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Moving towards multi-level governance of coastal managed retreat: Insights and prospects from France

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ABSTRACT

Policies aimed at adaptation to sea-level rise advocate new approaches, no longer based only on protection but also seeking to reduce the vulnerability of densely-urbanized coastal zones, especially through anticipatory relocation. However, such relocation faces substantial legitimacy and acceptability constraints in the case of both the population and locally-elected representatives. This article elucidates the social and institutional conditions for putting relocation on the agenda and implementing it in the case of France. It addresses the current situation through an analysis of the multi-level governance processes (national vision, local experiments and regional or area strategies) which contribute to the production of "actionable knowledge" for relocation in terms of policy legitimacy, credibility, applicability and acceptability. The detailed analysis of the stages and the types of actor involved reveals the hindrances, in terms of inertia and *status quo*, found at each level of decision-making and action as well as the positive role of actors or political entrepreneurs catalyzing interactions between these different levels. This multi-level governance enables a hybridization of initial standards, information sharing and collective learning which, together with operational proposals derived from studies and experiments create the "emergence conditions" for coastal area relocation and spatial reconfiguration projects.

KEY WORDS: Managed retreat, sea-level rise, coastal adaptation, acceptability, multi-level governance, France.

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INTRODUCTION

The issue of sea level rise is the subject of much scientific research aiming to regionalize scenarios, assess uncertainties and impacts at different scales, evaluate coastal vulnerabilities and study adaptation measures and policies. As such, recent results (Sterzel *et al.* 2020; Rasmussen *et al.* 2020) show worldwide the great vulnerability of coasts to sea-level rise due to the importance of urbanized areas. Sterzel *et al.* (2020) citing McGranahan *et al.* (2007) estimate that “40% of the world’s population inhabit a narrow coastal band that takes up 7% of the Earth’s land area”. Social sciences are increasingly involved in interdisciplinary research projects as the objective is also to collectively agree on acceptable levels of risk across social and geographical situations, and to build relevant capacities to implement adaptation policies in an anticipated way. Studies are therefore performed to compare costs and constraints of different adaptation strategies (Nordstrom *et al.*, 2015; Porro *et al.*, 2020) (Siders and Keenan, 2020) including relocation which, despite its co-benefits, faces major limits in terms of acceptability. The 2019 special report on the ocean and cryosphere of the IPCC (IPCC, 2019) underlines such governance constraints related to institutional, psychological or socio-cultural factors. According to this report: « *Key enablers for implementing effective responses include intensifying cooperation and coordination among governing authorities across spatial scales and planning horizons. Education and climate literacy, monitoring and forecasting, use of all available knowledge sources, sharing of data, information and knowledge, finance, addressing social vulnerability and equity, and institutional support are also essential. Such investments enable capacity-building, social learning, and participation in context-specific adaptation* » (IPCC, 2019, p.34).

In mainland France, the coastal municipalities represent 8 million inhabitants spread along 5 500km of coast, of which 25% is affected by erosion with 140 000 inhabitants living less than 250 m from the coast and 850 000 inhabitants (and 570 000 properties) located in low-lying areas. About 21 300 dwellings are likely to be affected by marine inundation by 2040 with a property value of €3.7 billion, to which must be added 2 000km of railway track and 20 000km of roads (CEREMA, 2019). Furthermore, the projections of the National Sea and Coastline Observatory (Observatoire National de la Mer et du Littoral-ONML)¹ forecast an increase in coastal population of 4.5 million people between 2007 and 2040 (a figure later updated by the ONML to +3.6 million between 2013 and 2050). Of course, the impact of sea-level rise will differ according to the time-scale, the area topography and future urbanization dynamics. However, people’s exposure should be reduced in the medium term through implementing adaptation measures and controlling demographic growth as well as urban redevelopment policies, especially relocation of the most-exposed assets.

¹ <https://ree.developpement-durable.gouv.fr/themes/milieux-et-territoires-a-enjeux/mer-et-littoral>

In 2010, storm Xynthia, with 54 deaths, increased awareness of the need to improve French coastal risk management policies through measures to reduce hazard exposure. Hence, government established a national strategy for integrated coastline management (MEDDE, 2012)² that recommended the implementation of relocation measures and funded an experimental program on five pilot sites (MEDDE, 2013, 2014, 2015). This experimental phase enabled exchange seminars at national level and defined 40 development proposals to facilitate the implementation of these policies. With the change of government in 2017 a new consultation phase was launched through different initiatives (e.g. “Coastal dynamics” national consultation between February and September 2018). This led to a joint ministerial mission (CGEDD/IGA/IGF, 2019)³ providing recommendations that were adopted by a parliamentary commission (Buchou, 2019) and should lead to a new bill in 2021. This policy-making process provoked lively debates about feasibility, institutional constraints, funding and more generally the acceptability of these measures by both elected representatives and the population, especially those directly affected and strongly attached to the amenities derived from living close to the sea (Dachary *et al.*, 2019). Their misgivings are all the stronger in that the cost-benefit analysis methods currently imposed by French authorities do not favor relocation because the discounted benefits do not compensate for the significant cost of repurchasing assets, compared with traditional policies of protection or beach nourishment (André *et al.*, 2016). On this matter, Turner *et al.* (2017) believe that “managed realignment can be more economically efficient than holding-the-line over a sufficiently long time period—generally greater than 25 years”.

A literature review shows the significance of adaptation strategies as research and public policy issues (Moss *et al.*, 2013; Lesnikowski *et al.*, 2017), including that of managed retreat measures: “Greater attention is now being paid to the advantages of retreating from the coast as an adaptation strategy, rather than implementing defences to resist shoreline change in situ” (Nordstrom *et al.*, 2015, p.13). It highlights the difficulties regarding the acceptability of relocation measures despite some recent progress (Hino *et al.*, 2017; Werners *et al.*, 2021). First and foremost, the negative effects of protection measures are increasingly stressed, as in the study of Orton *et al.* (2019) on the impact of dykes on biodiversity in the city of New York. Scata (2020) criticizes the fact that, in the USA, the new federal norms regarding the dimensioning of measures relies excessively on past damages, thereby minimizing the impact of climate change. It is noteworthy that, over the past decade, an increasing number of studies (Siders, 2019) and experiments (Hino *et al.*, 2017) have addressed the operationalization of relocation measures, following a period that focused more on identifying constraints using perception surveys with inhabitants and elected representatives (King *et al.*, 2014; Rulleau and Rey-Valette, 2017; Rey-Valette *et al.*, 2019). The emphasis is now on the conditions for implementing, regulating, information and funding relocation as a planned, coordinated and anticipatory adaptation strategy. According to Siders (*op.cit.*), the question is no longer whether to contemplate relocation but when and how these measures should be implemented. Relocation projects must therefore address several challenges: they must anticipate and reduce significantly future damages whilst maintaining equitable access to recreational services

² MEDDE: Ministry for Ecology, Sustainable Development and Energy

³ CGEDD: General Council for Environment and Sustainable Development ; IGA: Inspectorate-general for Administration; IGF: Inspectorate-general for Finance

provided by beaches (Clément *et al.*, 2015; Rulleau *et al.*, 2016) and preserving the attractiveness of coastal areas.

In line with the growing publication of articles featuring national relocation situations, this article aims to present the current situation and to analyze recent dynamics in the legitimization and acceptability of relocation measures in France. To do this, we highlight and analyze the development of the main governance systems related to this measure as well as the role of different institutions and policy scales (national statements and guidelines, local experiments, regional and territorial strategies). In addition to the 1986 law on coastal urbanization (“Loi Littoral”), the political treatment of coastal risk, although remaining subject to a strong tradition of centralized government, is increasingly moving towards decentralization, as has also been the case in England in particular (McGinlay *et al.*, 2020). Furthermore, since 1982, the French “natural” disaster insurance system (also called CatNat system) has provided at the national scale an extra-insurance mechanism for different natural disasters. This article analyses how, in this context, relocating assets and human activities is consistent with these institutional dynamics and discusses the resulting change factors in terms of policy and politics. Without being a real meta-analysis, this work is based on the results of a large number of studies carried out in France, mainly by the authors. It constitutes a rich material that we analyze through an original reading grid that mobilizes several dimensions of social and political acceptability namely legitimacy, credibility and applicability. We mainly assume that French coastal governance mechanisms of hybridization and experimentation are two key process in supporting managed retreat strategies. Our analysis confirms the key role of governance mechanisms and hypothesizes that hybridization, multi-level approaches, and experimentation are three decisive in analyzing governance modalities and ensuring a better acceptability of relocation.

