



OCEAN & CLIMATE
PLATFORM



Special Report

MANAGED RETREAT: PREPARING COASTAL CITIES FOR SEA LEVEL RISE



This document was produced by the Ocean & Climate Platform.
The following were involved in the production:

Coordination:

Théophile Bongarts, Anaïs Deprez, Sarah Palazot (Ocean & Climate Platform).

Writing and production:

Sarah Palazot, Théophile Bongarts, Anaïs Deprez, Lisa Devignol, Maud Chevalier with the support of Gauthier Carle, Loreley Picourt and Raphaël Cuvelier (Ocean & Climate Platform).

Sea'ties network of experts:

Camille André (Administrative region of Nouvelle Aquitaine), Virginie Bonot (Municipality of Petit-Bourg), Christophe Brière (EGIS), Cheryl Hapke (Fugro), Vassiliki Kourafalou (University of Miami), Al Hassane Loum (University Gaston Berger of Saint-Louis), Amon Martin (Thames Coromandel District Council), Nadia Pinardi (University of Bologna), Gaël Perrochon (GIP Littoral Nouvelle Aquitaine), Antoine Petitjean (Atelier Philippe Madec), Hélène Rey Valette (University of Montpellier), A.R. Siders (University of Delaware), Matthieu Suire (Cerema), Fernanda Terra Stori (University of Bologna), Torsten Thiele (ORRAA), Bart Van Den Hurk (Deltares).

The Ocean & Climate Platform Knowledge Dissemination Working Group:

Corinne Copin (Génération Mer), Céline Liret (Océanopolis), Danielle McCaffrey (Waves of Change), Gabriel Picot (Aquarium Tropical de la Porte Dorée).

Article writing:

Marielle Court.

Infographics and illustration:

Lygie Harmand.

Layout:

Natacha Bigan.

Cover photo:

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About the Ocean & Climate Platform

The Ocean & Climate Platform (OCP) is dedicated to fostering dialogue and collaboration between the scientific community, civil society, and policymakers. It unites over 100 global organisations—including research institutes, NGOs, foundations, scientific and educational centres, businesses, and local authorities—to promote scientific knowledge and advocate for ocean-based solutions in the fight against climate change. As a leading voice in the ocean-climate community, the OCP holds observer status at key UN conventions on climate (UNFCCC) and biodiversity (CBD) and participates in the French governmental review of IPCC reports.

Sea'ties, an initiative of the Ocean & Climate Platform

The Sea'ties initiative aims to facilitate the development of public policies and the implementation of adaptation solutions to support coastal cities facing rising sea levels. Its main objectives are to compile and disseminate knowledge, collect and share experiences, and support political action for the sustainable adaptation of coastal cities.

Sharing knowledge on managed retreat for coastal cities in response to rising sea levels

To promote awareness and understanding of ocean-climate-biodiversity interactions, the OCP brings together a community of scientists and science communication experts to produce accessible content for decision-makers and the general public. At the intersection of its missions to disseminate knowledge and advocate for the adaptation of coastal cities, this special report explores a critical yet often misunderstood adaptation strategy at the heart of scientific, political, and societal debates: managed retreat.

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KEY MESSAGES

- 1

Managed retreat is a **strategic and effective adaptation solution** to the inexorable sea level rise and the intensification of extreme weather events. **It can be defined as a planned effort to permanently move people, buildings, and activities away** from vulnerable coastal areas.
- 2

Managed retreat provides **an opportunity to reorganise and shape a desirable future for coastal cities** and regions, taking into account the aspirations of societies and the ongoing changes of biodiversity and the climate.
- 3

Managed retreat has to be **phased over time, progressing in stages towards larger-scale and transformational relocations** through transitional and supportive policies.
- 4

Managed retreat is a **major issue of public policy. It requires coordination at every level – from local to international** – to ensure coherent decisions, to mobilise suitable political, legal and financial levers, and to move past reactive and fragmented approaches.
- 5

Managed retreat relies on **the engagement of populations and stakeholders** concerned in order to shape, decide, and implement sustainable and acceptable relocation policies that do not aggravate vulnerabilities and injustices.

DEEP-DIVE ON MANAGED RETREAT: CHALLENGES, APPROACHES, AND METHODS



INTRODUCTION

As ice sheets and glaciers melt, and warming waters expand under the effects of climate change, sea levels are rising at an accelerating rate. Throughout the world, in a high-emission scenario, sea levels could increase by more than a metre by the year 2100. This progressive increase, combined with sudden and extreme climate events (strong tides, storms, tropical cyclones, etc.) is threatening coastal cities with loss of land, flooding, erosion, salinisation of soils, and the degradation of ecosystems. Projections of future sea level rise entail many uncertainties and local variations, which limit our capacity to prepare. And yet one thing is certain: sea level rise is irreversible over the coming hundreds if not thousands of years. **Faced with the inevitability of this phenomenon, certain areas will become uninhabitable and the relocation of people, buildings, infrastructures and activities will sometimes be inevitable.**

As underlined by the Special Report of the Intergovernmental Panel on Climate Change (IPCC) on the Ocean and Cryosphere in a Changing Climate (SROCC), managed retreat is an adaptation solution to sea level rise. Unlike emergency management, **managed retreat is defined as a planned effort to permanently relocate people, assets, and infrastructure away from areas at risk.**

The notion of “managed retreat” in fact covers a wide range of measures that can be developed and coordinated according to the current or future situation of a locality. **Managed retreat includes public policies such as: compensation and buyouts of private properties, mandatory resettlements, and revision of urban planning to provide setback zones, restrictions on rebuilding, and downzoning to encourage decreases in asset and population exposure over time in hazardous areas.**

Managed retreat policies affect small communities, individual assets, and large populations in equal measure. Hence, they **must be coordinated at every level, from local to national, and draw on international cooperation.** This necessity for coordination was recognised as early as 2010 at the COP16 of the United Nations Framework Convention on Climate Change (UNFCCC), encouraging States to take “measures to enhance understanding, coordination and cooperation with regard to climate change induced [...] planned relocation, where appropriate, at national, regional and international levels”. A measure, moreover, that the Sendai Framework 2015-2030 identified as a tool for achieving disaster risk reduction objectives.

