas, the public interest exception enshrined in section 11 created a mechanism allowing the clearance of those same areas (Bhan, 2009). As Roy notes, formalization programs – intended to normalize informal land use – can end up displacing those unable to meet the costs of their new economic lives (Roy, 2005). This scholarship highlights the impact of law on urban land use and informal residents. This paper shares much in common with the approaches of Bhan and Roy in highlighting changes in the vocabularies of rights and material impacts wrought by state intervention. However, it goes further in demonstrating how land use plans and territorialised risk can transform legal systems *in their entirety*, displacing not only distinct or discrete claims but wider systems of informality operating on land now deemed 'unsafe'.

Within the Philippines, many of large-scale informal settlements exist on land with state-recognized owners, whose ability to build or use their land is constrained by informal residents. In the Philippines, for example, while the law limits the state's rights to evict informal settlers for reasons other than risk or need (Republic Act No. 7279), private rights holders' rights of eviction are not constrained. Nonetheless, a complex array of social and practical pressures limits the ability and willingness of many landowners to evict informal settlers from their land (personal interviews). While private rights holders in the Philippines legally enjoy the same rights of control as their peers in the Global North, there exist practical, material barriers to the enjoyment of these rights.

Climate-adaptive planning creates an opening for the primacy of state-centric property orders to be asserted vis-à-vis informal orders. If we understand the successful implementation of planning in the Global North as constraining the state-sanctioned rights of property owners to do what they want with their property, the holders of the same legal rights in the Philippines often have a precursor challenge: the current residents of the land to which they claim title. Moreover, the implementation of a risk responsive planning regime requires the ability to control activity on land.

Obviously, there is a significant economic imperative to clear land of informal settlers, making it available for more economically 'productive' uses. For example, the initial plan to designate all land within 40m of the shore to be no-build-zones (see below) was strongly resisted and, as the recovery 'tzar' Secretary Ping Lacson noted,

> The very first person who raised a howl [about the 40 m no build zones] is the Secretary of Tourism. He told us during a Cabinet meeting, how can investors build a beach resort that is very far from the beach? It's as simple as that (Official Gazette of the Republic of the Philippines, 2014).

Similarly, the Tacloban City Planning Officer in charge of development of the land use plan in the wake of the story told me that economic imperatives were as important to the city as safety when it came to making decisions which parameters they would use for determining risk (personal interview). Already significant, income inequality in the Philippines is on the rise, with "political dynasties and family-linked conglomerates" dominating the economic sphere (Tuaño & Cruz, 2019). Dakila Yee has documented how "bourgeois environmentalism" (Yee, 2018) operated to designate subaltern informal settlers in Tacloban environmentally risky, supporting the clearing of their land. On Bantayan Island, the storm recovery has been used to advance local political objectives of reclassifying land for registration at the Land Titles Office (discussed below), making Santa Fe and her neighboring municipalities more attractive to investor capital.

I suggest that economic imperatives, while highly persuasive, are not enough to make sense of what happened in the Philippines following Typhoon Haiyan. In the case studies presented below, I demonstrate that

the state undertook to resolve the question of informal occupancy on land as part of its implementation of land use plans emerging from the hazard maps. We can understand this as reinforcing orders of social hierarchy and power (Fawaz, 2017), a deployment of a different 'public interest' argument (Bhan, 2016), and as a production of space that facilitates social control to advance capitalist production (Lefebvre, 1991). However, my core concern here is with relations between legal regimes, namely, the triumph of state-sanctioned property regimes over highly localized, but often long-term, informal property regimes. In the Philippines this is not a generalized triumph: formality triumphs over informality only on those places where the use plan delimitates risk and thus facilitates this form of social control. The resulting landscapes are the result of this state-centric property ordering, which in turn facilitates a very particular type of increased commercial investment in land.