In a first section, following a literature review of the main studies highlighting the significance of institutional factors and multi-level exchanges in the effective implementation of relocation policies, we present our analytical framework, methodology and data. The second section contextualizes coastal risk management in France and reviews the place given to relocation on the political agenda through various injunctions and national initiatives. The third section analyzes the way in which local strategies and experiments on relocation have been performed, while comparing the role played by various, more decentralized actors (local authorities and different agencies). Finally, the fourth section analyzes the factors of inertia and appropriation for this adaptation option, highlighting the catalyzing role of experiments and interlinkages between different policy scales.

1. ANALYTICAL FRAMEWORK METHODOLOGU AND DATA

Relocation is increasingly debated and studied with, to a lesser extent, feedback from empirical experience, most often *a posteriori* following storms. A recent example is the international conference devoted to this issue organized by the Earth Institute of Columbia University, NYC in 2019 with a second edition recently held in June 2021⁴. Analysis of governmental action or inaction on planned retreat (Mortreux *et al.*, 2018) has revealed several types of factor including information and people’s perceptions (Iorns Magallanes and Watts, 2019), insurance schemes that favor the *status quo* (Adler *et al.* 2019; Foster *et al.* 2019), funding resources and conditions, in particular the impact

⁴ <https://adaptation.ei.columbia.edu/content/what-point-managed-retreat-resilience-building-coastal-zone>

of relocation on fiscal taxes (Treuer *et al.*, 2018; Adler *et al.*, 2019; Shi and Varuzzo, 2020) and more generally the governance mechanisms (Iorns Magallanes and Watts, 2019). In order to convey the evolution of the concept and experience in the French case, we focus on the role of institutional factors in the analysis of the main developments observed over the last decade.

1.1. Recent feedbacks dealing with institutional factors in relocation policies

The inclusion of uncertainty about the rhythm of sea-level rise has led to the recent development of dynamic adaptive planning approaches based on sequential decision-making (Haasnoot *et al.*, 2013; Kool *et al.*, 2020; Racle *et al.*, 2020; Werners *et al.*, 2021). They entail major changes in public action practices. The issue is no longer to set the date for the implementation of certain measures but instead to identify the decision criteria and the circumstances deemed suitable to implement these measures (Abel *et al.*, 2016). Among the issues related to relocation governance mechanisms, the questions of decision scale and the conditions for the participation and information of those concerned are currently widely discussed. Through the comparison of two contrasted contexts, Schneider *et al.* (2020) show the key role of local authority involvement, collaborative governance and popular trust in the authorities. This analysis concludes that proactive commitment and dynamic planning are determinant for the implementation of adaptation measures. Nonetheless, the authors also insist on the harmonization of decentralized practice, which requires national guidelines and hence, a multi-level governance mechanism. At local level, numerous studies show the need for inclusive and participatory governance (McGinlay *et al.*, 2020). Following Hurricane Sandy, Foster *et al.* (2019) emphasized the role of neighborhood community groups in information and risk awareness. This inclusive community participation can be found in the Fiji Islands (Piggott-McKellar *et al.*, 2019a-b) or in the US State of New Jersey with a collaborative and integrated conception (tourism and water management) of the adaptation strategy (Burger *et al.*, 2017). Similarly, Shi (2019) compares the adaptation strategies of Los Angeles, Miami and Boston, and is critical of the administrative fragmentation, stressing the importance of participatory governance systems through regional networks and collaborations.

1.2. An analytical framework focusing on the role of governance mechanisms

The key role of participation and anticipation can be analyzed in terms regarding the consequences on the quality of information, actor commitment and political legitimacy (McGinlay *et al.*, 2020). Legitimacy is at the heart of the framework suggested by Olazabal *et al.* (2019) who analyzed it in terms of credibility (economic, technical and scientific) on the basis of resources, types and reliability of mechanisms, skills, and monitoring and evaluation. Drawing on a synthesis of existing approaches in terms of adaptation pathways in coastal areas, Werners *et al.* (2021) formulate seven propositions that stress the need for participatory and integrated approaches as well as the role of information and monitoring and evaluation to support the definition of flexible decisions. The management conditions of complex processes (proposition n°6) emphasize the risk of *status quo* related to governance mechanisms depending on stakeholder interplay, types of mechanism and participants (see also (Zandvoort *et al.*, 2017) on the role of the planning culture and the institutional context). More generally, Werners *et al.* (2021) insist on the importance of inertia and the path-dependency processes which are at the heart of the theory of change. In this vein, a comparative study of Spain and California stresses the importance of an equilibrium between “top-down” and “bottom-up”

approaches (Serra-Llobet *et al.*, 2016) with the State's key role being to reduce the effects of climate change and promote long-term adaptation (Adger *et al.*, 2013).

In order to address the evolution of the concepts underlying, and the experience with, relocation policies in France, we crafted a framework (Figure 1) connecting: (i) the importance of institutional variables and (ii) the role of experiments in the production of knowledge and learning at local and regional levels.

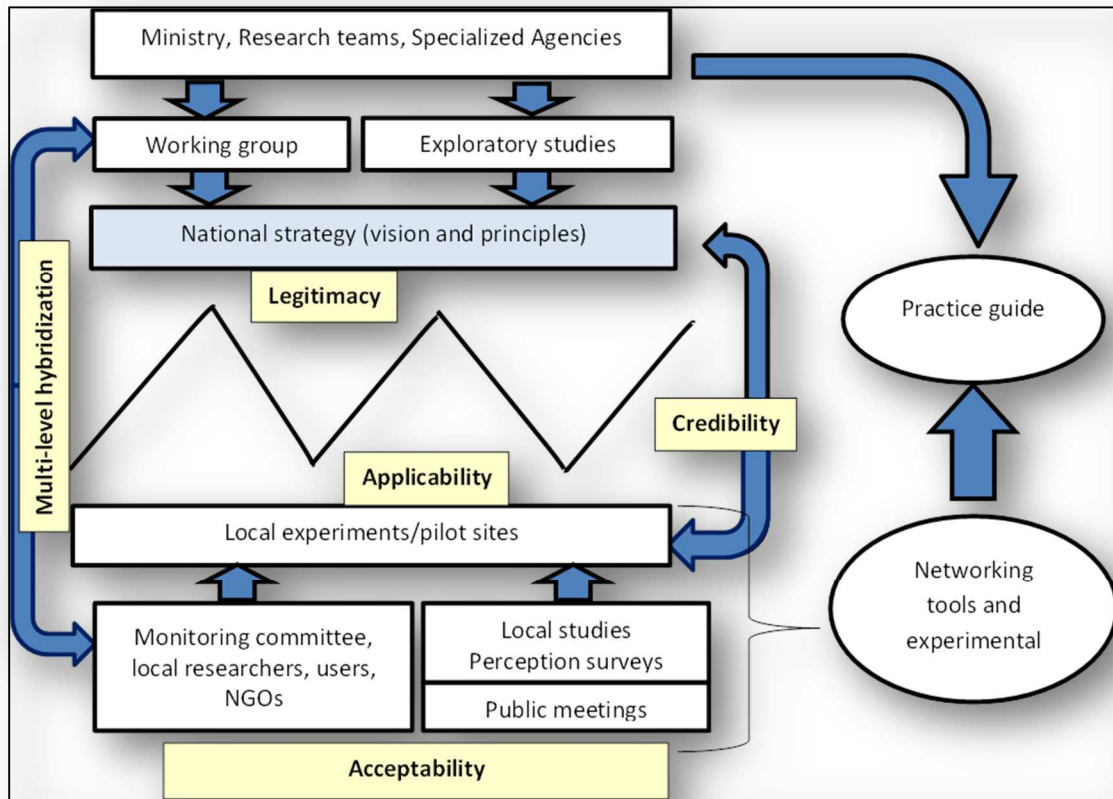


Figure 1. Interactions within the relocation governance system (Source: the authors)