Because of its complexity, managed retreat is a topic which attracts much debate and resistance among both the populations concerned and policy and decision makers. To better anticipate, design, and implement this adaptation strategy, it is essential to bring about changes in narratives and to work towards a shared understanding of the issues and the methodologies that can accompany its deployment. Why? Because managed retreat is more than just a response to sea level rise: **it is an opportunity to profoundly and sustainably transform coastlines, to the benefit of both societies and biodiversity.**

With this in mind, the Ocean & Climate Platform has designed this special report to be a practical, accessible and illustrated tool, exploring four major questions:

1. *Why choose managed retreat as an adaptation solution?*
2. *At what spatial scales should managed retreat policies be carried out?*
3. *Why and how to implement this adaptation strategy in a dynamic way?*
4. *How to ensure that managed retreat is fair and sustainable?*

1. The term “managed retreat” is often associated with any one of a number of variations, such as managed realignment, planned relocation, resettlement, etc. The merits of one term compared to another are still up for discussion among scientists and decision makers, especially because of the more or less positive connotations they convey. Unlike “managed retreat” and its variants, the French term *recomposition spatiale* (lit. spatial reconstruction) is not restricted solely to the relocation of people and infrastructures threatened by the sea level rise; instead it evokes the notion of rearranging and reinventing given areas on a much larger scale to ensure their sustainable adaptation to climate change. When coastal cities and districts commit to such policies, it can be important to debate the use of a particular expression in order to facilitate its acceptance. Nevertheless, for the purposes of this English version, we have retained the well-known term “managed retreat”.



WHY?

CHOOSING MANAGED RETREAT AS AN ADAPTATION SOLUTION

Managed retreat is neither a last resort nor a failure of adaptation policies. It is an adaptation strategy that must be prepared for in the same way as other options for protecting and accommodating infrastructures. In addition to making populations and assets safe, managed retreat is a territorial project that can drive social, economic, institutional and environmental changes. In other words, managed retreat presents an opportunity to collectively design a more desirable future for coastal cities.

Choosing the most appropriate response to inevitable but uncertain changes

↳ Reduce exposure to coastal risks effectively

While protective measures (dykes, sand replenishment, etc.) can provide temporary safety for people and assets, their effectiveness diminishes with the acceleration of sea level rise and the intensification of extreme weather

events. Accordingly, the **risk of protective structures being breached or overtopped³** is a serious threat to communities and infrastructure. Such measures can also have negative or unintended effects. They can disrupt the movement of sediment along the coast and **exacerbate erosion in neighbouring locations**. In addition, protective measures tend to **create a false sense of security** among populations and encourage them to continue to build houses and develop activities behind defences, despite the increasing risks. Lastly, protective measures incur **costs pertaining to construction, maintenance and improvements**, and are thus becoming more and more inaccessible for many municipalities. Compared to the economic, social and environmental costs

2. Adaptation strategies for coastal cities and settlements can be typically characterised into categories of protection, accommodation, advancing and retreat. Accommodation involves measures intended to reduce exposure while allowing for the continuous occupation of coastal areas, such as elevating and floodproofing infrastructure, improving water drainage systems, and installing early warning systems.

3. L"Overtopping" describes a situation where water levels exceed the height of the defensive structures, thus flooding the land behind them.

of maintaining infrastructures and populations in vulnerable areas, managed retreat is sometimes a wiser option over time. When prepared and inclusive, managed retreat may be the most appropriate measure for reducing risk exposure.

↳ *Combine and sequence managed retreat with other measures*

Managed retreat **does not exclude other strategies**, and combinations of solutions can be phased through time and space. In the short term, existing defences can be maintained to ensure the safety of populations and their assets while preparing over the medium and long terms, to move infrastructure and inhabitants to safer areas further inland. Next, the dismantling of defences and the demolishing of assets can allow for the rehabilitation and restoration of ecosystems that can act as buffer zones to limit the impact of erosion and marine flooding.

Redesigning coastal cities to create a desirable future

↳ *Work towards new territorial models*

Managed retreat involves profound changes for cities and their inhabitants who maintain strong economic, political, emotional, and cultural ties to the coast. However, managed retreat is also an opportunity to reorganise cities profoundly, and thus **improve living conditions for everyone, in particular the most vulnerable**. Authorities must be vigilant to ensure that these changes take into account the environment and the aspirations of local communities to avoid “maladaptations” that are beneficial to some while detrimental to others.

↳ *Reconnect adaptation to ecosystems*

Managed retreat questions the effectiveness and relevance of all-defensive approaches. In contrast, managed retreat can be an opportunity to develop a **new risk culture**, more attuned to the coast’s natural dynamics and the valuable services ecosystems provide. For example, relocation can allow for the **restoration of ecosystems** that have been degraded by urbanisation, such as salt marshes, which absorb wave power and limit the impacts of flooding. In this regard, focusing on densification over urban sprawl is essential to limit the encroachment on natural areas.

↳ *Recentre social justice*

Managed retreat often **reveals inequalities** that already exist within a locality, and when overlooking the most vulnerable groups, it **is likely to aggravate them**. This is the case when it comes to sharing the cost of relocations between households, in particular the payment of compensation to main and second-home owners. Yet, managed retreat can be **an opportunity to correct such inequalities**. To be acceptable, managed retreat strategies must reflect the aspirations of communities by offering them new opportunities on the coast and in the hinterland, such as easier access to property ownership, improved mobility, and new cultural and community spaces.

WHERE?

SPATIAL SCALES OF MANAGED RETREAT

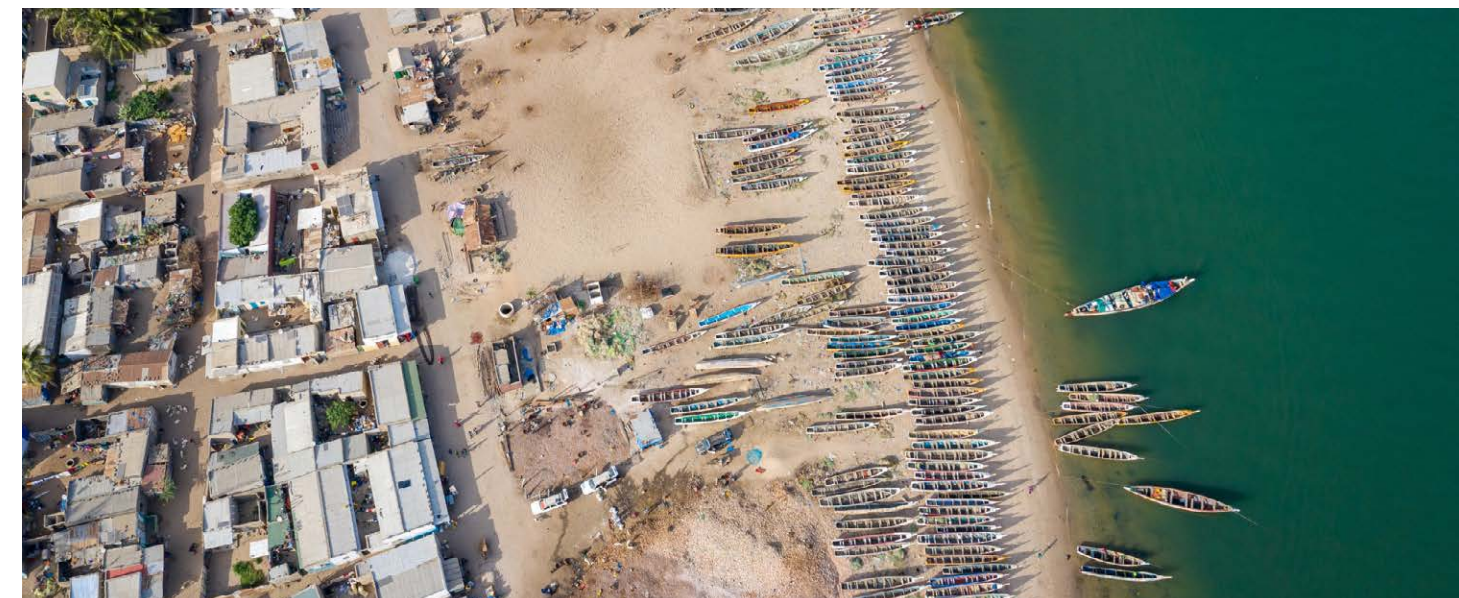
What do we relocate?