4. Methodology

This paper demonstrates these claims through two case studies of climate adaptation in Tacloban City and Santa Fe, Cebu, two municipalities in the Visayan region of the Philippines. Why use the Philippines case studies to exemplify this phenomenon? The Philippines, with its geography and location, represents a sort of bellwether for global climate change impacts. The archipelago has over 7500 islands, of which about 2000 are inhabited. Like many Pacific Island states, the Philippines is highly vulnerable to sea level rise (Mcleod et al., 2010; Mimura, 1999). The islands are beset by tropical storms, which are—as elsewhere in the world—increasing in frequency (Dorland et al., 2022; Michener et al., 1997; Yumul et al., 2011). Storm intensity rises with water temperature. The south-west Pacific is experiencing rapidly increasing ocean temperatures, which also further impact sea level rise (World Meteorological Organization, 2021). Disaster events and fluctuations in climate continue to—and are anticipated to further—significantly disrupt food security across the country (United Nations, 2021). The nation has responded to this extraordinary risk profile with a comprehensive legal regime.[2]

It is difficult to overstate the significance of climate change to the Filipino national psyche. The constant barrage of "natural" catastrophes that plague the islands might have given rise to "cultures of disaster" (Bankoff, 2003). Yet the existential and fundamental threats that climate change represents are of a different order. As early as 2013, eight in 10 Filipinos believed that they had personally experienced the impact of a changing climate (World Bank, 2013). With expenses associated with annual multi-hazard loss equivalent to 69 % of yearly social expenditures (Alcayna et al., 2016), there is a significant appetite for interventions that find little purchase in countries with different risk profiles. Because natural disaster events can produce a short-to-medium-term surge in adaptation investment and an appetite for structural change (discussed in depth below), the Philippines is already making significant investments in risk-responsive settlements.

In the Philippines, the formal legal code, a title-by-registration system, was adopted in the early years of the American colonial regime. For non-lawyers, this refers to a system where one's ownership rights result from the registration of those rights in a central land administration system, rather than from – say – the sale of land from one person to another. The severe effects of the system are unmoderated by opportunities for acquisitive title (adverse possession), which would enable people in possession of a land against the interests of the legal owner to acquire title after a particular period of time. Informal systems of ownership are non-state systems of land ownership, regulating property beyond the reach of the formal legal system. They and are common in rural and urban parts of the country, with one in four Filipinos living informally as of 2019 (Philippines Statistics, 2019).

The Philippines, with its high levels of urban and rural informality, offers a property profile similar to many other low-to-middle-income countries (United Nations Human Settlements Programme, 2003), where "legal" system of land ownership exists alongside "informal" property orders (Basile & Ehlenz, 2020). Because of this prototypical property ordering, the Philippines provides an opportunity to see what happens extensive investment in purportedly climate-responsive adaptation and shelter is made property systems marked by high levels of informality. While all interventions, nations, and experiences are—of course—heterogenous, the case studies presented below illustrate the triumph of one property order over another. This same conflict will necessarily reoccur as the impact of climate change worsens, and—without radical changes in political economy and development funding models—will replicate the same outcome.

The two case studies presented below are of two communities—a city and a low-income municipality—that experienced significant damage during Typhoon Haiyan, which hit the Philippines on November 6, 2013. The disaster triggered enormous investment in disaster risk reduction activities and the development of new land use and development plans across impacted municipalities. Disaster created opportunity (Fan, 2013; Timms, 2011) for significant investment in land use planning and shelter, as well as economic development more generally. The changes that began as part of the disaster recovery continue to develop nearly a decade later. These case studies were developed from state documentation (land use plans, climate adaptation plans etc.), and qualitative data gathered in fieldwork in both locations, conducted between 2014 and 2019, including 12 months intensive fieldwork between 2015 and 6. Interviewees included local government officials, humanitarian workers from both government and non-government organizations, local community members and project beneficiaries, and international donors. Analysis was inductive, following the coding of interviews and documents.

