Ōtākou Whakaihu Waka
UNIVERSITY OF OTAGO

Kā Rakahau o Te Ao Tūroa
Centre for Sustainability

Just adaptation:

Considerations for changing land-use in urban areas

Research Summary for the South Dunedin Future Programme

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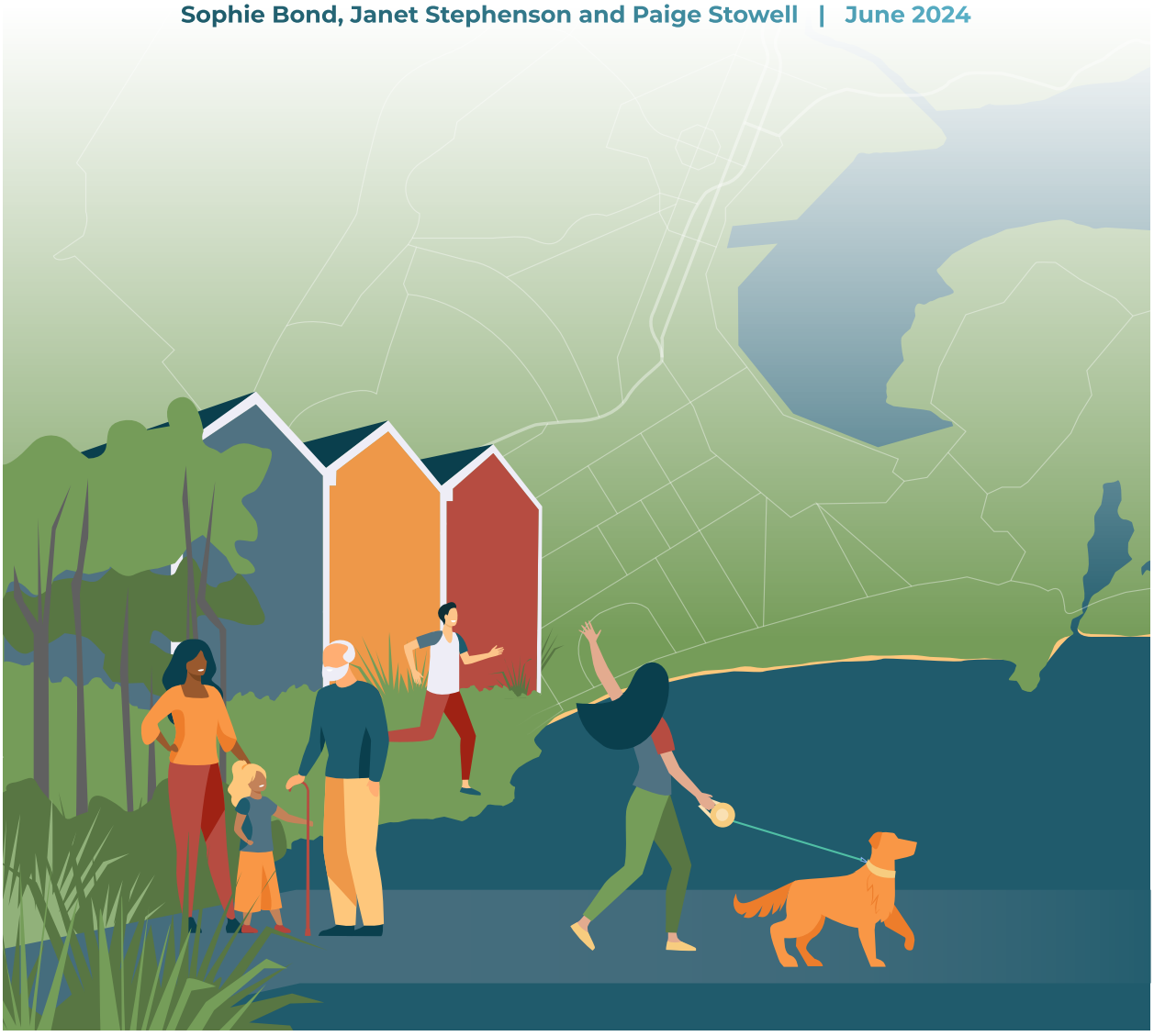


Introduction

This research summary has been developed for the South Dunedin Future (SDF) programme, a joint initiative between the Dunedin City Council and the Otago Regional Council to inform their adaptation planning for the greater South Dunedin area. Much of the area was originally developed through land reclamation and development that has removed and diverted natural water ways. Climate change will bring challenges such as rising seas and more storms that, in time, will make parts of the area wetter and unsuited to housing and other intensive uses.

At the time of writing, SDF have identified sixteen possible adaptation approaches for South Dunedin. These can be grouped into Protect, Avoid, Retreat and Accommodate. Protect refers to staying in place and building defenses. Accommodate also involves staying in place, but includes making changes to buildings and infrastructure to improve resilience. Retreat is purposefully moving away from areas where the risk is too high and avoid involves staying away from areas of high risk in the first instance.