Relocation applies to various types of assets and stakeholders: public property and services (schools, hospitals), housing (public, private and informal; main and second homes), economic activities (industries, hotels), and infrastructure (roads, railways, power lines, drainage systems.). For a municipality, relocating such assets and stakeholders has social, economic, institutional, legal, and even environmental implications of varying degrees.

Where do we undertake relocation?

↳ *Map areas where relocation needs to be done*

The first factor is risk exposure, based on an accurate assessment of the **current and future vulnerabilities of any given area**. Once these vulnerabilities have been mapped, choosing the appropriate responses requires a comparison of the **social, economic, and environmental costs**. For example, while the maintenance and improvement of defensive structures in highly urbanised and densely populated areas is



In Guadeloupe and Martinique, public consultations precede relocations



© Camille PASQUIER, Ville Petit Bourg

On the islands of Guadeloupe and Martinique, shoreline retreat and collapsing cliffs are now well-known risks. Two localities are particularly affected: Petit Bourg in Guadeloupe and Le Prêcheur in Martinique. Both islands have instigated pilot projects to rehouse populations and thus ensure their safety.

The projects are inevitably different but they share at least one similarity: the idea that involving as many of the inhabitants as possible through early anticipation and regular explanations and dialogue is essential.

Studies in Petit Bourg have shown that, due to prohibitive costs, demolishing rather than consolidating the cliff was the preferred option to safeguard housing. Field assessments determined that around eighty houses, home to forty families, were situated in areas posing a serious risk to human life.

“The co-designing period was vital,” said Virginie Bonot, director of Urban Planning and Development for Petit-Bourg. “During the initial phase we organised public meetings which brought together the entire project team, including representatives and technicians from the town council, the State and the 50 Pas Géométriques Agency, as well as engineers from the French Geological Services (BRGM). Additionally, two representatives from the social housing development body, the MOUS, played an essential role in leading individual meetings with families during the second phase

of consultation. These two people from the MOUS established a bridge between the project team and the families to facilitate document collection and keep families informed about meetings and project progress. All inhabitants could contact them directly by telephone. We were lucky to have these people right from the very beginning of the operation, for almost five years!”

Such close contact with the population allowed the team to defuse any disputes, to reassure whenever necessary, and to build trust.

Approximately 200 km away, in the municipality of Le Prêcheur, Martinique, inhabitants find themselves trapped between the encroaching sea and the island’s active volcano. The inhabitants are very familiar with the lahars, these torrential mudflows laden with volcanic debris which race down the volcano’s sides.

“We are going to build a school, which will double as an emergency shelter for the inhabitants, and new housing for those who have to move,” says architect and urban planner Antoine Petitjean who is in charge of the project. The project aims to be an example for France’s overseas territories, offering attractive housing.

“We couldn’t pursue this project without involving the population right from the start,” continues the architect, in particular for choosing locally-sourced, sustainable

materials for the future houses (wood, bamboo, gabion walls and rammed earth) and innovative industrial processes. “For more than a year, between 2019 and 2020, we organised two-week-long meetings every two months. We set up forums for working and retired farmers, and students. We established an overview of their lifestyles and surveyed their self-built homes. This allowed us to understand what the inhabitants considered to be essential and what was absolutely necessary to reproduce in the new neighbourhood.”

Persuading the inhabitants to relocate wasn’t the hardest part of the project. The lahars of 2018 were enough to convince them to move away from the coast towards the *mornes**.

“Six years have passed since community engagement began and the current climate of hope generated by the project,” warns Antoine Petitjean.

Not all the problems have been resolved. In Martinique, where almost all the technical aspects of the first phase of works are in place and ready to launch, the green light has yet to be given because of a lack of institutional and regulatory support for the project: “If we wait too long, we risk undermining trust, especially if a disaster occurs before the project implementation,” says Antoine Petitjean.

In Guadeloupe, 31 of the 40 families have already been relocated and have settled into their new homes, while four families are completely opposed to moving. Not to mention a rumour that is doing the rounds: what if the local authorities are relocating people so they can get their hands on the land to build a seafront hotel? Virginie Bonot hasn’t thrown in the towel: “We will keep organising workshops to consult people, notably on the project of establishing collective gardens, creating a memorial area, planting mangroves, and so on.”

Ultimately, the rehousing projects in Le Prêcheur and Petit Bourg demonstrate an essential lesson: ensuring the safety of populations is not enough; ongoing dialogue and listening to their needs is indispensable ●

* Local word for mountains and hills.

justifiable, managed retreat may be preferable considering the economic and social costs, in areas that are less densely populated and less urbanised.

↳ Identify suitable destinations

Choosing a destination or several destinations often involves **several localities and municipalities that are more or less in geographical proximity**. Relocation is often simpler when it comprises moving from one locality to a nearby destination. This approach is often preferable for communities and activities that have direct ties to the coast, such as fishing and coastal tourism. Rethinking the city from within by promoting densification over sprawl in neighbouring areas may also help reduce urban expansion into natural areas, thereby preserving ecosystems. Moreover, it allows for the consideration of the constraints and expectations of municipalities, which neither wish nor are able to lose a significant portion of their population or accommodate an excessive influx of residents and activities.

However, geographical proximity is not always possible when cities have limited land availability. It can even be inappropriate if it exposes people and assets to new risks, or requires repeated relocations in the future. In all cases, choosing a suitable destination must involve **consultation with the affected populations**.