5. The case studies

5.1. Understanding the context: planning and relocation in the Philippines

The responsibility for land use planning sits with local government units (LGUs). The Philippines, which explicitly embraced a decentralized model of political control after the end of the Marcos regime, devolves significant authority to the more than 1700 LGUs across the country. Among the tasks delegated to them, LGUs have responsibility for health and social welfare services, waste disposal, infrastructure, higher education, and tourism facilities (Local Government Code of 1991: *sec*. 17). LGUs cover populations from fewer than 200 (Kalayaan, Palawan) to almost 3 million (Quezon City, Metro Manila) people, and from 1.76km^2 (Pateros, Metro Manila) to 2444km^2 (Davao City, Davao de Sur) (Philippine Statistics Authority, 2016), with obviously different capacities to meet their obligations. Along with other mandated tasks, each LGU is required to develop a comprehensive land use plan (CLUP). As part of that plan, land is designated high, medium, or low risk for climate-related and geo-hazard-related projections (Housing and Land Use Regulatory Board, 2013: 242). Where land is designated medium or high risk, certain uses are discouraged depending on the hazard type (ibid: 147).

5.1.1. Relocation as a planning instrument

Government relocation has a long history in the Philippines. During Spanish colonial times, the local population was relocated from indigenous barangays into pueblos to facilitate Christian indoctrination and control (Constantino, 1975; Corpuz, 1989; Phelan, 1959). In the contemporary Philippines, relocation is used as a planning instrument, as well as a tool to support economic development at the individual and

[2] For a list of climate-specific Acts, Administrative and Executive Orders, Proclamations, Climate Change Commission Administrative Orders, and Department of Environment and Natural Resources administrative and special orders, see the website of the Department of Environment and Natural Resources (n.d.).

national levels. There is a very high overlay of hazard and informality (see, for example, Morin et al., 2016). Removing people from "unsafe land" is perceived as increasing the safety of inhabitants and others in the community, as well as being an economic opportunity for relocated households (National Economic and Development Authority, 2020). However, these endeavors are, all too often, unsuccessful. For example, in 2010, former President Benigno S. Aquino III launched *Oplan LIKAS: Lumikas para Iwas Kalamidad at Sakit* (Operation Plan: Evacuate to Avoid Calamity and Sickness). Oplan LIKAS was intended to move more than 104,000 informal settlers away from danger areas (World Bank, 2016: 2). The program had a "high attrition rate" (ibid: 14). Indeed, across all relocation programs, over 60 % of informal settlers relocated from Manila to outside the city eventually return (Hoffmann, 2016). Even the government itself described endeavors to upgrade informal settlements through relocation as an "expensive folly" (National Informal Settler Upgrading Strategy 2014: 84, cited in World Bank, 2016: 102). Nonetheless, it remains a cornerstone of the nation's development and risk management strategies.

5.2. The impact of Typhoon Haiyan

It was against this context Typhoon Haiyan struck the Philippines. Immediately following the storm, there was enormous appetite for interventions that responded to the perceived climate-related threat posed by typhoons (for a discussion of the public perception of Haiyan as climate change related and resulting appetite for change, see Compton, 2018). The initial proposal was for 40-m "No Build Zones" along the shoreline, with the areas to be kept free of all construction. There was, however, limited legal authority for this. The Water Code provided for easements, but—other than on land zoned as agricultural, where they were required to be 40m—the easements that would have applied in Tacloban City were only 3m (Presidential Decree 1067: art. 51). Even if it were legally possible to implement a 40-meter easement, most of the identified land had legal owners whose interests would have been impacted by a no-build rule, with significant political consequences if the plan had been implementable. By March 2014, the national government declared its intention to instead relocate people depending on the relative safety of the land on which they were living, leaving the land free for other suitable uses.

In November 2014, the national recovery definitively directed LGUs to designate "high," "moderate," and "low" level danger zone designations in municipal CLUPs. Understood in conjunction with other instruments, this meant that there should be no housing built on unsuitable land—though other types of construction could be permitted, including construction for commercial or industrial purposes (Philippines Department of the Environment and Natural Resources et al. 2014: 2(g), 3(k), 9(e)). The national government anticipated relocating households to safe land, requiring the construction of 205,128 permanent houses for "families living in hazard-prone and unsafe areas" (Philippines Office of the Presidential Assistant for Reconstruction and Recovery, 2014: 49) across impacted municipalities. This plan 'rendered technical' a climate responsive response to the disaster, insofar as it defined the terrain of action and enabled the government to act.