The aim is to identify interactions between: i) working groups involving public administrations and scientific experts to define action principles (conceptual elements) at the national level, ii) local experiments aiming to co-produce knowledge and to study the feasibility of these principles in various contexts and iii) intermediate actors with a particular role. These interactions concern the multi-level governance modalities that are involved in making and legitimizing decisions and ensuring their acceptability. A further aim is to study the production and circulation of knowledge, recommendations and action principles in terms of credibility and legitimacy (McGinlay *et al.*, 2020) as well as their salience and applicability in the sense that they are actionable (Cash *et al.*, 2002; Kirchoff *et al.*, 2013). This multi-level construction of actionable knowledge and principles is generally adopted by studies of the epistemology of knowledge or collective and organizational learning processes. Consequently, governance mechanisms must be defined that promote dialogue between different types of actor and mobilize local understanding to facilitate the appropriation of

knowledge and the acceptability of the ensuing decisions and policies. The analysis of the conditions for the appropriation of sustainable development principles refers to double-loop learning processes (Argyris and Schön, 1978), i.e. that imply a combined change in practices, values and reference framework and, hence, specific learning processes requiring transfer and hybridization processes.

1.3. Research tools and data collection

Our analysis reviews the issue of relocation in France using a large number of surveys and interviews mainly undertaken by the authors as part of various research projects. Therefore, our material comes from a range of empirical approaches, such as semi-structured interviews with actors and managers, participatory observation of national meetings (coastline management committee, National Association of Coastal Elected Representatives...) and local level activities in different places (Region of Nouvelle-Aquitaine, *Commune* of Ault...), formation of focus groups comprising elected representatives and stakeholders at national or local level, and the documentary analysis of specific governmental and scientific reports. And to this list must be added surveys of residents in various places in the south of France. In all, there are more than fifty semi-structured interviews with actors and managers of these coastal areas, the answers to some 1 166 survey questionnaires and around ten focus groups that provide the basis for our analysis (Table 1).

We also participated in national exchange and feedback seminars (February 2013, May 2014, June 2015) related to the experimental program and seven national consultative seminars “Coastal dynamics” organized between February 2018 and September 2018 by the Ministry for Ecology. Finally, we also analyzed and attended numerous public meetings, seminars and working groups organized in the two most innovative French regions in terms of relocation, namely Occitanie and Nouvelle-Aquitaine.

Several studies have presented and analyzed these materials in different ways to deal with more specific and narrower questions (André et al., 2015 ; Clement et al., 2015 ; Rulleau et al., 2016 ; Rey-Valette et al., 2016 ; André et al., 2016 ; Rulleau et al., 2017 ; Rocle 2017 ; Rocle and Salles , 2018 ; Rey-Valette et al., 2019 ; Dachary-Bernard et al., 2019). For instance, some studies rely on textual analyses of qualitative data from interviews and focus groups whereas others rest on statistic and econometric modelling of the quantitative responses of the survey. For the purpose of this paper, this material has been analyzed in a comparative and comprehensive manner, assessing the interlinkages between applicability, legitimacy and credibility of the proposed measures as well as the importance of multi-level hybridization processes. The main objective is to provide a reflexive analysis and to account for the processes and factors that play a key role in social and political acceptability of relocation in France.

Research projects		Resident surveys	Stakeholder surveys / Focus group	Focus analysis on governance mechanisms dealing with relocation (figure 1)
ALTERNELIVE (2013-2015) Provence Alpes Côte d'Azur region	Number	401 residents Main and second homes	-	Assessing the inhabitants' acceptability for relocation and identifying some cognitive biases
	Primary Objective	Population's perception of inundation risks and evaluation of willingness to pay for building a dyke and for relocation; prioritization of compensation criteria		
SOLTER (2013-2015) Occitanie region	Number	258 main-home residents	8 workshops involving 226 people (50% local authorities) with one national workshop	Assessing the inhabitants' acceptability for relocation (surveys) + characterizing key processes of multi-level interactions between actors and institutions (focus group + interviews). Analyzing institutional arrangements and compromises (hybridization) between national government (legitimation processes) and local/regional actors concerned with measures' salience and credibility
	Primary Objective	Research-action program with managers Comparative study of inundation perceptions by hinterland and coastal populations, analysis of local solidarity and justice criteria; evaluation of residents' preferences for relocation attributes (period, progressivity, area size and type of dialogue)		
REPLI (2013-2014) GIP (Public interest group) Littoral Aquitain – Ministry for Ecology	Number	507 main- and second-home owners, tourists and day- trippers	30 semi-structured interviews with institutional actors, scientists and experts as well as coastal managers and NGOs+ analysis of a local consultative committee in Lacanau (Gironde) debating different relocation scenarios	Cross-analysis between inhabitants' acceptability (potentially risky reforms for local elected officials) and various degrees of legitimacy, credibility and salience in order to highlight the extent of global social acceptability for relocation policies
	Primary Objective	Perceptions and social representations of coastal erosion and relocation measures + analysis of participatory mechanisms and consultation process about relocation + analysis of GIP Littoral Aquitain (as a pilot regional actor) operating mode in setting the political agenda at different policy scales		

Table 1. Details of the research projects and material

2. THE WEIGHT OF THE POLITICAL AND INSTITUTIONAL CONTEXT IN SETTING THE RELOCATION AGENDA

The modes of collective action dedicated to coastal risk in France have evolved substantially in the last three decades in terms of not only tools and actor involvement but also the objectives of regulation and adaptation in the face of increasing coastal vulnerability. We present here a few highlights in the progression of the political relocation agenda in France, stressing the national injunctions and initiatives coming mostly from the Ministry for Ecology and Sustainable Development (both the scope and name of which have significantly evolved towards the notion of ecological transition). The role of public actors (research and expertise institutions, local authorities, spatial planners...) and private actors (consultants and experts, insurances...) involved alongside the State in the implementation of relocation will be addressed in the third section.

2.1. Contextualization of coastal risk governance in France

Since 1982, natural disaster prevention plans have been the main tools for risk management and prevention in France. Through zoning and related easements, these plans govern urbanization rights according to the exposure and vulnerability of areas at risk. According to Barraqué (2014), they stand as the counterpart of the national solidarity system (called CatNat system). Indeed the CatNat scheme is built on the idea of a national solidarity: it is financed by an additional premium calculated by applying a single rate to the premium of the basic insurance contract: 12% for a home/business multirisk policy and 6% for a vehicle insurance policy. Storm Xynthia in 2010 was an important factor in strengthening coastal risk prevention, with the adoption, a few weeks after the disaster, of 300 new, so-called priority, "Coastal risk prevention plans". However, over 10 years later, these prevention plans still struggle to foster the integration of climate projections into the urban planning regulations, mainly because at the local level the priority is often given to tourism and economic issues and because of their conflictual nature between State and local authorities (Robert and Schleyer-Lindenmann, 2021).

The incorporation of the EU Floods Directive (2010) into French law and into a national strategy for flood risk management introduced new tools for the management and the prevention of coastal risk (SNGRI). While centrally directed by the Ministry for Ecology, increasing responsibility has been devolved to local authorities (*communes* and *intercommunalities*) for the implementation of local strategies to manage flood-inundation risks (SLGRI). This trend continued with the transfer of skills and responsibilities for "Water resources management and flood prevention", including marine inundations, to *intercommunalities*. As regards erosion and coastline retreat, a national strategy for integrated coastal management (SNGITC) was developed in 2012 (MEDDE, 2012) and was a significant and symbolic moment: this strategy recommends both relocation and the implementation of local "shared" coastal risk management strategies. However, these two national strategies, SNGITC and SNGRI, raise problems of public policy coordination and consistency at local and area levels. They are the responsibility of two departments within the Ministry for Ecology (one with a more partnership-based tradition concerning coastal management, the other with a more top-down tradition concerning risk). Such differentiated administrative responsibility means that erosion, which

is now considered to be a foreseeable event, does not qualify for compensation under the CatNat system, which some locally-elected representatives consider to be iniquitous or unjust.