Some of these approaches may result in significant land-use change in parts of South Dunedin. One of these significant changes could be to allow water to re-establish itself in specific areas in greater South Dunedin (Retreat and Accommodate). In these places, homes and businesses may need to make way for green/blue spaces such as wetlands and parks that would act as temporary ponding areas during flood events.

The second significant change could be through building more intensive housing in some safer locations in South Dunedin, so that people could stay in the area (Protect and Avoid). In those places, land-use could change from the low-density housing that currently covers most of South Dunedin to more intensive housing.

This report discusses the implications of these two key potential changes, drawing from current international and national research. It identifies key benefits and issues associated with creating new green/blue spaces and intensifying housing, and provides some solutions to address the issues. The final section proposes a framework to ensure the justice and wellbeing implications of these changes are considered in decision-making.

Above: Protect-Accommodate-Retreat-Avoid framework of adaptation approaches (Source: DCC)

Making space for water to return

For over a decade there have been increasing efforts in theory and practice to 're-nature' cities (Scott and Lennon 2016). Rather than attempting to control or tame nature in urban spaces, re-naturing refers to a shift towards working with nature to meet the needs of city dwellers and facilitate adaptation to more resilient urban forms. This re-naturing is labelled in different ways in different contexts and subdisciplines, but includes terms such as urban greening, green infrastructure, green and blue infrastructure, re-naturing, nature-based solutions, and biophilic cities. Research on climate adaptation has drawn on and contributed to this field, by specifically looking at how space can be made for water in urban areas that are prone to flooding, and/or at risk of sea-level rise.

Green (increased planting and vegetation) and blue (waterways and storage) infrastructure refers more specifically to increasing flood resilience through designed features that absorb, filtrate and hold water, such as swales, rain gardens, desealing parking areas, green roofs, wetlands, and restoring or daylighting urban streams (O'Donnell et al 2020). Again, terminology varies, including water-sensitive design, sustainable drainage systems (SUDS), and Sponge Cities. Examples can be seen in the Urban Nature Atlas (https://una.city).

Benefits of Green and Blue Infrastructure

Flood management that is designed around natural systems can generate multiple benefits, resulting in such approaches often being described as 'win-win' (Anguelovski et al 2019) (see Table 1).

Table 1

Direct benefits	For more details, see*
Reduced local temperature	Brown et al 2015; Cortinovis et al 2022; Gill et al 2007; O'Donnell et al 2020; Shade et al 2020; Shokry et al 2018.
Increased water retention, reduced runoff, better stormwater management	
Increased carbon storage	
Better air quality	
Improved biodiversity	
Increased physical activity	Anguelovski 2014; Bennett et al 2017; Connolly et al 2013; Nieuwenhuijsen 2021; Rigolon et al 2021.
Better mental health	
Reduced stress, increased sleep	
Enhanced social interactions	
Safe spaces for groups	
Improved general health	
Reduced health inequities in areas with lower socio-economic demographics	Anguelovski et al 2019; Harrison et al 2023.
Indirect benefits	
Reducing damp cold housing and associated health issues	Howden-Chapman et al 2023; Harrison et al 2023; Nieuwenhuijsen 2021a; Royal Society 2017; Tombs et al 2021.
Reduced contact with contaminated water and less water-borne disease	
Less anxiety about flooding	
Economic benefits from reduced threat of future floods in terms of property value, business continuity and security of tenure	

*Full references at the end of this report.

Some scholars caution that there is a difference between urban greening projects and flood management projects. Nieuwenhuijsen (2021) notes that the health benefits of green/blue initiatives are yet to be quantified and will depend on the type of infrastructures developed. Nevertheless, where blue and green infrastructure increases access to green space for residents, the health benefits should carry over.

Potential issues with Green and Blue Infrastructure

Despite the evidence of social and environmental benefits of urban greening and certain forms of green and blue infrastructure, some scholars argue that framing it as win-win may overlook some risks and, in some contexts, result in maladaptation (Anguelovski et al 2019). The most obvious risks are associated with the design of green and blue infrastructure. Care is required to ensure it is appropriate for the context, that it is well maintained, and if the benefits of green space are to accrue, then it must be accessible and useable as recreation spaces as well as its flood mitigation functions. But two further key risks have emerged in recent research.

Risks from relocation: A land-use change from housing to green and blue infrastructure will require the relocation of residents. Any change of this nature requires very careful consideration of the potential for some households to be more significantly impacted than others, even when the same criteria for redress is applied evenly. Land-use change from housing to other uses, even if staged over time and involving voluntary acquisition is likely to be challenging and controversial (Boston 2023). It will involve significant cost and may involve displacement and loss of land and buildings even if those residents remain in the same location. Some home owners are likely to leave the area even if there are options to remain. Some households may be financially disadvantaged depending on mechanisms for compensation employed. Those who rent have few formal avenues to protect their interests and wellbeing, and also tend to be those more susceptible to harm. There is a significant risk of mental health impacts from stress and uncertainty, disruption to sense of place and place-attachment, disruption to community support networks, and a change in community demographics.