As such, one measure of the success of this territorialization "can be assessed less by the verity of its representations than by the degree to which it is able to constitute a terrain within which its representations are truthful" (Blomley, 2014). If a local population accepts the underlying premise – that mapping hazard and risk and controlling how risky land is used can reduce potential climate related harm – the state is able to "render technical" (Li, 2007) potentially existential challenges arising from climatic threats.

The two case studies that follow explain how the appetite for climate adaptation was translated into land use plans, drawing on particular conceptualizations of risk and hazard. The recovery project and land use plans have, over the past eight years, produced landscapes that seem very far from "climate resilient". They have also driven the reordering of local property relations. All the land in these case studies had state-recognized owners, either because their title is registered at the Land Titles Office (as in Tacloban) or because their ownership is registered with the LGU and confirmed through the payment of land lax. The land also had long-term, informal settler residents who transacted and managed land through systems entirely distinct from the state. By providing a mechanism for territorialization, the land use planning maps allowed local powerbrokers and the state to remove informal settlers from land. This has allowed for an effective triumph of the state-centric property order over the long-term informal orders derived from long-term possession and sub-state exchange which existed in these spaces.

5.3. Tacloban City

Tacloban City is the only highly urbanized city in Region VIII, with a present population of over 250,000 (Philippine Statistics Authority, 2021). The city was "ground zero" for Typhoon Haiyan.[3] It was hit by a five-to-six-meter storm surge (Mori et al., 2014), which destroyed 28,734 houses and damaged a further 17,643 (Tacloban City, 2014: slide 7). In 2012, almost 12 % of the city's population comprised informal settlers—that is, people in possession of the land against the interests of the owner (Tacloban City, 2015: 157). Further, the 2007 census indicated that more than a quarter of a million households in Region VIII were without legal property rights, living rent-free on land with the consent of the landowner (Philippine Statistics Authority, 2007).

5.3.1. Hazard-mapping, territorialization and rendering technical

The data used to identify hazardous land in any given municipality depended on the technical skills at their disposal. Read broadly, community involvement is required by law, as risk reduction activities are meant to be based on Community Based Disaster Risk Reduction and Management (Republic Act No. 10121). In poorer municipalities, like those far from the shore in the *bukid*[4] areas served by the Palo Archdiocese recovery program, data were obtained through participatory mapping exercises.

Tacloban City, in comparison, saw a massive influx of aid workers and international support in the wake of the storm. The city relied on maps provided by the Department of the Environment and Natural Resources (DENR), the Japanese International Cooperation Agency (JICA), and the United Nations Human Settlements Programme (UN-Habitat) (personal interview). As the Tacloban City Planning and Development Officer told me, while "social research is ok, based on the experience of people on the ground," the LGU relied only on maps from "accredited agencies" (ibid).

The 2017–2025 Land Use Plan (Tacloban City, 2017) reflects the significance of the Typhoon Haiyan storm surge as fundamental to how the city made decisions about land use. As the CLUP itself notes:

> The effect of the damages brought about by the super typhoon "Yolanda" more specifically of the storm surge, guided this land use planning activity and land use policy framing exercise to a projected wise use of lands resilient against natural hazards and adapted to climate change. (ibid: 199).

The city is, however, beset by a range of climate-contingent risks. Large swathes of its terrain are prone to rain-induced landslides (ibid: 43), flood (ibid: 44), and ground shaking (ibid: 45) and liquification (ibid: 47) (both earthquake related), as well as storm surge (typhoon- and storm-induced waves) (ibid: 43) and tsunami (ibid: 47). Indeed, the

[3] The phrase was used by now President Duterte when describing Tacloban after the storm (see Curato, 2017).