↳ Adopt a coherent and concerted approach

Relocating populations and assets disrupts the connections across land and involves many stakeholders and levels of governance. Managed retreat must integrate all geographic scales in a coherent manner, from neighbourhoods to municipalities, municipal partnerships and regional councils, and up to governments. This multiscale approach ensures coherence between local, regional and national policies, while responding to the specific needs of the coastal settlement concerned. To meet such challenges, managed retreat must become a coordinated public policy, thereby moving beyond fragmented and isolated initiatives to promote collective solutions.

In the Southwest of France, managed retreat is being developed collectively

The administrative region of Nouvelle Aquitaine in the Southwest of France, with its 970-kilometre Atlantic shoreline, is particularly exposed to sea level rise impacts. In 2006 a Coastal Public Interest Group (GIP Littoral*), which brings together government bodies, the regional council, and intercouncil partnerships, was set up to provide coherent support to all municipalities concerned with establishing adaptation solutions to flood and erosion risks in Nouvelle Aquitaine.

“Currently, there are 13 local strategies for coastal management and GIP Littoral functions like a toolbox to provide knowledge for local authorities and help them develop their coastal strategies,” explains Gaël Perrochon of GIP Littoral. “We are working on strategies relating to risk management, as well as sustainable development projects for beaches and seaside towns. We also ensure that the recommended management methods correspond to local objectives and are coherent with the region-wide strategy adopted in 2012. For example, there would be no point in building a new defensive structure on the seashore to protect an isolated asset, such as a campsite, that has already been scheduled for relocation.”

GIP Littoral’s purpose is to put forward a proven working method based on the assessment and monitoring of local projects. This approach not only ensures effective project management but also enables elected officials to clearly communicate the rationale behind their decisions to citizens. Once the action plan is approved, local stakeholders can access funding to implement the proposed initiatives.

Lacanau is one of the very first municipalities to have developed a management strategy for tackling coastal erosion. Considered as a national pilot test, the local strategy provides for the

redevelopment of the seaside. The first and second phases involve the consolidation of the existing defences through sand replenishment operations, followed by works to increase the height of the rip-rap by 2050. But the town council is doing much more than that: “As early as 2017, the town council identified a high-risk area in its local urban plan to regulate urbanisation, and subsequently limited the number of buildings that can be built there in the future,” explains Gaël Perrochon. The town’s road network was also reviewed and the main artery, which leads to the beach, was reconfigured in order to benefit shops and businesses while providing space for nature to reinvest the seafront. Also, the town council is working on various timelines and is undertaking a feasibility study on managed retreat.

“Up until now, most of the work has focused on publicly owned land. This has facilitated our operations on the ground,” indicates Gaël Perrochon. But for many towns, executing planning projects and strategies is made considerably more complicated when it involves purchasing private assets. France’s Climate and Resilience law has provided the beginnings of a response with certain tools (tax rebate, special tenancy agreements, etc.). “Nevertheless, these tools can’t be deployed in their current form because there isn’t any funding, and municipal councils don’t have the necessary means to implement actions relating to managed retreat. Given the risks of disputes in the future, they will need to be strengthened from a legal standpoint.” This is a call for the State to address these issues and support municipalities accordingly ●

* GIP Littoral comprises the French State, the Regional Council of Nouvelle Aquitaine, the 4 Departmental Councils in the region (Charente-Maritime, Gironde, Landes, Pyrénées-Atlantique) and the 16 municipal intercouncils.

WHEN?

DYNAMIC APPROACHES TO MANAGED RETREAT

Adapting coastal cities to rising sea levels involves navigating multiple uncertainties. These uncertainties concern not only climate change, the rate of sea level rise and the onset of sudden extreme events (storms, hurricanes, etc.), but also the economic, cultural and political changes to our societies which will not be the same in a hundred years’ time. Uncertainties, while inevitable, rarely align with political agendas. And yet the acceleration of climate change requires immediate adaptation policies that take into account the long term while being flexible enough to address changes likely to occur in the near future.

To meet this challenge, the scientific community and local planners recommend a dynamic approach based on the concept of adaptation pathways. This method allows stakeholders to contemplate profound changes, such as managed retreat strategies.



Stages of dynamic adaptive policy pathways

1/ What do we want to achieve?

→ Assess the situation and guide adaptation towards a desirable future

- Assess risks, vulnerabilities, and opportunities
- Define a long-term adaptation goal



2/ What are the solutions?

→ Sequence actions into adaptation pathways

- Evaluate and qualify feasible and desirable solutions to achieve the adaptation goal
- Design adaptation pathways of solutions sequenced over time
- Identify signals and thresholds for transitioning from one solution to another



3/ How to ensure implementation?

→ Develop the dynamic adaptation plan

- Report previous steps (adaptation goal, vulnerabilities and opportunities, adaptation pathways, indicators, signals, and thresholds...)
- Define the monitoring system and policy review process (resources, frequency...)
- Assign roles and responsibilities



Engage communities

Remain flexible

1 What do we want to achieve?

Assess the situation and align adaptation with a desirable future

→ **Understand the vulnerabilities and the opportunities:** Adaptation aims to reduce the vulnerabilities of populations. As such, the first stage consists of understanding and prioritising these risks by undertaking an assessment of local vulnerabilities. It is essential to comprehend the potential sticking points and levers for action (laws and regulations, funding, etc.). This assessment enables stakeholders to anticipate reforms and new measures necessary to facilitate actions, such as relocation.

Examples of assessment data: scenarios and projections of sea level rise and population growth; statistics on local distribution of income, gender, and the average age.

→ **Define a long-term adaptation goal:** Adaptation strategies must enable the achievement of a long-term resilience objective which aligns with a vision of a sustainable future. This goal must be defined in a concerted way in order to respond to local needs and aspirations. Indicators can then be defined to monitor the achievements of these objectives.

Example of an objective: "Populations are safe and live in sustainable conditions by 2100, without residing in or being required to enter zones at very high risk of flooding, except for leisure activities."

2 What are the solutions?

Sequence actions into adaptation pathways

→ **Identify, evaluate, and qualify solutions:** Once the assessment has been made, the possible and desirable solutions for achieving the adaptation goal must be identified.

→ **Design adaptation pathways of sequenced solutions:** Adaptation pathways involve planning and sequencing short, medium and long-term actions. A new action is triggered when the preceding action becomes ill-suited, in particular because of environmental or societal changes. Pre-defined thresholds allow stakeholders to decide when to trigger a new action.

Example of a pathway: A dyke that was initially consolidated could be abandoned in the medium term in favour of the gradual relocation of activities to safer areas. This could be triggered when rising sea levels and associated risks reach thresholds that are considered to be unacceptable.