Although clear mechanisms, funding and appropriate legislation for planned relocation are still lacking in Aotearoa New Zealand, there are several useful reports that highlight issues and options. In 2023, the New Zealand government released two documents, one from an independent working group (Expert Working Group on Managed Retreat 2023) and another document from the Ministry for the Environment (2022). In addition, the Environmental Defence Society has released a report exploring possible funding mechanisms (Peart et al 2023). Following from these reports, an inquiry by the Environment Select Committee into climate change adaptation was launched in August 2023 to inform the development of a proposed Climate Adaptation Bill. However, at the time of writing, the outcomes are unclear. The new coalition Government has transferred the inquiry to the Finance and Expenditure committee with further submissions being called. A detailed review of this material is beyond the scope of this brief except to note that the current lack of a national system for funding and compensating residential loss significantly increases the risks of maladaptation and unjust outcomes for specific groups who are already susceptible to harm. It also makes proactive planning more challenging. Moreover, for Māori land (whether in relation to land tenured as Māori land or owned by Māori individuals or organisations), a specific approach developed by Māori affected is required to ensure it does not become a continuation of colonial land taking and dispossession.

Risks of gentrification: A second key consideration for land-use change involving an increase in green and blue infrastructure is the risk of what has been described as ‘green gentrification’ or ‘climate gentrification’. Gentrification is a term that refers to the displacement and demographic changes associated with rapid increases in the market value of housing in specific neighbourhoods. Lack of affordability pushes rents up, forcing tenants of housing and small businesses to move if they can no longer afford the rent. Home owners may capitalise on the increased value by selling, or may be forced to sell as a result of increased costs associated with living in the area (for example, in insurance and rates) or because their community networks have been displaced as the character of the

neighbourhood changes. Wealthier people move in because they can afford the higher purchase prices or rents, and poorer people are displaced.

Early gentrification literature focused on the changes that occurred largely through market mechanisms. Some local government-led regeneration projects have been labelled state-led gentrification where they specifically redevelop the urban form to attract higher socio-economic groups, actively displacing lower income communities (Hochstenbach 2017; Lees and Ferreri 2016; Reades et al 2023). More recently, researchers refer to climate, eco- or green gentrification (Augelovski 2016; Keenan 2018) where climate adaptation has resulted in a surge in property value due to improved amenity values and reduced risk of flooding, forcing socio-demographic and community changes. Such processes further exacerbate the justice challenges of managed relocation, for example where one street is relocated and compensated at pre-adaptation market values, and their neighbours gain as property value increases from the same project.

Similarly, climate gentrification can arise when affluent but climate impacted communities move or property speculators purchase property in more 'affordable' but less climate risky neighbourhoods, and those areas begin to gentrify. This domino effect has been seen to cause displacement of lower socio-economic groups and communities of colour in areas that might otherwise have been relatively stable (for example in Miami, see Taylor and Aalbers 2022). As Planas-Carbonell et al (2023, p2) suggest, "deploying adaptation interventions does not only have equity implications at the planning and immediate implementation stage, but also over the long term when evaluating unequal mid- and long-term benefits of adaptation for socially vulnerable groups". Inequitable effects can occur by either 'commission' where adaptation planning initiatives directly displace poorer socio-economic groups or by 'omission', where such negative impacts occur inadvertently.

Decision-makers initiating climate adaptation therefore need to consider who adaptation initiatives benefit, what the benefits and costs of any adaptation projects are and who bears them. Such consideration should not just be in a general sense (which risks overlooking already marginalised groups), but for specific groups across communities affected (Anguelovski et al 2016). Research has also shown how different financial mechanisms can be drivers of gentrification, including land banking in less climate risky areas, and local authorities incentivising continued development in risky coastal areas explicitly to fund future adaptation projects (Taylor and Aalbers 2023). In the context of a particular urban area where flooding is predicted to increase in frequency and severity, this might mean that adjacent, more elevated areas increase in housing value. This demonstrates the need to understand local property market dynamics in order to be clear about potential drivers of different kinds of gentrification and their impacts, who is adversely affected, and how existing conditions might shape adaptation initiatives over the longer term.

Ways forward

While green and blue infrastructure, nature-based solutions and similar approaches to 'letting the water back in' can be seen as win-win in many ways, the above highlights the need for care to avoid maladaptation. Relocation and managed retreat is challenging and controversial. In a different way, gentrification research has often also been controversial, accused of not paying due attention to the benefits of improving neighbourhood environments and lived experience for residents who either move into them or who manage to stay.