Finally, despite the existence of an 1807 law obliging residents to pay for the cost of protection against sea-related risk, which would suggest their active involvement in the required actions, the State and the local authorities have been and remain the dominant actors in coastal risk management policies and practices. The issue of coastal risk adaptation is, however, becoming increasingly urgent locally and is leading to discussion and debates which will give coastal residents and users an increasing role to play. Thus, the management of coastal risk in France depends at once on governance that is increasingly shared between the State and local authorities and on “remote government” by a traditionally centralized State that is diversifying its modes of action to promote adaptation to climate change in coastal areas. However, the growing multiplication and complexity of coastal risk instruments is leading to certain “dilemmas” for local elected representatives in their implementation (Meur-Férec and Rabuteau, 2014), one of which is asset and activity relocation.

2.2. Stages in the legitimization of relocation policies

Relocation of assets and activities, or managed retreat, has been included in many official documents in France since 1990 (Figure 2). One of the first mentions appears in a 1991⁵ instruction relative to coastal protection and development and the 1998 report of the Parliamentary Office for the Evaluation of Public Policies indicated that: *“the alternative offered to the public decision-maker [...] is mainly between two political options which are funding land protection or funding land abandonment to the sea, i.e. human and activity retreat “* (Marini, 1998). Emphasizing the *“unpopular nature [of retreat] in a country where the defense of private property is essential”* several studies of this adaptation option were undertaken, in particular as part of the Mission Littoral (Coastal Mission) and the planning agreement between the State and the Languedoc-Roussillon region between 2003 and 2004. In 2006, a circular from the Ministry for Ecology stressed *“the need to opt for managed retreat in some cases or to safeguard certain parts of the seashore from urbanization and developments with irreversible impacts”*. The national climate change adaptation strategy stipulated in 2007 that managed retreat should be *“studied and planned in the light of the predictable consequences of global warming on our coasts”* (p.77). The discussions that informed the production of a guide on *“Coastline management”* (MEDDE, 2010) and the *“Grenelle of the sea”* reasserted the need to *“establish a government position and take a strong institutional stand concerning coastline management, including facilitating the local management of the acceptability of the necessary measures (managed retreat, ...)”* (COMOP & Grenelle de la Mer, 2010, p 94).

⁵ “Nowadays, coastline recession is quasi-general and likely to worsen in the coming years. Therefore, to avoid difficult and very costly interventions, you are required to ensure that urbanization is controlled effectively in areas exposed to marine erosion, [...] and, if necessary, you will establish risk perimeter security areas that ban building or secure its retreat” (Circular letter of 22 October 1991 relating to coastline protection and development.

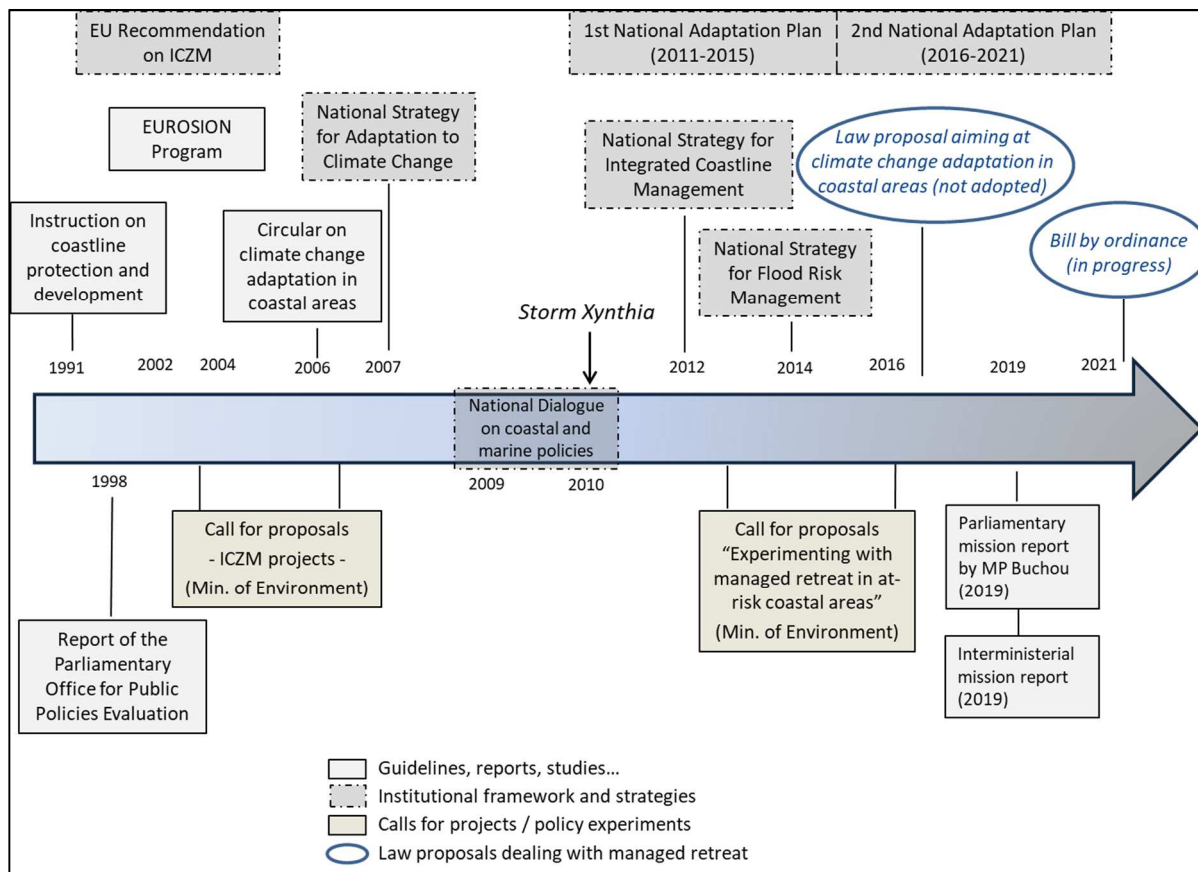


Figure 2. The progressive emergence of relocation in France (Source: the authors)

The “costs” as well as the “political risks” associated with the implementation of such an option (Gibbs, 2016; Mortreux *et al.*, 2018) have led to the use of successive terms to describe “relocation”: “withdrawal”, “managed retreat”, “asset and activity relocation” (Cousin, 2011) and, more recently, “territorial reconfiguration” (Buchou, 2019). This progression reflects the efforts of the State to reduce the aversion generated by this option amongst elected representatives. Hence, no large-scale operation has so far been undertaken on private assets in France in a preventive and planned approach⁶. Only a few works have been carried out such as moving the road on the Lido linking Sète to Marseillan, or a few houses located on a cliff in Criel-sur-Mer as part of an imminent danger and expropriation procedure (for an overview of main French examples, see (André *et al.*, 2015)).

3. BETWEEN PATH DEPENDENCE AND POLITICAL EXPERIMENTATION: WHICH ACTORS ARE THE CATALYSTS FOR CHANGE IN RELOCATION?

In accordance with our analytical framework (Figure 1), the purpose here is to present different experimental initiatives, highlighting their role in innovation and in mobilizing actors at different levels, in order to develop principles and tools (such as legal instruments on property rights, new fund dedicated to restructuring of coastal areas or local observatories among other) for the implementation of relocation. Several structuring initiatives were undertaken at national level,

⁶ On the other hand, 1 162 dwellings (located in 15 *communes*) were repurchased and demolished in the New-Aquitaine region following storm Xynthia (André, 2013).

amongst which a call for projects from the Ministry for Ecology played a catalytic role for other demonstration projects at different levels.

3.1. Strengthening the legitimacy and credibility of managed retreat in France

Both policy experiments and pilot studies reinforce legitimacy and credibility of managed retreat in France.