[4] *Bukid* means mountain(s) in Cebuano. In Leyte, it is used when referring to inner-island hill areas. These municipalities are significantly poorer than their shoreline counterparts.

city's own recover plan notes the local "funnel" effect during storms, which "tends to invite the strongest storm surges" (Tacloban City, 2014: slide 6), exacerbating their height and intensity. The city is anticipating higher temperatures and increased rainfall during the wet season (Tacloban City, 2017: 36–37), which is likely to contribute to increases in landslides, flooding, and typhoon frequency and strength. It appears, too, that earthquake frequency is increasing because of climate change (Maji et al., 2021; Usman, 2016).

Given its inability to address risks that effectively impact its entire territory, the city had to delineate those risks that it was able to address. It did so through its CLUP. While the city's technical partners might have the luxury of proposing planning interventions based exclusively on geophysical and risk maps, the Tacloban City government was acutely aware that these decisions were profoundly political. As the City Planning and Development Officer told me, "UN-Habitat and JICA … have very different frameworks and priorities" from the local government, and the LGU had two "non-negotiable" priorities for the mapping task: physical safety and the retention of the city's role as the central commercial center of the region (personal interview).

Thus, the storm event, the hazard maps, and the City's economic and social objectives all informed the scope of interventions and contributed to the scope of the climate change intervention that the land use planning exercised represented. As a result, the City decided to designate all land less than 5m above sea level as a high level danger area (personal interview), in an attempt to address storm vulnerability and sea-level rise. The resulting territorialization had a very high degree of overlay with both the informal settler population of the city (personal interview) and the original 40-m No Build Zones proposed in the immediate wake of the storm.

5.3.2. Property

The resulting relocation (or attempted relocation) of 80,000 people away from shoreline areas also had the effect of bringing to a close long-term property orders that had existed among informal settler communities. For example, one informal community living on the San Jose peninsula had members who had been in place for around forty years. Generations had been born on the land, and the community had a system for exchange, inheritance, and the leasing of land among residents, relatives, and new arrivals. Many residents had ties to an island in Samar (the neighboring province), and there was some degree of in and outbound migration for education and employment needs. While the community ordered land relations amongst themselves according to rules of their own making, they were also making efforts to normalize their collective ownership of the land in the eyes of the state. While the local electricity company had formal title to the land the community was pursuing a claim disputing this title on the basis of prior possession. Supported by a local NGO, this claim collapsed in the wake of the storm.

With the land territorialized as dangerous, the CLUP prohibited residential building on the land and relocated the residents of the land to the new Tacloban North settlement site, about 25 km (15.5 miles) away. As a result, the existing generational property system that governed human relations with that land was extinguished. The relocation program brought the residents of the community into the formal economic and administrative grid. Residents are now billed for electricity and water, which they had previously accessed freely from wells and illegal connection to the utility network. It is unclear if full legal title to the property to which they have been located will be provided, and – if so – whether the relocatees will be able to afford the land lax obligations such title would give rise to. With the CLUP providing for non-residential uses of dangerous land, by early 2019, and before all the residents of the land had been removed, a small resort had been built where the community had lived.

5.4. Santa Fe

Santa Fe is a fourth-class (that is, poor) rural municipality located on Bantayan Island. It is part of Cebu province and is home to approximately 28,500 people (Santa Fe Municipal Government, 2018: 53). While residents might depend on subsistence agriculture and other forms of low skill labor, the tourism industry is the municipality's primary economic engine (ibid: 35). Typhoon Haiyan made landfall on Bantayan Island. Across the three municipalities located on the island, 93 % of houses were totally or partially destroyed by the storm (Shelter Cluster, 2018: 99).

The recovery—and land use planning generally—is compounded by the complex land tenure system on the island. President Marcos declared it a wilderness area in 1981. Presidential Proclamation No. 2151 (1981) indicates that 4326ha of total area, across several different locations, was to be reserved

> for foreshore protection, maintenance of estuarine and marine life, including special forests for the exclusive habitats of rare and endangered Philippine flora and fauna …