Nevertheless, from a just adaptation lens, the literature highlights the complexity and risks of maladaptation and the lack of relative power and self-determination of households that have less resources. The question of who bears those benefits and negative consequences must be fully interrogated at a range of scales (household to wider urban area) and over time (short to long term).

Box 1

Approaches that may address issues and enhance benefits of green and blue infrastructure:

- Careful evidence-based design of green and blue infrastructure.
- Design in partnership with mana whenua to recognise past relationships with the whenua and to enhance these relationships where desired and possible.
- Engage the community in design and implementation, with specific and sensitive engagement with those directly affected.
- Ensure the design involves opportunities for recreation to facilitate health benefits.
- Resource ongoing maintenance of new green and blue infrastructure.
- Consider who bears benefits and costs at multiple scales of any relocation.
- Carefully model possible housing market changes factoring in a wide range of indicators, spatial and temporal scales to explore the risks of gentrification.
- Consider mechanisms for maintaining affordability (see below).

Increasing housing density

Urban intensification (sometimes called densification) refers to policies and planning rules that enable greater densities of urban dwelling. Intensification policies emerge in planning for a variety of reasons. In the context of climate change they may be oriented to urban sustainability, avoiding urban sprawl and its associated negative consequences - vehicle emissions, increased hard surfaces, loss of productive land and infrastructure requirements. Or, as may be the case in South Dunedin, urban intensification could be focused on accommodating households who have been relocated from within the area due to other associated adaptation measures (e.g. implementing green and blue infrastructure).

Urban intensification might involve high-density apartment style living or medium-density town house developments. How people feel about urban intensification varies around the world depending on historical context, culture and existing urban form. Medium density housing tends to be more acceptable in Aotearoa New Zealand (but see below).

Benefits of intensification

Over the last 50 years or so, urban growth management and sustainable urbanism have developed in both research and practice. Common models of sustainable urban development include transit-oriented development, smart growth, new urbanism and urban villages. All involve compact urban forms with increased density, street layouts that are easy to navigate and accessible, amenity features including local shops and green spaces, and access to public transport. Some also pay attention to building construction, such as passive heating design and green building materials.

Where housing quality is poor on average, and for households that are located higher in the social deprivation index, intensification provides an opportunity for multiple benefits so long as the benefits directly translate to those households and are designed in to the new build developments (see table 2).

Table 2

Direct benefits of new, more intensive housing	For more details, see
Improved health from dry healthy homes	Allen and O'Donnell 2020; Ancell and Thompson-Fawcett 2008; Dempsey et al 2012; Haarhoff et al 2016; Howden-Chapman et al 2023; Lehmann 2016; Opit et al 2020.
Increased accessibility (for example for the elderly or those with disabilities)	
Shared community facilities that can increase social cohesion	
Increased amenity value and improved urban form	
Reduced carbon emissions from sustainable building design	Banister 2011; Bui et al 2023; Dembski et al 2020; Ibraeva et al 2020; Knowles et al 2020; Nieuwenhuijsen 2020, 2021b;
Reduced car use resulting from careful urban design around public transport and local shops	
Incorporation of green and blue infrastructure in the design (e.g. swales, rain gardens, green roofs).	As above in table 1.
Incorporation of permanent affordability mechanisms (see below)	Austin 2023; Penny et al 2023; Mitchell et al 2023.

Issues and risks of intensification

Despite the range of benefits to intensification, there are significant challenges to achieving them that are structural, cultural and institutional. The current planning system tends to be developer led, allowing a high degree of market autonomy for developers to deliver what they deem will sell and be profitable. The cost of construction in Aotearoa New Zealand creates barriers to quality sustainable building (Bui et al 2023). Moreover, it is uncommon and challenging for a local authority to be highly prescriptive in the design and construction of new developments. Factoring in permanent affordability into housing developments is not economically advantageous for developers. This is compounded by what some have described as the financialization of the housing market, where housing has become increasingly commodified and an asset, rather than a home providing security and family life (Broome 2008; Opit, Witten and Kearns 2020). Furthermore, in Aotearoa New Zealand, intensification remains challenging in terms of its social acceptability. We focus on two key interrelated risks that are tied to these structural constraints – the attractiveness of medium density housing, and its affordability.

Attractiveness of medium density housing: Urban development in Aotearoa New Zealand has historically been low density, driven by demand for single story dwellings with a garden space (Opit, Witten and Kearns 2020). This is a historical legacy of colonisation where many early settlers sought to escape poor, overcrowded living conditions in urban centres in industrial Britain, with the promise of space, property and autonomy. Most urban form is consequently low density, which correlates with high car dependence and associated emissions. In addition, there are strongly held beliefs in the rights of property owners reflected in institutional, legal frameworks and 'light touch' regulation on the housing market (Kelsey 2015). Yet there is some evidence of shifts among young people and older generations who, given constrained choices in housing (due to high cost and low supply), may choose higher density where additional amenities and community features are nearby (Allen 2016; Opit, Witten and Kearns 2020).