3.1.1. The first experimental phase at national level

The need to give some credit to this option that was considered to be unpopular led the working group presided by Alain Cousin (2010-2011) to recommend “experimental sites” within the national strategy for the integrated management of the coastline (MEDDE, 2012). In March 2012, the Ministry for Ecology launched a call for projects entitled “*Experimenting asset and activity relocation: spatial reconfiguration of areas threatened by coastal risks*” (MEDDE, 2013). The purpose was to produce a national guide of lessons learnt and recommendations for elected representatives and decision-makers. The “experimental” approach ought to allow local authorities to “test” the implementation of relocation. According to the Ministry’s chargé de mission responsible for monitoring this call for projects, the aim was to “*motivate volunteers to test and imagine how the idea of relocation could become operational*”. Hence the call for projects displayed the ambition to “*initiate and encourage the implementation of experimental and innovative, concerted and shared, pilot approaches to asset and activity relocation operations in a perspective of overarching area redevelopment, while supporting local actors in preparing these operations*” (specifications of the call for projects). Studies and experiments were to be undertaken within the existing legal framework to identify the legal and regulatory hindrances. The five sites that responded to this call were areas where coastal risk issues were already strongly established and some of them had already tested Integrated Coastal Zone Management projects. Table 2 below shows the main challenges for each pilot site, given that the program planned to address them through feasibility studies including the possibility of repurchasing some plots but without actually implementing relocation operations.

Communes (department)	Objectives
The Mediterranean coast	
Vias (Hérault)	Rebuilding of the dune system and adaptation of 14 camping sites and 3 000 informal second or main homes for people living in precarious conditions.
Hyères les Palmiers (Var)	Relocation of a road, (agricultural and sea-side) activities and an airport
The Atlantic coast	
Ault (Somme)	Relocation of 80 houses due to cliff erosion
Lacanau and La teste de Buch (Gironde) Labenne (Landes)	Relocations due to erosion in a Lacanau neighbourhood (1 200 dwellings and some twenty shops), 5 camp sites in La teste de Buch, and public amenities (2 shops, car park, play area) in Labenne
Overseas	
Petit Bourg, Le Prêcheur (Guadeloupe)	Ensuring asset safety in the face of cliff erosion in Petit Bourg and evolution of the urban model in the Prêcheur (roads, dwellings and public buildings)

Table 2: Brief presentation of experimental areas (Source: from CEREMA 2020)

State rhetoric in favor of experimental approaches aims to “put on the table” and facilitate the appropriation of the relocation option. These experiments are a means to involve local authorities and thereby hold them responsible for regulating the coastal issue. Several areas have adopted this mobilizing rhetoric and have subscribed as innovative regions, such as the Public Interest Group Littoral Aquitaine (GIP) (see section 4.1). National seminars have been organized and a shared platform set up to facilitate the diffusion of experiences and concerns. However, at the end of these trials, a guide, drawing on the lessons, that presented 40 management proposals (National Committee for the monitoring of the national integrated management of the coastline, 2015) was considered insufficient and demands have gradually emerged for regulatory and funding progress to allow adaptive planning and management.

3.1.2. Key actors multiply demonstration and experimental initiatives

Some major institutional actors, in particular the Conservatoire du littoral (Coastal Conservation Authority), CEREMA (Centre for Studies and Expertise on Risks, Environment, Mobility, and Urban and Country/Land Planning) and some departments or regions have experimented using various pilot sites⁷⁸. These initiatives, especially from the Coastal Conservation Authority, are often an extension of actions to raise awareness of the dynamic nature of the coastline and to promote “flexible management” practices and “nature-based solutions”. Thus, following discussions and seminars that began in 2000 on the land consequences and the types of response (“resist”, “suffer”, “adapt”) in the face of sea-level rise (Clus-Auby *et al.*, 2004), the Coastal Conservation Authority supported two experimental projects that have played a structuring role. The LiCCo project (2011-2014) (*Living with a changing coastline*), in partnership with the Environment Agency (UK), relied on “workshop sites” to develop experience sharing and know-how, in particular as regards communication, awareness-raising and ways to adapt to coastal risk. The Ad’Apto Life project (2017-2021), with ten pilot sites in France (including one in Guyana and another in Corsica), aimed to “show concretely, with local examples, that well thought-out anticipation accepting the mobility of the land-sea interface in preserved natural spaces is possible”. It proposed to experiment with new modes of action and new partnerships, according to “field conditions” and the numerous future factors of change. Through these projects, the Coastal Conservation Agency has adopted best practice in seeking to encourage imitation and the diffusion of new practices.

Subsequently, many other experimental initiatives have been developed at a smaller scale, often led by *intercommunalities*, supported by the Regions and the Departments, as mentioned in the Buchou report (2019). For example, the joint association of the Baie de Somme, or more recently, an approach coordinated since 2019 by the Association of Elected Coastal Representatives (ANEL) and the CEREMA sought to develop, experiment and enhance integrated coastal management approaches in the face of coastal risk.

⁷ The Coastal and Lakeside Conservatory, created by a law of July 1975, has as its mission to preserve coastal areas and their ecological equilibrium using a land-planning control policy.

⁸ The mission of the CEREMA (Centre for Studies and Expertise on Risks, Environment, Mobility, and Development) is to address the significant societal challenges of sustainable development and the management of areas and towns. It supports and helps the State and local authorities in their development and mobility policies whilst experimenting new services and solutions.

3.2. Enhancement of Public acceptability

Alongside, or as part of, these experimental projects, there has been a multiplication of surveys to take into account the perceptions and the behaviors of the inhabitants of coastal *communes* (main and second-home residents) and beach users (tourists and day-trippers). Numerous studies have noted the psychological and socio-economic constraints, in particular related to people's attachment to the place in the populations directly affected by relocation (King *et al.*, 2014; Rey-Valette *et al.*, 2018; Treuer *et al.*, 2018).

Several surveys have been undertaken in France in various contexts (some are mentioned in Table 1). The synthesis of the results of ten surveys undertaken in France between 2007 and 2017 (Rey-Valette *et al.*, 2019) showed varied perceptions according to the type of population (main-home or second-home residents, tourists) as well as the impact of institutional factors on acceptability according to the level of legitimacy and trust granted to the institutions. The analyses distinguish two categories of acceptability factors: socio-technical depending on the nature of the measures and political in terms of legitimacy, concertation and the degree of integration into local policies. For example, one of the objectives of the SOLTER research program ("Territorial Solidarity and Strategies for Coastal Resilience to marine flooding") was to study the preferences of populations for a possible relocation strategy on the basis of four main modalities: concertation arrangements, timing of relocation implementation, schedule (or progressivity) of relocation implementation and a scaled additional cost⁹. It is noteworthy that residents prefer a concerted relocation policy when defining the size of the area concerned and selecting the compensation criteria. They also want a progressive approach, implemented over 15 to 30 years. On the other hand, these preferences are heterogeneous according to people's risk perception, in particular for the financial arrangements: contribute little to a small delocalized area or pay a lot in the case of a larger area (Dachary *et al.*, 2019). The same program showed that inhabitants envisaged that payment for these operations would come from national or regional taxes, i.e. in line with a principle of broad solidarity. The survey undertaken in the ALTERNELIVE project within the framework of the experiment in Provence Alpes Côte d'Azur (Hyères les Palmiers, Table 2) showed the existence of cognitive biases (optimism bias) concerning the continuation of current solidarity-based insurance conditions and the absence of a downturn in the housing market (Rulleau and Rey-Valette, 2017).

3.3. Applicability of "spatial reconfiguration" of coastal areas.

In line with the development of terminology, recent thinking has proposed the notion of "coastal dynamics" for erosion (dissociated from inundation) and "spatial reconfiguration" to stress the need for an integrated approach to risk in terms of area development. The idea is to re-design areas as a function not only of future risks and the outlook for the coastline but also of societal evolution and its attractiveness in a changing world (development of tourist demand, new construction norms, mobility, positive energy areas, biodiversity preservation, landscape valuation, management of heat islands...). This evolution requires thinking in terms of a very diverse range of reconfiguration

⁹ For further information on the survey protocol and the choice experiments scenarios, cf. (Dachary-Bernard *et al.*, 2019).

modalities depending on the types of area, the modes of urbanization and the types of coastal economy aligned with traditional development planning tools (Robert and Schleyer-Lindenmann, 2021).