The scope of the Presidential Proclamation is unclear, requiring "future delineation and survey" (ibid). This has not taken place. The National Integrated Protected Areas System Act of 1992 (Republic Act No. 7586) reaffirmed the protected status of the island, again without indicating the extent of the wilderness area on the island. As such, the whole island and the other 19 islands in the Bantayan islands group—comprising over 11,000ha—are treated, for the purposes of property law, as if they are a wilderness area. This has frozen land registration on the island as it was in 1981. The Land Titles Office holds titles only for lots that were already registered at the time of proclamation of the wilderness area. To provide for the growing population, the three municipal governments on the island operate a de facto system of land registration, with tax records and deeds of sale serving as evidence of land ownership—though this system falls below the threshold required for mortgage security interests. In addition, fieldwork demonstrated significant communities in the municipality living informally on titled and untitled lots, with and without the permission of the state-recognized owners. While there have been attempts to rationalize the scope of the National Integrated Protected Areas System protections on the island—not least to increase tourism investment (Salimbangon, 2019)—these have not yet come to fruition.

5.4.1. Hazard-mapping, territorialization, and rendering technical

In the immediate wake of the typhoon, the Santa Fe municipality received significantly less technical assistance than Tacloban City. At the time of the storm, the municipality had 1:100,000 hazard maps made by DENR; 1:50,000 scale maps were developed in 2014. The three municipalities on the island decided to implement a uniform buffer zone along the shoreline. The CLUP designates 20m from the shore as unsafe land, requiring people to move. The choice of 20m was, even more so than in Tacloban, a highly contingent decision. As the mayor told me, they settled on 20-m buffer zones because if they used the 40-m zone initially proposed by the President, "everyone has to move" (personal interview).[5]

Yet moving people 20m back from the shoreline of an almost flat sand island does little to implement a climate-safe landscape. The municipality is low lying, with 98 % of its area level (with slopes of up to 3 %) (Santa Fe Municipal Government, 2018: 20). Elevation ranges from 1m to 20m above sea level, with height limited to a small part of the interior of the municipality. The 17.2km shoreline of the municipality is largely beach and lagoon, punctuated by rock escarpment on the eastern shoreline. The population of the town is concentrated in the barangays of Marikaban, Talisay, and Okoy, which are low lying—barely above sea

[5] I note that Bantayan (municipality) has implemented 3-m buffers in Población. This exception to the 20-m rule reflects Bantayan's topography. Its town center also faces the sea but is built on hard rock—unlike Santa Fe, where the town center is built on much more hazardous sand.

level—and susceptible to storm surge as a result (Nationwide Operational Assessment of Hazards, n.d.). The municipality's Climate Adaptation Plan acknowledges that sea level in the country is expected to rise by approximately 20cm by the end of the 21st century under RCP8.5 scenario (Santa Fe Municipal Government, 2018: 98). The map in Fig. 1—photographed during fieldwork in 2019—indicates the extent of expected inundation in 2055, following that sea-rise trajectory. Marikaban, Talisay, and Okoy, as well as Población (the town center) and Pooc, are almost completely inundated. At present, the municipality acknowledges that sea level rise impacts 67 % of the population, with about 20 % at high risk (Santa Fe Municipal Government, 2018: 99).

Storm surges, related to typhoons, also threaten the island. Three significant typhoons hit the municipality between 2008 and 2018. While official DENR maps indicate a low risk of storm surge that is limited to specific areas, locals dispute th risk characterization. The "post-Yolanda testimonies of the affected coastal dwellers and fisherfolks" and "data gathered by the municipal government" (Santa Fe Municipal Government, 2018: 85) indicate that storm surge presents a more significant risk than recognized by DENR. Locally developed maps suggest that most of the municipality is at risk (Santa Fe Municipal Government, 2018: 90). Nonetheless, given the extent of the threat to the island, it is unsurprising that the municipality limited its human-residence interventions to shoreline relocation. Anything else would be existentially untenable.

5.4.2. Property

Because of the legal status of land on Bantayan, there is a high level of complexity to land tenure arrangements. Local and regional politicians attempted to have the land reclassified as alienable and disposable in the wake of Haiyan (Salimbangon, 2019; The Freeman, 2014). This was nominally because the lack of alienable land limited where state-funded relocation projects could be located (Quintas, 2016; Romanillos, 2014) but would also likely attract significant investment to the island. These attempts have yet to come to fruition.