3 How to ensure implementation?

Developing the dynamic adaptation plan

- **Take stock:** A key tool for implementing strategies is the adaptation plan, which reports all the above-mentioned stages: objectives, actions, pathways, success indicators, signals and thresholds, etc.
- **Provide for a monitoring and reviewing system:** A dynamic plan is by definition flexible and can be revised according to the monitoring and evaluation of climate and societal changes, and policies' impact assessments. It must therefore clearly detail the monitoring system used (indicators, frequencies, resources, etc.).
- **Define competencies and attribute responsibility:** A plan clearly attributes roles and responsibilities, thus holding stakeholders accountable for future decisions. A plan allows for needs and actions to be anticipated, and is thus an information and communication resource for stakeholders.

How to stay on track?

Monitor signals and tipping points to ensure flexibility when conditions change

- ➔ **Define and monitor success indicators, signals and tipping points:** Rather than setting a deadline for implementing a new adaptation measure, the transition of one action to another is better regulated by the monitoring of signals, warning an approaching critical situation, also called a tipping point (or threshold). A tipping point is reached when risks have become unacceptable and the on-going actions have become ill-suited to achieving the adaptation goal. Once reached, new actions are triggered to improve adaptation.

Examples of signals: Increasing dyke maintenance costs; frequency of coastal flooding.

Examples of tipping points: Access to a given critical infrastructure flooded X times per year; the shoreline is less than X metres from a dwelling, X public buyouts.

- **Get communities involved:** Notions of desirability, acceptable risk and exposure thresholds, and policies all imply the necessity for regular consultations and engagement with populations in adaptation processes.

Designing the pathway to managed retreat

The high variability that characterises climate change require us to adapt in a flexible manner, especially in coastal areas. Economist H  l  ne Rey Valette, senior researcher at Montpellier University and specialist in managed retreat, explains: “We need to approach the relocation of populations by developing adaptation pathways.” This involves the establishment of a timeline for what has to be undertaken, an itinerary for achieving an ultimate adaptation goal for a municipality, even if a specific date has not been set. “Initial measures can involve the relocation of public spaces, such as car parks, before focusing on movable assets and ultimately working towards buyouts of housing.”

The speed at which projects progress greatly depends on the level of vulnerability. That is the core idea of the pathway: “For example, the destruction of some buildings can wait ten or twenty years,” explains H  l  ne Rey Valette, although protection must be ensured during this interim period. “What is certain is that, from now on, local and national governments will no longer agree to help municipalities build dykes, install rip-rap or replenish beaches unless the relocation of buildings has really been planned for in the future.”

“It’s very complicated, especially for local elected representatives”, says the researcher, but also for the inhabitants. “We are not

accustomed to thinking 30, 40 or even 50 years ahead.” It is difficult to be part of a transition made up of incremental changes that accumulate over the long term. Especially since a project lasting several decades cannot be set in stone and will inevitably change over time. “We need to think of these itineraries like Russian dolls, with measures that will stack or nest over time.”

One of the priorities for these coastal regions will be to rethink tourism and how it is funded, especially making the latter conditional upon the development of adaptation pathways. The issue is also considerable for the real estate market. “Property values will undoubtedly fall in certain areas, but they must not collapse entirely,” warns H  l  ne Rey Valette. An intergenerational approach can be key in that regard. It is not necessarily desirable to force elderly people to move but their descendants must be prepared for the fact that they will not be able to inherit, for example, the house.

“We are often lacking in collective imagination,” states H  l  ne Rey Valette. “Nevertheless, I believe we are on the right track. Fifteen years ago when we started talking about planned relocations, nobody listened. Today, much has changed. We are moving in the right direction.” Future paths cannot repeat past endeavours: “We must build and invent new models of public policies which allow us to anticipate.” ●



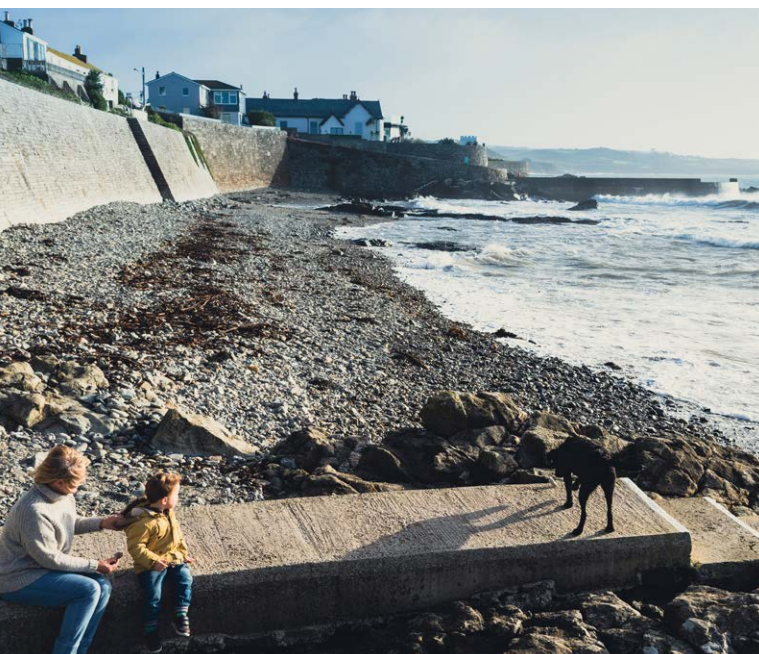
A dynamic approach to managed retreat

↳ Plan for the (very) long term

Managed retreat must be considered as a means for achieving an adaptation goal. This involves planning over timescales far longer than the usual life cycles of public policies, often spanning decades, like 2070 or 2100. Planning for the very long-term can encourage intergenerational responsibility towards future populations and help overcome individual interests that can hinder the acceptance of managed retreat.

↳ Anticipate and remain flexible in an uncertain context

Anticipation is essential to avoid reaching a tipping point where retreat becomes unmanageable and turns into an emergency response. However, adaptability is key. To avoid premature or poorly received decisions, it is just as important to consult with communities as it is to trigger relocation operations at the right time. By basing managed retreat on the monitoring of signals and thresholds, decision-making becomes more flexible and relevant, and the decisions taken are more likely to be accepted.