This cultural and historical context reinforces the desirability of and aspiration for home ownership, and has implications for the culture around renting a home. For example, for those who are not eligible for social (state) housing, private renting is not seen as a home for life by either renters or landlords, but rather a transitional step into home ownership. For many, though, this transition is likely to be longer, and some may never become home-owners given housing prices.

This suggests that renting in future is likely to be far more common.

Affordability: The emergence of 'generation rent', both in Aotearoa New Zealand and abroad (Eaqub and Eaqub 2015; Hoolachan et al 2017; Opit, Witten and Kearns 2020) links directly to questions of affordability. Poor quality older housing is more affordable, but it is associated with poor health and wellbeing. These risks are exacerbated by fuel poverty, low incomes, and other aspects of individual lives that render some people more vulnerable like older groups and those with chronic health conditions or disabilities (Howden-Chapman et al 2023). Such effects will be compounded by climate impacts such as increased storm events, rising ground water, flooding and sea level rise and affect both renters and home owners.

Renters typically have poorer health outcomes than home-owners, but this can be lessened when rental accommodation is supported by Government programmes and policies (Howden-Chapman et al 2023). The risks are further reduced when the state actively protects renter rights such as in Germany. Research also shows that housing insecurity and its consequences, such as being forced to relocate, contributes to poor health outcomes, including a negative effect on mental health.

These issues highlight the potential for benefits from careful regeneration projects where land-use change results in improved housing for those relocated. However, there are also potential inequities for those 'left behind' who are not required to relocate but remain in poor quality housing.

Additionally, 'affordable' options in most new developments are not affordable for those higher in the social deprivation index. Although housing affordability varies across the country, most urban centres have experienced significant housing price increases in the last decade. Furthermore, like many other post-industrial nations, issues of housing affordability are likely to increase in the future (Baker et al 2020). Housing unaffordability is caused by and generates structural inequalities – that is, inequalities that arise from social and economic systems that are deeply entrenched in the institutional, political and economic systems of the country. Homeowners are more able to raise equity and have assets to pass on to future generations, creating intergenerational opportunities for wealth accumulation. Conversely, where house prices are unaffordable, it becomes increasingly difficult to accumulate sufficient capital to move into home ownership. In addition, there is research that demonstrates how much harder it is for long-term renters to 'settle' and feel at home (Hoolachan et al 2017). In the absence of interventions in these systems, wealth inequalities associated with housing affordability intersect with health inequalities discussed above, and these are likely to worsen as climate impacts increase in severity and frequency, and can be further exacerbated by poorly executed adaptation initiatives involving land-use change.

Ways forward

Questions of affordability must be addressed to enable just adaptation from land-use change in South Dunedin. Many commonly used solutions to affordability such as subsidised purchase prices or low-cost mortgage lending to allow first time homeowners into the market only give temporary relief from escalating property prices. They also do not address the intergenerational injustice for those who cannot afford to buy, nor are they likely to mitigate the risk of climate gentrification.

However, there are some models of development that provide for permanent affordability. This is where the property remains affordable rather than returning to the open market when the first owners sell. However, such solutions require greater intervention in the property market, such as through the use of land trusts, or increases in social housing provision, or regulation of the private rental sector such as the use of rent controls (see Austin 2023; Penny et al 2023; Mitchel et al 2023) .

Box 2

Approaches that may address some of the risks of housing intensification:

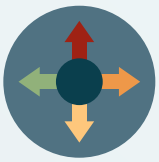
- Any land-use change that removes poor quality housing and replaces it with new more dense developments must provide for affordable alternatives for both renters (social and private) and owners who are displaced, as well as consider the broader impacts for the wider area.
- Urban design features and density must be appropriate to context and to occupants' preferences.
- Effective community engagement is needed to understand community values and preferences for dwellings, urban form, community facilities and overall design.
- Benefits of medium density living may need to be communicated through an education and socialisation process.
- Include sustainable and passive building design to ensure a high degree of sustainability and healthy homes.
- Introduce permanent affordability mechanisms to manage risk of gentrification and avoid losses to those subject to relocation.

Just Adaptation

The discussion above makes it clear why any decisions should consider the broad implications (for harm or betterment) of any course of adaptation action. From a 'just adaptation' perspective, land-use changes should be beneficial to individuals, families, iwi and hapū, and the community (materially, socially and culturally) and should definitely not result in people being significantly disadvantaged (see Bray et al 2023). Using a justice framework for decision-making can help maintain environmental, economic, social and cultural wellbeing, and mitigate the risk of maladaptation. The framework below draws on five dimensions of justice, offering high-level considerations for decision-making.