Despite this, multiple relocation sites were identified in the municipality. This case study highlights two of these sites, occupying the same piece of titled land but developed independently by the National Housing Authority and Habitat Philippines. The relocation site was purchased from a local landowner, who had been trying to sell the land for years but had been unable to because it was unsuitable for farming and "only foreigners want to live in the *bukid*" (personal interview).[6] The plan was to use the land to relocate 1000 households to a National Housing Authority-funded project and another 270 to houses by Habitat (half this number were delivered because the poor quality of the land increased costs such that Habitat did not continue the project).

Given that there were only 5395 households in the municipality in 2014 (Philippine Statistics Authority, 2014), the scale of the relocation endeavor should be apparent—particularly since it is only one of several relocation sites. The consequence for property ordering is significant. The complex patterns of exchange that existed among informal settlers on untitled or titled land were comprehensively displaced. Alice Beach, a beautiful white sand area north-west of the center of town and home to—at the time—three small resorts and several dozen informal settler families, was one of the first sites cleared. In this case, little attention was paid to the delineation of safety: all informal settlers on the site were relocated, with the support of the legal landowners. As in Tacloban, many residents had been on the land for decades and complex rule systems had evolved. These included rules relating to rights to fruit from trees and for compensation and rectification when damage to another's house occurred. These systems have been replaced, in the relocation site, with mortgages, utility bills, and incorporation into the administrative grid. On the beachfront, too dangerous for human habitation, new resorts have sprung up.

5.5. The climate-resilient landscapes of Tacloban City and Santa Fe

Because designation as dangerous land changes the uses permitted on the given land, the resultant landscape in both Tacloban City and Santa Fe has been transformed. For both, the land use planning process has not *constrained* property rights, as is often claimed in Global North-focused literature. Instead, it has wholesale transformed property ordering, displacing long-term systems of informal land tenure derived from possessory interests and reifying state-sanctioned forms of title. This reordering of systems has significant consequences for the emergent, nominally climate-resilient landscape.

While some informal settlers remain, the shorelines of these cities are reconstructed as sites of commercial and industrial development. Where, a decade ago, long-term occupants lived in self-constructed huts of nipa, plywood, and sheet metal, today resorts and industrial sites have materialized. This reordering occurred in the name of climate resilience and risk reduction. Yet its actual contribution to long-term climate resilience is questionable. For example, tourism on Santa Fe increased from 26,115 visitors in 2011 to 137,713 in 2017 and sits at the center of the town's economic development strategy (Santa Fe Municipal Government, 2018: 36). Tourism now accounts for 95 % of all water consumed annually in the municipality (ibid: 35). The sustainability of this economic order represents a challenge for the community, both ecologically and socially. The main street of Población, which, when I first visited in January 2014, hosted one resort, a few small restaurants, and local shops, now houses multiple bars, a myriad of eating establishments, and service providers oriented toward incoming tourists. Local vendors and the community are increasingly displaced from the landscape, moved to a location far from the town center, installed in row houses, and encumbered with new financial obligations. Similarly, in Tacloban, resorts and hotels replace informal settlements, and the city is host to multiple new retail developments. The economic revitalization of the city has bought a McDonald's to the city, in addition to multiple new malls. The commercial redevelopment of the shoreline is occurring across the city, with particular investment in tourism facilities. Former informal settler residents are kept well out of site, 20km to the north of the town center. As with Santa Fe, investment in this land required clear state-sanctioned legal title, and—more importantly—the removal of incumbent residents.

There are obvious burdens imposed by these new property arrangements. Santa Fe and Tacloban City's most vulnerable residents are now subject new expenses and forms of social exclusion. At the same time, while the elite benefit most from the described development, the increased availability of low-skill work within the tourism industry – primarily cleaning and maintenance – offer potential, reliable waged labor. Given the dependence on day trading and subsistence fishing in relocated communities, these jobs are potentially transformative (despite being low wage). In the longer term, however, there is an interesting paradox in play. With limited climate resilient land in both communities, it is possible that those relocated will be able to maintain the ongoing habitation as currently valuable land becoming increasingly less viable. There is a real potential for first-mover advantage, although how long these communities would sustain themselves remains an open question.