↳ Accompany progressively transformational relocations, step by step

Managed retreat unfolds exponentially, starting with limited initiatives that pave the way for major transformations. For example, initial relocations involving low-stakes assets such as car parks and public spaces can lead to much larger, faster and comprehensive transformations in the future. It is a complex process which develops over several decades. Adopting a pathway approach allows for making the most of the transition period by dividing adaptation into progressive and manageable stages. There are various types of actions:

- **Low and no-regret actions** that do not compromise future capacities to implement managed retreat, and which can generate immediate co-benefits. For example, protecting ecosystems can both limit current risks and reinforce resilience in the long-term.
- **Continuous actions** that accompany the entire process, such as activities to raise awareness and engage with communities, as well as the monitoring and assessment of policies and vulnerabilities.
- **Preventive or preliminary actions** such as capacity-building activities, risk and vulnerability assessments, fundraising.
- **Transitional or provisional actions** that enable the management of immediate risks while allowing time for the planning of more enduring solutions. For example, temporarily maintaining dykes.
- **Structural or transformational actions** such as the relocation of assets, infrastructure and housing.

Saint Louis, Senegal: sustainably rehousing after an emergency

Overlooking the Atlantic Ocean, the Langue de Barbarie, a thirty-kilometre sandy peninsula protecting part of the city of Saint Louis, is particularly exposed to climate risks, erosion and flooding. In 2017, while a major five-year project was being prepared by the World Bank to implement an adaptation and resilience strategy for the city, a devastating tidal wave disrupted everything. The situation quickly escalated into an emergency, endangering an entire neighbourhood of fishers. Several dwellings were completely destroyed, displacing close to 1,500 people who were forced to take shelter in makeshift tents under precarious conditions. Those remaining had to be convinced to evacuate quickly. A 4.5-kilometre-long and 20-metre-wide strip was delimited where houses would be demolished, making way for defensive structures to halt the encroaching sea.

A traumatic event for the families who, not only had to cope with the loss of their former way of life, but also had to trust the promises being made to rehouse them. “We undertook a study in an attempt to measure acceptability,” remembers Al Hassane Loum, head of the Saint Louis development agency and researcher at Gaston Berger University in Saint Louis. “At the peak of the emergency, 90% of the families agreed to be rehoused. They had no choice in the matter. In that case, we talk about involuntary rehousing.”

“We quickly realised that we had to provide housing that was an improvement over what had been lost,” explains the researcher. “Architects presented designs that were refined until acceptable.” But adjustments had to be made. “The basic principle for rehousing was ‘one house built for every

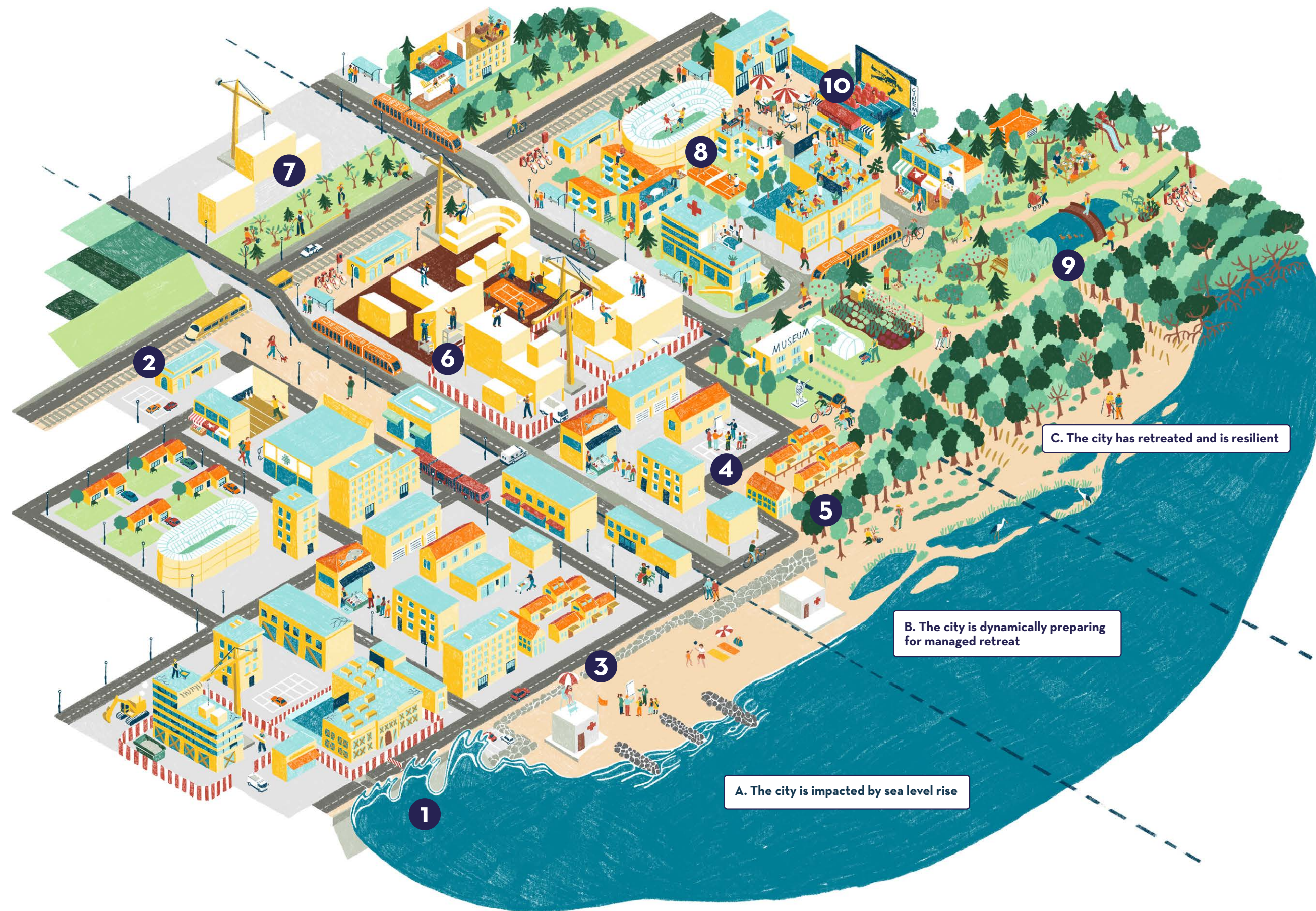
house destroyed’. But due to the very high density of the original site, we increased the number of homes to be constructed. Particular care was given to the living environment. For instance, former neighbours were allowed to reunite if they wished, and essential amenities like schools, a healthcare centre, roads, and areas for gardening were included.”

Luckily for Saint Louis, the city has a local development agency dedicated to address social engineering issues, and a regional development agency which guides and coordinates actions between local councils. “These two agencies are responsible for finding the right channels (meetings, films, etc.) for communicating with the population of Saint Louis and the other neighbouring municipalities,” indicates Al Hassane Loum. “They are highly skilled.”