At the end of the previous phases and drawing on the lessons of the experiments, especially in terms of financial needs for asset compensation, an inter-ministerial mission proposed some principles to operationalize reconfiguration (CGEDD/IGA/IGF, 2019). The main proposal is for new anticipatory repurchase systems to reduce compensation costs. Public authorities would purchase the freehold and propose tenancies to the residents for a duration determined by the temporal dimension of risk. At the same time, a new tax is being considered for property transactions in coastal areas (0.2% above €100 000). These proposals are based on a precise evaluation of damage in the year 2040 (CEREMA, 2019) and will be included in the Buchou report (2019) in the form of 15 recommendations which are currently being debated to develop a draft law (simplified procedure established by ordinance) that should be put to the vote during the first semester of 2021. Although these new guidelines emphasize their integrated nature and the need to inform the relevant populations, the adaptive and sequential nature of the measures' implementation tends to be overlooked, except that a distinction is made between two reference periods: areas vulnerable within the next 30 years (with very strict constraints) and those at risk beyond 30 years where small-scale changes may be envisaged as long as they are part of a global project of spatial reconfiguration approved by the State. Taking into account this sequential nature would, however, require institutional innovations (Rocle *et al.*, 2020), the feasibility of which in the face of inertia in public action practices and rules has yet to be widely addressed.

4. DISCUSSION

The previous description of the phases, actors and mechanisms in the case of France illustrates the importance of multi-level processes that allow for the co-construction of hybrid approaches and the reinforcement of the conditions of legitimacy, credibility and operability of relocation. This type of multi-level process enables collective learning and benefits all national and regional actors by contributing to the gradual acceptance of relocation. Thus the feedback on actions towards the legitimization and operationalization of relocation shows, in line with our analytical framework and the literature, the decisive role of governance conditions, especially the synergies between scales and types of actor (State and local authorities). Hence, this analysis identifies a set of institutional factors that are determinant for relocation in the French context. We seek to discuss these factors in terms of strengths or constraints to identify the levers that favor the appropriation of knowledge and the implementation of relocation actions.

4.1 From experiments to legislation: the role of “political entrepreneurs” to strengthen legitimacy and applicability

Highlighting multi-level interactions and multi actors within experiments and pilot projects elucidates the processes of hybridization of knowledge favorable to the progressive appropriation of relocation as an adaptation solution. We note that there is a process for the institutionalization of relocation (Figure 3) through the emergence of a national vision and calls for projects within which some actors

appropriate these experiments and use them as political arenas to fuel national, regional or local coastline management strategies.

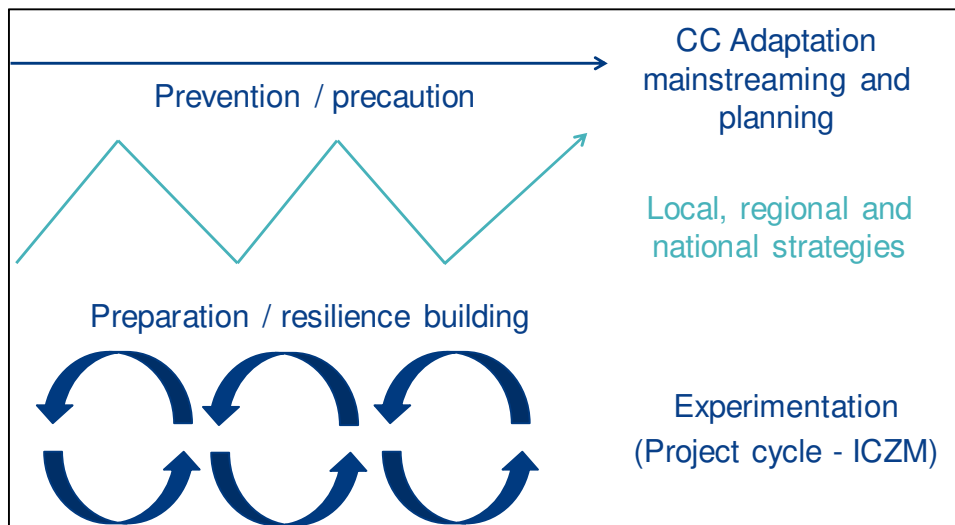


Figure 3. Outline of the politization pathways in coastal zone adaptation (Source: Rocle, 2017))

Experimental projects may be considered as “incubators” for conceiving and testing new ideas, with the goal of expanding beyond the sites concerned to mainstream adaptation into more traditional coastline management plans and tools. However, it is fitting to reflect upon the conditions in which these projects may incubate and diffuse: experiments follow a logic based on “pilot sites” and “demonstration projects” where assumptions and limits in terms of scaling-up and more systemic changes have already been discussed (e.g. Sanderson, 2002). The *a posteriori* analysis of the call for projects launched by the Ministry for Ecology shows how some actors can carry demands coming from the experimental arrangement into other public and political arenas. The key role of the Coastline Public Interest Group (GIP Littoral) should be stressed with its board of directors including the State and all the local authorities along the New Aquitaine coast. Its institutional structure and modes of action, based on engineering and political information resources (in particular from the numerous political functions of the Board of Directors’ president at national and regional levels), helped to establish the trust and legitimacy necessary to propose different measures and innovations for relocation at the national level (Rocle, 2017).

Rocle and Salles (2018) refer to this group as a “boundary entrepreneur” in coastal public action, highlighting its role as a bridging organization between different sectors and between different levels of public action, and also its power to convince and persuade in achieving structural changes. Having supported a project in three pilot sites (Table 2), it participated in debates and discussions at both local level for the town of Lacanau (the French site where discussions on the issue are the most advanced) and national level. Many recommendations were included in the draft law concerning the adaptation of coastal areas to climate change tabled in the National Assembly in 2016. This draft bill was not adopted because of a change in the parliamentary term during the 2017 presidential election but it inspired other projects and draft bills, in particular, the draft ordinance put forward by the Ministry for Ecology currently being discussed in Parliament.

4.2 The emergence of “communities of practice” to enhance applicability and acceptability

Following calls for projects that attracted the interest of different scientific, managerial or institutional actors, a large number of partnership research projects have contributed to the study of relocation feasibility conditions over the past decade. These projects have gradually created communities of researchers and managers whilst contributing both new knowledge on relocation in the French context and legal, financial and institutional proposals to advance local projects. For example, the SOLTER project (Rey-Valette *et al.*, 2016) showed the important role played by discussions of survey results and of the scenarios that were co-constructed within the project. This research-action project was based on a close partnership between researchers and managers. An *a posteriori* survey of the wider group (7 researchers and 10 stakeholders) driving the project was undertaken to assess their perceptions of this type of collaborative research and its results, and to investigate the motivations behind their engagement. On a scale of 0 to 10, several project effects scored 7 and above: learning (7), the dynamic character of participation (7.2) and the hybridization process within the group (7.8). However, the issues concerning the focus of the approach (4) and the over-investment in working hours (4.2) scored poorly. All respondents replied that they would use the results of their work, bearing in mind that for two thirds of them, the results were innovative in the sense that they raised unanticipated issues. For managers, the main outcomes were, in decreasing order, a deeper examination of the relocation issue, the new interactions with researchers, the co-construction of a relocation implementation protocol and the identification of solidarity with the hinterland, which was a central project theme. Finally, there were numerous motivations behind the different forms of engagement, relating to a “community of practice” centered on learning and sociability, or to a “community of project” more centered on results.