Hazard maps underly these landscape transformation. The increased investment in unoccupied titled land was facilitated by the removal of informal settlers and the displacement of their systems of property ordering. With a very real and appropriate concerns about climate change providing political capital, the ability to exert a greater level of control over human relationships with land through the territorialization of risk has facilitated both a social reordering and landscape transformation.

[6] On Bantayan, *bukid* is used to refer to any land located at some distance from the shore. More generally, it is used to refer to mountains and in Tacloban it is used to refer to hill areas.

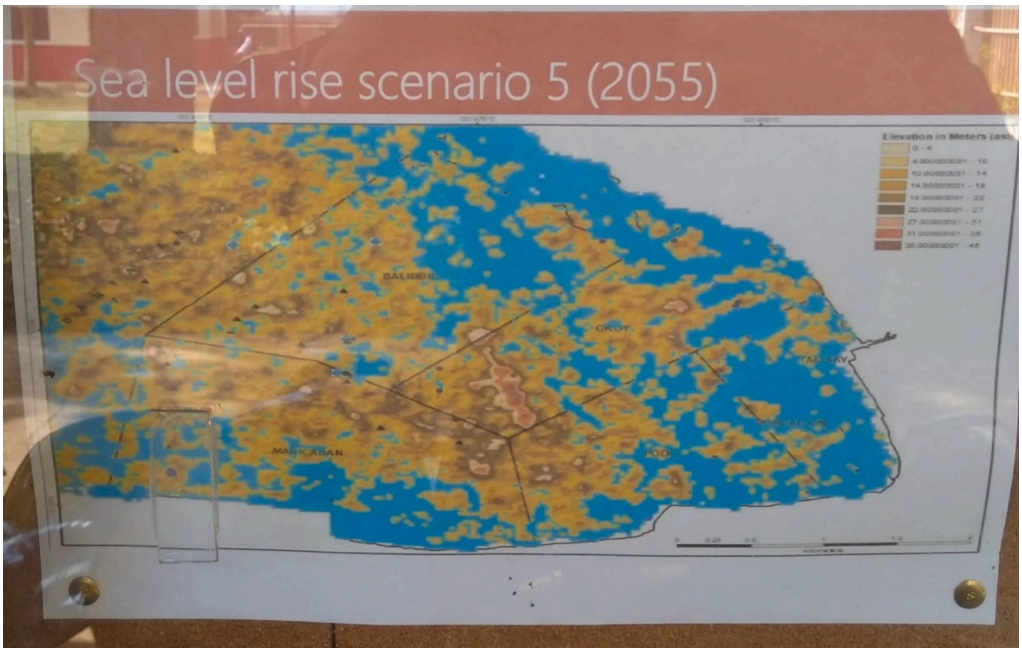

Fig. 1. Map indicating inundation of Santa Fe shore by 2055 under scenario RPG8.5.

6. Conclusion

The long-term potential of Tacloban City and Santa Fe will be challenged by ongoing changes in the climate. The decisions these communities have made about the nature and scope of climatic impacts, expressed through their land use plans, has reordered property and facilitated new landscapes of economic and material advancement. In doing so, these case studies demonstrate that the oft-stated claim that planning constrains property reflects—very much—the epistemic and situational position of authors. The relationship of planning to property is contingent on the complexity of the property regime in a given place, and the way that regime structures human relationships with land. These case studies, which demonstrate the impact of planning in areas with informal settlements and incumbent property regimes, show planning liberating state-sanctioned property rights from the burden of other regimes. It is likely that in other contexts—say, where complex systems of state-recognized customary land tenure co-exist with state-afforded tenure—the interaction of planning and property would afford a very different outcome. In any case, the landscapes that emerge from these processes will continue to evolve as the material, legal, and economic pressures on the land change over time.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

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