“In the meantime, before the dwellings are ready, a temporary dyke was built as part of the project to protect Saint Louis. This led certain inhabitants to believe their former homes were now safe, and they no longer needed to move out.” Explaining is a never-ending process.

The next stage involves planning for the year 2050, even 2100, when the entire city of Saint Louis could be at risk. “Once again, if we want to warn and convince the populations, we need to possess all the information. This includes scientific data, simulations and models so that we can explain and gain the populations’ support. Such work can only be done step by step, very progressively. It’s far from being complete.” ●

Illustration of a dynamic pathway to managed retreat



A. The city is impacted by sea level rise

1 The **risk and vulnerability assessment** indicates that a portion of the coastline will become uninhabitable due to rising sea levels. The coastline remains largely degraded, with limited public access and ongoing conflicts over land use.

It is necessary to **identify and prioritise relocation sites** and find resettlement areas. Envisioning the future can be complex, and tools are used to visualise what managed retreat might look like: scenario planning, serious games, virtual reality, etc.

2 Local authorities begin characterising the interactions between coastal and inland areas to plan a **coordinated transition**. They establish cooperation frameworks and define their respective responsibilities.

3 To ensure the acceptability of managed retreat, **communities are trained, informed, and empowered to participate** and express their needs through forums of dialogue and conflict resolution. Particular attention is given to the most vulnerable and traditionally excluded communities.

Local authorities, in consultation with stakeholders, determine **adaptation pathways that include phased relocation operations**. This plan outlines the necessary transitional actions leading to managed retreat and sets thresholds triggering relocation actions.

B. The city is dynamically preparing for managed retreat

4 A **steering committee** is established to oversee the implementation of relocation operations. This permanent body also ensures continuous dialogue with communities.

5 The municipality **gradually initiates the relocation of assets** and services under its ownership. It begins dismantling infrastructure in the most at-risk areas while maintaining and improving certain protective structures to mitigate immediate dangers. Meanwhile, it prepares for larger-scale relocations, including defining non-buildable zones and acquiring land.

6 The **hinterland is preparing to accommodate new activities and populations**. It builds and **updates key services and infrastructure**: roads, public transport, and soft mobility options (bicycles, etc.), as well as public services such as schools and hospitals. Transitional policies include measures to **make new lifestyles appealing** and improve economic, social, and cultural opportunities.

7 Residents are also consulted on the design of future housing and the layout of new neighborhoods. Various opportunities are provided, such as homeownership programs, community spaces, and gardens.

C. The city has retreated and is resilient

8 **Large-scale relocation operations** begin: industries, housing and neighbourhoods...

Deconstructing properties is a challenging process for residents. Authorities support them through **memorial initiatives**, such as recycling materials from old homes, creating commemorative sites, and proposing artistic projects in deconstructed areas.

9 The coastline is **secured** to prevent resettlements in high-risk zones. Natural ecosystems in these areas are gradually restored to serve as buffer zones against flooding and to slow down erosion. **New recreational** and public access opportunities to the coastline are enabled.

10 **In the hinterland, livelihoods have also improved**. Residents enjoy new economic, cultural, and social opportunities.

A culture of **civic participation** has emerged, with communities actively engaging in urban planning projects. Inclusive mechanisms ensure their involvement, strengthening their resilience and sense of belonging.

HOW?

PILLARS OF A FAIR AND SUSTAINABLE MANAGED RETREAT

Managed retreat is a long and complex process. It requires ambitious public policies, with appropriate governance frameworks, and sufficient funding for municipalities. Social justice and communities must be placed at the heart of processes and objectives.

Governance: ensuring adaptive and cooperative approaches

Institutional and political obstacles to managed retreat

Governance frameworks are often poorly suited to a dynamic approach to adaptation and relocations.

Competencies and resource allocation are usually not clearly defined and shared between governance levels. When local decision-makers lack adequate support, they are often compelled to relocate assets and communities urgently to safeguard public safety. As a result, relocation policies tend to be hastily planned and poorly coordinated across authorities.

Levers for a governance adapted to managed retreat

Overhauling laws and regulations to integrate adaptation pathways would provide the flexibility needed by local authorities to plan for transitional measures enabling future relocations in evolving climatic and social conditions.

Adaptation plans must establish a clear framework for leading managed retreat efforts based on the principles of **inclusive, multi-level and multi-stakeholder governance**. They should define the competencies and responsibilities of all parties involved.

It is also crucial to **encourage collaboration and exchange feedback** among stakeholders and local authorities.

Social justice: promote and strengthen equity

The risks managed retreat poses for social justice

Relocations often expose existing inequalities of power and wealth, and can exacerbate them. If these dynamics are not acknowledged and corrected, the most vulnerable communities may bear the burdens while receiving little to no benefit.

Levers for a fair and equitable managed retreat

Placing social justice at the heart of processes and objectives of managed retreat policies involves the following:

- **Acknowledge** the existing power and social dynamics which contribute to inequalities.
- **Ensure the equitable and informed participation** of populations in decisions, in particular groups that are the most vulnerable and traditionally excluded from decision-making (low-income households, women, youth, minority groups, etc.).
- **Fairly distribute** the costs and benefits of managed retreat.
- **Improve** living conditions and **rectify** policies which have disproportionately harmed certain communities.

Stakeholder engagement: establish trust and encourage informed participation

Obstacles to the acceptability of managed retreat

Gaining acceptability for managed retreat poses a major challenge for local authorities. The invisibility and unpredictability of coastal risks accentuate the difficulty to comprehend the necessity to undertake relocations among populations. In addition, residents are often ill-informed on the practical details concerning managed retreat policies. Skepticism among the population, combined with the political risks involved, can also make local elected officials hesitant to take decisive action.

Levers for mobilising stakeholders for managed retreat

In addition to ensuring equitable policies (see above), stakeholder engagement involves strengthening dialogue and trust between elected representatives and the population:

Dialogue and active participation of stakeholders can be enhanced by proposing dedicated forums where they can express their concerns, negotiate solutions, resolve disputes and actively engage in the joint creation of pathways for managed retreat.

The permanence, inclusiveness and transparency of steering organisations are key. These are essential intermediaries between elected representatives and inhabitants, holding regular consultations and ensuring transparent communication on ongoing activities.

It is essential to acculturate and educate populations, and communicate regularly and transparently on the risks and policies of managed retreat. A range of tools can be utilised, such as serious games, foresight activities, and even collaborative mapping to engage communities and raise awareness.