4.3 Inertia factors as a limit to acceptability of relocation

In France, natural disaster insurance (excluding agriculture) is governed by two complementary systems: the “traditional” private contract system covering insurable natural risks and the public natural disaster insurance system (“CatNat”) covering uninsurable natural hazards (Grislain-Létrémy and Peinturier, 2010). Under the latter scheme, the State provides damage compensation once a state of natural disaster for the period concerned, the *commune(s)* affected, and the nature of damages covered by the insurance has been declared by joint ministerial decree (article L.125-1 of the insurance code). At the request of a *commune*, the departmental prefect liaises with a joint ministerial commission that, having sought expert opinion, establishes the exceptional character of the natural event responsible for the damage. The recognition of the event as a natural disaster gives victims the right to claim compensation. This CatNat system requires therefore coordination between actors (mayor, prefect, joint ministerial commission) and the mobilization of scientific expertise to support political decision-making, increasing its legitimacy and role in risk management. Nonetheless, the system may be criticized for its limits and the inertia that it helps to create, as highlighted in the literature, independently of special insurance conditions (Adler *et al.*, 2019; Foster *et al.*, 2019). Associated with preventive zoning plans, it seems to provide solid financial support to households without creating any incentives for them to take the mitigation measures deemed useful (Poussin *et al.* 2013), even reducing the efficiency of preventive systems (Dachary-Bernard *et al.*, to be published) by creating a form of “financial security” (Cazaux *et al.*, 2019). In addition to this weak incentive effect, the CatNat system may also produce a crowding-out effect because being able to

benefit from State assistance in the case of a claim may reduce the individual incentive to insure privately (Kousky *et al.*, 2018). It may also create a moral hazard with households tempted to settle in vulnerable areas as they expect to be compensated in case of natural disaster, as has been shown in Germany and the United States (Hudson *et al.*, 2017). It should be noted, however, that in France, the role of the joint ministerial commission in the process means that compensation cannot be taken for granted (Cazaux *et al.*, 2019). Finally, the “CatNat” system is also presented as a source of inertia by delaying risk awareness because it requires damaged properties to be rebuilt as they were (Huteau, 2016).

Inertia is also produced by the heterogeneous nature of people’s acceptability of relocation strategies. As shown above, the analysis of the preferences of Béziers residents (Solter project, Table 1) showed genuine support for a concerted relocation policy, i.e. involving them in the approach and the implementation modalities. Nonetheless, these preferences proved to be heterogeneous and distributed according to people’s degree of risk exposure and their feeling of being in an area at risk (Dachary *et al.*, 2019). This clearly illustrates the existence of optimism bias. Our study identified two groups: the “unaware individualists” in the sense that they favor individual approaches, individual responsibility and significant compensation for a small number of people; the “informed solidarity” people, who, even not directly concerned by flooding, tend to have greater risk awareness. The optimism bias represents a kind of inertia at the level of individuals who are unaware of the risks to which they are exposed. Preference heterogeneity does not help decision-making when the public actor is keen for the support of the whole population to reduce political risks (Gibbs, 2013; 2016).

5. CONCLUSION

This retrospective and dynamic analysis of putting relocation on the agenda in France highlights the role of multi-level interactions between the approach of government departments, national public actors and institutions and the numerous experiments at local and regional levels to integrate risk issues and regional development strategies. The proposed analytical framework enables certain inertia factors to be identified together with the levers favoring relocation within political decentralization or recentralization movements.

It is noteworthy that this notion, proposed in various guises from the beginning of the 1990s, was put on the political agenda by the drafting of a national strategy in response to the heavy damage caused by storm Xynthia in 2010. However, it is the numerous experiments, driven initially by the State and later supported by various public actors that have promoted the political legitimization and credibility of this measure. The analysis addresses the articulation of the processes as a function of the scales and actors and shows the importance of a multi-level governance to facilitate the legitimacy, credibility, applicability and acceptability of these policies. Experiments were found to have a key role in the creation of a hybridization process between scales and types of actor thereby promoting collective learning and operational propositions. As regards inertia factors, the emphasis is placed on insurance practices and on the heterogeneity of residents’ preferences, in particular the existence of cognitive biases concerning risk perception.

The implementation of a true adaptive strategy (of the type used in Haasnoot's work in the Netherlands (Haasnoot et al., 2013 ; Haasnoot et al., 2021)) implies an adjustment of public action procedures and a strengthening of monitoring and evaluation measures. For now, this type of approach is presented as the objective to be reached in the medium term because it implies profound transformations in public practices and in mentalities. For the time being, elected officials and managers emphasize the need for a preliminary phase based on three axes: modification of regulations (notably the procedures for buying back properties), increased number of new experiments, development of new tools for monitoring and evaluating the results, and reinforcement of communication and awareness actions. The current logic of public action is sequential rather than adaptive.

While the principles for relocation implementation emphasize the temporal scales and stress the need for an approach in terms of adaptation pathways and progressivity in response to developments, the “interplay of scales” at spatial and institutional levels requires an expansion of current frameworks and new forms of collaboration, mutualization, and even solidarity between local authorities. It is essential to acquire planning and management tools that allow a broad approach to urbanization including land-use and fiscal strategies at a minimum scale of a coastal sedimentary unit. The expected migratory flows of residents requiring relocation in the medium term needs to be addressed at a larger scale integrating hinterland communities and anticipating both the unwillingness to leave of those required to relocate and the reluctance and resistance of hinterland residents to integrate these new demographic flows. This appears to be a current research issue which, beyond the psycho-social blockages identified in relation to risk perceptions, strengthens the need for dialogue and calls into question the innovative and driving capacity of institutions.

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BIBLIOGRAPHY

- Abel, N., Wise, R.M., Colloff, M.J., Walker, B.H., Butler, J.R., Ryan, P., Norman, C., Langston, A., Anderies, J.M., Gorddard, R., 2016. Building resilient pathways to transformation when “no one is in charge” insights from Australia's Murray-Darling Basin. *Ecology and Society* 21 (2).
- Adger, W.N., Barnett, J., Brown, K., Marshall, N., O'brien, K., 2013. Cultural dimensions of climate change impacts and adaptation. *Nature climate change* 3, 112-117.
- Adler, D., Burger, M., Moore, R., Scata, J., 2019. Changing the National Flood Insurance Program for a Changing Climate. *Envtl. L. Rep. News & Analysis* 49, 10320.
- André, C., Boulet, D., Rey-Valette, H., Rulleau, B., 2016. Protection by hard defence structures or relocation of assets exposed to coastal risks: contributions and drawbacks of cost-benefit

- analysis for long-term adaptation choices to climate change. *Ocean & coastal management* 134, 173-182.
- André, C., Sauboua, P., Rey-Valette, H., Schauner, G., 2015. Acceptabilité et mise en œuvre des politiques de relocalisation face aux risques littoraux: perspectives issues d'une recherche en partenariat. *VertigO-la revue électronique en sciences de l'environnement* 15.
- André, C., 2013. Analyse des dommages liés aux submersions marines et évaluation des coûts induits aux habitations à partir de données d'assurance: perspectives apportées par les tempêtes Johanna (2008) et Xynthia (2010). PhD Thesis, Université de Bretagne occidentale-Brest.
- Argyris, C., Schön, D.A., 1978. A theory of action perspective. Addison-Wesley Publishing Company.
- Barraqué, B., 2014. The common property issue in flood control through land use in France. *Journal of Flood Risk Management* 10, 182-194.
- Buchou, S., 2019. *Quel littoral pour demain ? Vers un nouvel aménagement des territoires côtiers adapté au changement climatique*. Rapport remis à Monsieur le Premier Ministre et à Madame la Ministre de la Transition Écologique et Solidaire, 113p. [online] https://www.ecologique-solidaire.gouv.fr/sites/default/files/2019.11.29_Quel-littoral-pour-demain.pdf.
- Burger, J., O'Neill, K.M., Handel, S.N., Hensold, B., Ford, G., 2017. The shore is wider than the beach: Ecological planning solutions to sea level rise for the Jersey Shore, USA. *Landscape and urban planning* 157, 512-522.
- Cash D., Clark W., Alcock F., Dickson N. ? Eckley N., Jäger J., 2002. Salience, Credibility, Legitimacy and Boundaries: Linking Research, Assessment and Decision Making. Working Papers RWP02-046, Series Harvard University, November 2002, 25 p.
- Clément, V., Rey-Valette, H., Rulleau, B., 2015. Perceptions on equity and responsibility in coastal zone policies. *Ecological Economics* 119, 284-291.
- CEREMA (Centre d'Études et d'Expertise sur les Risques, l'Environnement, la Mobilité et l'Aménagement), 2020. Adaptation des territoires littoraux méditerranéens au changement climatique. Phase 1 Benchmarking des expériences existantes, Rapport d'étude, 88 p.
- CEREMA (Centre d'Études et d'Expertise sur les Risques, l'Environnement, la Mobilité et l'Aménagement), 2019. *Évaluation prospective des enjeux affectés par le recul du trait de côte*. Rapport, 4p. https://www.cerema.fr/system/files/documents/2019/10/evaluation_enjeux_potentiellement_atteints_part_recul_trait_cote_v_octobre_2019.pdf
- CGEDD-IGA-IGF, 2019. Recomposition spatiale des territoires littoraux. Rapport Ministère de la Transition Ecologique et Solidaire - Ministère de l'Intérieur - Ministère de l'Action et des Comptes Publics, Paris, 234 p.
- Clus-Auby, C., Paskoff, R., Verger, F., 2004. Impact du changement climatique sur le patrimoine du Conservatoire du Littoral. Scénarios d'érosion et de submersion à l'horizon 2100. Paris, Conservatoire du littoral