There are many frameworks for just adaptation. Many identify three key dimensions of justice (as discussed in environmental justice literature) – **procedural**, **distributive** and **recognition** justice. In relation to climate change **intergenerational** justice is also important given the long-term impacts of climate change and the responsibility of current generations for future generations for both past emissions and current actions. In Aotearoa New Zealand, honouring **Te Tiriti o Waitangi** is a further key dimension of justice.

Procedural



Distributive

Recognition

Intergenerational

Te Tiriti o Waitangi

Table 3:

Framework for including justice concepts in adaptation decision-making
(adapted from Bray, Stephenson and Bond 2023)

Dimension of justice	Explanation	Key questions associated with the land-use change proposed
Procedural	Those affected by adaptation should have a voice and role in decisions taken.	Who is affected directly by the land-use change? Who is indirectly affected? How are affected people involved in decision-making processes? Do those affected have an effective voice? Are engagement processes robust, inclusive, transparent and built on trust?
Distributive	Benefits and impacts of any adaptation measures are evenly distributed.	What are the economic, social, and cultural benefits and who gains from the land-use change? What are the economic, social and cultural costs, and who bears them? Who is directly and indirectly materially affected and how? What are the environmental impacts and benefits?
Recognition	Structural processes embedded in institutions, economic-political-social systems, and historic and contemporary marginalisations are accounted for and addressed.	What are existing inequalities in the areas and surroundings where the land-use change is proposed? Are existing inequalities exacerbated? Will the same groups that have been historically disadvantaged be significantly affected? How can outcomes for historically and currently marginalised groups be improved?
Inter-generational	Future generations are not negatively impacted and will benefit from decisions taken today.	Will the land-use change improve the likely conditions for future generations? Are intergenerational inequities likely to be worsened? How can outcomes for future generations be improved?
Te Tiriti	Te Tiriti o Waitangi is honoured and upheld, and decisions affecting Māori are taken by or in partnership with and endorsed by Māori.	Is the mana of mana whenua upheld? Have Māori been involved in co-designing adaptation? Have Māori been resourced sufficiently to engage in a way that they deem appropriate? Has the Ihirangi Rauora framework[1] been considered and applied (if appropriate to mana whenua)? How are Māori interests, values and knowledge affected? What are the past and present relationships of Māori with the specific place and area subject to land-use change?

1 Ihirangi Ruaora is a framework for climate change adaptation through a te ao Māori lens.

Table 3 provides a definition of each of these five dimensions of justice, and some key questions that decision-makers should consider in relation to adaptation initiatives. While there are significant complexities associated with climate adaptation that involves land-use change, the risks of maladaptation can be reduced through decision-making that prioritises and is guided by justice principles.

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References

Allen, N. M. (2016). Quality of urban life and intensification: Understanding housing choices, trade-offs, and the role of urban amenities, (Doctoral dissertation, ResearchSpace@ Auckland).

Allen, N., Haarhoff, E., & Beattie, L. (2018). Enhancing liveability through urban intensification: The idea and role of neighbourhood. Cogent Social Sciences, 4(1), 1442117.

Allen, N. and O'Donnell, G. (2020). *Creating improved housing outcomes: Medium- density housing liveability and wellbeing literature review*. BRANZ Study Report SR431. Judgeford, New Zealand: BRANZ Ltd.

Ancell, S., and Thompson-Fawcett, M. (2008). The social sustainability of medium density housing: A conceptual model and Christchurch case study. *Housing studies*, 23(3), 423-442.

Anguelovski, I. (2014). *Neighborhood as refuge: Community reconstruction, place remaking, and environmental justice in the city*. MIT press.

Anguelovski, I., Connolly, J. J., Garcia-Lamarca, M., Cole, H., & Pearsall, H. (2019). New scholarly pathways on green gentrification: What does the urban 'green turn' mean and where is it going? *Progress in human geography*, 43(6), 1064-1086.

Anguelovski, I., Shi, L., Chu, E., Gallagher, D., Goh, K., Lamb, Z., ... & Teicher, H. (2016). Equity impacts of urban land use planning for climate adaptation: Critical perspectives from the global north and south. *Journal of Planning Education and Research*, 36(3), 333-348.

Anguelovski, I. (2014). *Neighborhood as refuge: Community reconstruction, place remaking, and environmental justice in the city*. MIT press.

Austin, P. (2023) *Community Land Trusts: Performance and Relevance for Aotearoa New Zealand, Building Better Homes, Towns and Cities: Affordable Housing for Generations*, BBHTC, August 2023, Wellington: AHFG, BBHTC. https://www.buildingbetter.nz/wp-content/uploads/2023/09/Community-Land-Trust-Report-FINAL-2-August-2023.pdf

Baker, E., Pham, N. T. A., Daniel, L., & Bentley, R. (2020). New evidence on mental health and housing affordability in cities: A quantile regression approach. Cities, 96, 102455.