In the United States, like anywhere else, managed retreat is foremost a question of social justice

Around the world, communities are relocated from prone-risk coastal areas, either as an emergency response or – in still very rare cases – as a planned solution. Regardless of the circumstances, those relocated must be rehoused. Do such rehousing plans incorporate social justice? “There are far more cases where social justice is lacking than where it is upheld,” signals AR Siders, associate researcher at the University of Delaware, USA, “but things are progressing”.

While managed retreat can create situations of injustice, it’s not necessarily the cause. Sometimes it merely exposes pre-existing inequalities. On the Isle de Jean Charles, off the coast of Louisiana, a Native community was relocated in response to rising sea levels exacerbated by nearby oil-drilling operations. Although the relocations were well prepared, federal regulations denied these communities’ official tribal status, thus impeding them from obtaining the right to be rehoused in the new town which had been designated for them. “In this precise case, the lack of social justice pre-dated considerably the question of relocation, yet it had a direct impact,” explains AR Siders.

A similar injustice occurs when displaced individuals receive financial compensation but are left to navigate the housing market on their own. While wealthier families can manage this transition, low-income households often struggle to secure suitable housing. “Once again, relocation often merely exposes existing social injustices.”

Another place, a different example: a relocation plan organised in Grand Forks in North Dakota, USA, did indeed offer new housing but came to an abrupt end. “These houses were two to three times more expensive than the ones previously lived in,” reveals the researcher. “The people simply could not afford them.”

Most of the time the people running the rehousing plans do their utmost to help, but find themselves thwarted by a lack of funding.

The objective is to plan ahead. In many places we know precisely what could occur in 20 or 30 years’ time. And yet, nothing is done until the disaster happens. “In the immediate aftermath, families are traumatised and in a great state of distress, sometimes having lost everything. Moreover, they must make the difficult decision to move out. This is not an effective approach. We must plan for the long term. Instead, relocation should be integrated into natural life cycles, such as job changes, retirements, or the desire to move to a different climate, then resettlements could be achieved more smoothly.” It is obviously much easier to regularly help small groups of people to move house than it is to move an entire community in one fell swoop.

“If we look at the example of Grand Forks, the idea of building houses was a good one. But by neglecting to think carefully about who they were being built for rendered the plan ineffective. We need to learn from these previous experiences.” Learn from past failures, therefore, to better manage retreat in the future ●

Funding: respond to exponential and long-term needs



Obstacles to the durable funding of managed retreat

Funding for adaptation, in addition to being largely **insufficient, is often earmarked for defensive works and short-term plans**. Municipalities can call on very few resources for experimenting with alternative adaptation strategies, such as managed retreat, whose implementation demands **considerable and long-term financial resources**.



Levers for funding managed retreat

It is essential to design funding mechanisms that are fair and suited to the growing and long-term needs of municipalities.

The cost-benefit analysis of managed retreat must be included in the overall framework of adaptation funding so that the cost of relocation can be **compared - in a balanced way - with the investments required** for maintaining activities in vulnerable areas.

Managed retreat represents **an opportunity to invest in resilience**, in particular through the renovation and improvements of buildings and infrastructures, as well as the rehabilitation of blue-carbon ecosystems.



RESOURCES

This special report draws on the scientific and field expertise of the partners of the Sea’ties project, collected through individual interviews and a thorough literature review. Below are some of the key resources for further exploration of the topic of managed retreat.

IPCC Report

- Glavovic, B.C., R. Dawson, W. Chow, M. Garschagen, M. Haasnoot, C. Singh, and A. Thomas, 2022: Cross-Chapter Paper 2: Cities and Settlements by the Sea. In: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 2163–2194, doi:10.1017/9781009325844.019.

Resources of the Ocean & Climate Platform

- Ocean & Climate Platform. (2023). Policy recommendations for coastal cities to adapt to sea level rise. Sea’ties. 28 pages. https://bit.ly/recommendations_adapt_coastal_cities_SLR
- Ocean & Climate Platform (2021). IPCC Sixth Assessment Report: Sea level rise, impacts, vulnerabilities and adaptation. [Video]. <https://youtu.be/leeHU87SRyE>
- Ocean & Climate Platform. (s.d.). Seaties. Ocean & Climate Platform <https://ocean-climate.org/seaties/>

Scientific literature

- Brière, C., & Haasnoot, M. (2020). Gestion des risques littoraux et trajectoires d’adaptation par méthode DAPP. *Keynote, JNGC 2020*, 847-858. <https://doi.org/10.5150/jngcgc.2020.092>

- Haasnoot, M., et al. (2021). Pathways to coastal retreat. *Science*, 372, 1287-1290. <https://doi.org/10.1126/science.abi6594>
- Haasnoot, M., Kwakkel, J. H., Walker, W. E., & ter Maat, J. (2013). Dynamic adaptive policy pathways: A method for crafting robust decisions for a deeply uncertain world. *Global Environmental Change*, 23(2), 485-498. <https://doi.org/10.1016/j.gloenvcha.2012.12.006>
- Haasnoot, M., Di Fant, V., Kwakkel, J., & Lawrence, J. (2024). Lessons from a decade of adaptive pathways studies for climate adaptation. *Global Environmental Change*, 88, 102907. <https://doi.org/10.1016/j.gloenvcha.2024.102907>
- Mach, K. J., & Siders, A. R. (2021). Reframing strategic, managed retreat for transformative climate adaptation. *Science*, 372, 1294-1299. <https://doi.org/10.1126/science.abh1894>
- Rey-Valette, H., Richard, A., Michel, L., Richard-Ferroudji, A., & Heurtefeux, H. (2024). Retour sur la co-construction de stratégies de recomposition spatiale. Le cas de l’Occitanie (France). *VertigO : La revue électronique en sciences de l’environnement*, 24(1). hal-04578812
- Siders, A. R., Ajibade, I., & Casagrande, D. (2021). Transformative potential of managed retreat as climate adaptation. *Current Opinion in Environmental Sustainability*, 50, 272-280. <https://doi.org/10.1016/j.cosust.2021.06.007>

Reports, guidelines and conferences

- New Zealand Government, Ministry for the Environment. (2024). *Coastal Hazards and Climate Change: Guidance for Local Government*. 978-1-98-852535-8
- PEERS. (2022). *Adaptation Pathways in Action: Creating Resilience to Sea Level Rise from Uncertainty at the Local Government Level in New Zealand*.
- PEERS. (2023). *Adaptation Pathways in Action: Establishing “Thresholds” to Create Pathways to Resilience*.
- PEERS. (2023). *Adaptation Pathways in Action: Generating and Using “Triggers” and Monitoring Systems to Support Pathway Change and Maintain Resilience*.
- Ademe. (2019). *Guide méthodologique : Construire des trajectoires d’adaptation au changement climatique du territoire*. 979-10-297-1186-2.





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