Banister, D. (2011). Cities, mobility and climate change. *Journal of transport geography*, 19(6), 1538-1546.

Bennett, H., Jones, R., Keating, G., Woodward, A., Hales, S., & Metcalfe, S. (2014). Health and equity impacts of climate change in Aotearoa-New Zealand, and health gains from climate action. *Migration*, 3, 12-16.

Bray, A., Stephenson, J. and Bond, S. (2023). Just Adaptation: what does justice mean, and how can it guide adaptation planning and decision-making? Summary report, Centre for Sustainability, University of Otago. https://hdl.handle.net/10523/15268

Broome, A. (2008). Neoliberalism and financial change: The evolution of residential capitalism in New Zealand. *Comparative European Politics*, 6, 346-364.

Brown, R. D., Vanos, J., Kenny, N., & Lenzholzer, S. (2015). Designing urban parks that ameliorate the effects of climate change. L*andscape and Urban Planning*, 138, 118-131.

Bui, T. T. P., MacGregor, C., Wilkinson, S., & Domingo, N. (2023). Towards zero carbon buildings: Issues and challenges in the New Zealand construction sector. *International Journal of Construction Management*, 23(15), 2709-2716.

Connolly J.J., Svendsen E.S., Fisher D.R. and Campbell L.K. (2013). Organizing urban ecosystem services through environmental stewardship governance in New York City. *Landscape and Urban Planning* 109: 76–84.

Cortinovis, C., Olsson, P., Boke-Olén, N., & Hedlund, K. (2022). Scaling up nature-based solutions for climate-change adaptation: Potential and benefits in three European cities. *Urban Forestry & Urban Greening*, 67, 127450.

Dembski, S., Hartmann, T., Hengstermann, A., & Dunning, R. (2020). Enhancing understanding of strategies of land policy for urban densification. *Town Planning Review*, 91(3), 209-216.

Dempsey, N., Brown, C., & Bramley, G. (2012). The key to sustainable urban development in UK cities? The influence of density on social sustainability. *Progress in Planning*, 77(3), 89-141.

Eaqub, S., & Eaqub, S. (2015). *Generation rent: rethinking New Zealand's priorities* (Vol. 30). Bridget Williams Books, Wellington.

Expert Working Group on Managed Retreat. (2023). *Report of the Expert Working Group on Managed Retreat: A Proposed System for Te Hekenga Rauora/Planned Relocation*. Expert Working Group on Managed Retreat, Wellington.

Gill, S. E., Handley, J. F., Ennos, A. R., & Pauleit, S. (2007). Adapting cities for climate change: the role of the green infrastructure. *Built environment*, 33(1), 115-133.

Haarhoff, E., Beattie, L., & Dupuis, A. (2016). Does higher density housing enhance liveability? Case studies of housing intensification in Auckland. *Cogent Social Sciences*, 2(1), 1243289.

Harrison, S., Macmillan, A., Bond, S., & Stephenson, J. (2023). Participatory modeling for local and regional collaboration on climate change adaptation and health. *The Journal of Climate Change and Health*, 12, 100235.

Hochstenbach, C. (2017). State-led gentrification and the changing geography of market-oriented housing policies. *Housing, Theory and Society*, 34(4), 399-419.

Hoolachan, J., McKee, K., Moore, T., and Soaita, A.M., (2017) 'Generation rent' and the ability to 'settle down': economic and geographical variation in young people's housing transitions, *Journal of Youth Studies*, 20:1, 63-78.

Howden-Chapman, P., Bennett, J., Edwards, R., Jacobs, D., Nathan, K., & Ormandy, D. (2023). Review of the impact of housing quality on inequalities in health and well-being. *Annual review of public health*, 44, 233-254.

Howden-Chapman, P., Crane, J., Keall, M., Pierse, N., Baker, M. G., Cunningham, C., ... & Zhang, W. (2024). He Kāinga Oranga: reflections on 25 years of measuring the improved health, wellbeing and sustainability of healthier housing. *Journal of the Royal Society of New Zealand*, 54(3), 290-315.

Ibraeva, A., de Almeida Correia, G. H., Silva, C., & Antunes, A. P. (2020). Transit-oriented development: A review of research achievements and challenges. *Transportation Research Part A: Policy and Practice*, 132, 110-130.

Keenan, J. M., Hill, T., & Gumber, A. (2018). Climate gentrification: from theory to empiricism in Miami-Dade County, Florida. *Environmental Research Letters*, 13(5), 054001.

Kelsey, J. (2015). *The FIRE economy: New Zealand's reckoning*. Bridget Williams Books, Wellington.

Knowles, R. D., Ferbrache, F., & Nikitas, A. (2020). Transport's historical, contemporary and future role in shaping urban development: Re-evaluating transit oriented development. *Cities*, 99, 102607.

Lees, L., & Ferreri, M. (2016). Resisting gentrification on its final frontiers: Learning from the Heygate Estate in London (1974–2013). *Cities*, 57, 14-24.

Lehmann, S. (2016). Sustainable urbanism: towards a framework for quality and optimal density? *Future cities and environment*, 2, 1-13.

Ministry for the Environment (2023). *Te kimi kāinga rua ā-hapori me te tahua urutau: Ngā take me ngā kōwhiringa - Community-led retreat and adaptation funding: Issues and options*. Manatū Mō Te Taiao - Ministry for the Environment, Wellington.

Mitchell, I., Glaudel, C., Berghan, J., du Plessis, D, (2023) Enablers and barriers impacting on development of affordable alternative housing tenures in New Zealand, report prepared for BRANZ by Livingston and Associates Ltd, BRANZ, Porirua. https://d39d3mj7qio96p.cloudfront.net/media/documents/ER81_Affordable_alternative_housing_tenures.pdf

Nieuwenhuijsen, M.J., (2020). Urban and transport planning pathways to carbon neutral, liveable and healthy cities. A review of the current evidence. *Environment International*, 140, 105661.

Nieuwenhuijsen, M. J. (2021a). Green infrastructure and health. *Annual Review of Public Health*, 42, 317-328.

Nieuwenhuijsen, M. J. (2021b). New urban models for more sustainable, liveable and healthier cities post covid19; reducing air pollution, noise and heat island effects and increasing green space and physical activity. *Environment international*, 157, 106850.

O'Donnell, E., Thorne, C., Ahilan, S., Arthur, S., Birkinshaw, S., Butler, D., ... & Wright, N. (2020). The blue-green path to urban flood resilience. *Blue-Green Systems*, 2(1), 28-45.

Opit, S., Witten, K., Kearns, R., (2020) Housing pathways, aspirations and preferences of young adults within increasing urban density, *Housing Studies*, 35(1) 123-142

Peart, R., Tombs, B.D., Marshall, K. (2023). *Aotearoa New Zealand's Climate Change Adaptation Act: building a durable future. Options and models for managed relocation policy*. Working Paper 3. Environmental Defence Society Incorporated, Auckland.

Penny, G., Logan, A., Olin, C. V., O'Sullivan, K. C., Robson, B., Pehi, T., ... & Howden-Chapman, P. (2024). A Whakawhanaungatanga Māori wellbeing model for housing and urban environments. *Kōtuitui: New Zealand Journal of Social Sciences Online*, 19(2), 105-131.

Planas-Carbonell, A., Anguelovski, I., Oscilowicz, E., Pérez-del-Pulgar, C., & Shokry, G. (2023). From greening the climate-adaptive city to green climate gentrification? Civic perceptions of short-lived benefits and exclusionary protection in Boston, Philadelphia, Amsterdam and Barcelona. *Urban climate*, 48, 101295.

Reades, J., Lees, L., Hubbard, P., & Lansley, G. (2023). Quantifying state-led gentrification in London: Using linked consumer and administrative records to trace displacement from council estates. *Environment and Planning A: Economy and Space*, 55(4), 810-827.

Rigolon, A., Browning, M. H., McAnirlin, O., & Yoon, H. (2021). Green space and health equity: a systematic review on the potential of green space to reduce health disparities. *International journal of environmental research and public health*, 18(5), 2563.

Scott, M., and Lennon, M., (2016) Nature-based solutions for the contemporary city, Interface in *Planning Theory and Practice* 17(2) 267-300. http://dx.doi.org/10.1080/14649357.2016.1158907

Shade, C., P. Kremer, J. S. Rockwell, and K. G. Henderson. 2020. The effects of urban development and current green infrastructure policy on future climate change resilience. *Ecology and Society* 25(4):37.

Shokry, G., Anguelovski, I., Connolly, J.J., Maroko, A., & Pearsall, H. (2022) "They Didn't See It Coming": Green Resilience Planning and Vulnerability to Future Climate Gentrification, *Housing Policy Debate*, 32:1, 211-245,

Taylor, Z. J., & Aalbers, M. B. (2022). Climate gentrification: risk, rent, and restructuring in Greater Miami. *Annals of the American Association of Geographers*, 112(6), 1685-1701.

Te Apārangi Royal Society (2017) *Human Health Impacts of Climate Change for New Zealand – Evidence Summary*, Te Apārangi Royal Society, Wellington. https://www.royalsociety.org.nz/assets/documents/Report-Human-Health-Impacts-of-Climate-Change-for-New-Zealand-Oct-2017.pdf

Tombs, B.D., Stephenson, J., France-Hudson, B, Ellis, E. (2021). Property Purgatory. *Policy Quarterly*, 17(1): 50-56.