- Committee for the monitoring of the national integrated management of the coastline. 2015. "40 Mesures pour l'adaptation des territoires littoraux au Changement Climatique et à la gestion intégrée du Trait de Côte " 32p.
- COMOP & GRENELLE DE LA MER, 2010. Rapport final du Comité Opérationnel Aménagement, Protection et Gestion des espaces littoraux (COMOP 6).
- Cousin A., 2011. Propositions pour une stratégie nationale de gestion du trait de côte, du recul stratégique et de la défense contre la mer, partagée entre l'État et les collectivités territoriales. Rapport présenté par Monsieur Alain COUSIN, Député de Manche. Paris.
- Dachary-Bernard, J., Vergneau, F., à paraître. La métropole bordelaise et le risque inondation - une analyse des prix immobiliers, in Changements globaux : les métropoles estuariennes au défi de l'anticipation, Denis Salles, Glenn Mainguy & Charles De Godoy Leski Eds., coll. Iste.
- Dachary-Bernard, J., Rey-Valette, H., Rulleau, B., 2019. Refining the analysis of coastal and hinterland community preferences for attributes of managed retreat: the key-role of risk perception. *Journal of Environmental Management*, 232, 772-780.
- Foster, S., Leichenko, R., Nguyen, K.H., Blake, R., Kunreuther, H., Madajewicz, M., Petkova, E.P., Zimmerman, R., Corbin-Mark, C., Yeampierre, E., 2019. New York City Panel on Climate Change 2019 report chapter 6: community-based assessments of adaptation and equity. *Annals of the New York Academy of Sciences* 1439, 126-173.
- Haasnoot, M., Lawrence, J., Maignan, A.K., 2021. Pathways to coastal retreat. *Science* 372, 1287-1290.
- 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, 485-498.
- Hino, M., Field, C.B., Mach, K.J., 2017. Managed retreat as a response to natural hazard risk. *Nature Climate Change* 7, 364.
- Hudson, P., Wouter Botzen, W.J., Czajkowski, J., Kreibich, H., 2017. Moral Hazard in Natural Disaster Insurance Markets: Empirical Evidence from Germany and the United States. *Land Economics* 93, 179-208.
- Huteau, C., 2016. Le déplacement en zones côtières : entre anticipation et gestion des risques naturels. Perspectives juridiques. PhD thesis, Faculté de droit et de science politique, Université de La Rochelle. 445 p.
- Iorns Magallanes, C.J., Stoverwatts, J., 2020. Adaptation to Sea-Level Rise: Local Government Liability Issues. Victoria University of Wellington Legal Research Paper.
- IPCC, 2019. IPCC Special Report on the Ocean and Cryosphere in a Changing Climate [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegria, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.)]. In press.

- King, D., Bird, D., Haynes, K., Boon, H., Cottrell, A., Millar, J., Okada, T., Box, P., Keogh, D., Thomas, M., 2014. Voluntary relocation as an adaptation strategy to extreme weather events, *International Journal of Disaster Risk Reduction* 8, 83-90.
- Kirchhoff, C.J., Lemos, M.C., Dessai, S., 2013. Actionable knowledge for environmental decision making: broadening the usability of climate science. *Annual review of environment and resources* 38, 393-414.
- Kool, R., Lawrence, J., Drews, M., Bell, R., 2020. Preparing for sea-level rise through adaptive managed retreat of a New Zealand stormwater and wastewater network. *Infrastructures* 5, 92
- Kousky, C., Michel-Kerjan, E.O., Raschky, P.A., 2018. Does federal disaster assistance crowd out flood insurance? *Journal of Environmental Economics and Management* 87, 150-164.
- Lesnikowski, A., Ford, J., Biesbroek, R., Berrang-Ford, L., Maillet, M., Araos, M., Austin, SE., 2017. What does the Paris agreement mean for adaptation? *Climate Policy* 17, 825–831.
- Marini, P., 1998. Les actions menées en faveur de la politique maritime et littorale de la France. Rapport d'information de M. Philippe MARINI fait au nom de l'Office parlementaire d'évaluation des politiques publiques, n°345 (1997-1998), Paris, Assemblée Nationale et Sénat.
- McGinlay, J., Jones, N., Clark, J., Maguire-Rajpaul, V.A., 2020. Retreating coastline, retreating government? Managing sea level rise in an age of austerity. *Ocean and Coastal Management* 204, 105458.
- McGranahan, G., Balk, D., Anderson, B., 2007. The rising tide: assessing the risks of climate change and human settlements in low elevation coastal zones. *Environment and Urbanization* 19, 17-37.
- MEDDEM (Ministère de l'Écologie, de l'Énergie, du Développement Durable et de la Mer), 2010. La gestion du trait de côte, Versailles, Éditions Quae.
- MEDDE (Ministère de l'Écologie, du Développement Durable et de l'Énergie), 2012. Stratégie nationale de gestion intégrée du trait de côte. Vers la relocalisation des activités et des biens. http://webissimo.developpement-durable.gouv.fr/IMG/pdf/sngitc_20120301_cle211b7c.pdf
- MEDDE (Ministère de l'Écologie, du Développement Durable et de l'Énergie), 2013. Vers la relocalisation des activités et des biens - 5 Territoires en expérimentation - Séminaire national de lancement du 14 février 2013
- MEDDE (Ministère de l'Écologie, du Développement Durable et de l'Énergie), 2014. Vers la relocalisation des activités et des biens - 5 Territoires en expérimentation – Actes du séminaire à mi-parcours du 19 mai 2014
- MEDDE (Ministère de l'Écologie, du Développement Durable et de l'Énergie), 2015, *Vers la relocalisation des activités et des biens – 5 Territoires en expérimentation – Actes du séminaire national de Restitution* du 30 juin 2015. Paris, 79 p.
- Meur-Férec, C., Rabuteau, Y., 2014. Plonevez-les-Flots : un territoire fictif pour souligner les dilemmes des élus locaux face à la gestion des risques côtiers. *L'Espace géographique* 43, 18-34.

- Mortreux, C., de Campos, R.S., Adger, W.N., Ghosh, T., Das, S., Adams, H., Hazra, S., 2018. Political economy of planned relocation: A model of action and inaction in government responses. *Global Environmental Change* 50, 123-132.
- Moss, R.H., Meehl, G.A., Lemos, M.C., Smith, J.B., Arnold, J.R., Arnott, J.C., Behar, D., Brasseur, G.P., Broomell, S.B., Busalacchi, A.J., Dessai, S., Ebi, K.L., Edmonds, J.A., Furlow, J., Goddard, L., Hartmann, H.C., Hurrell, J.W., Katzenberger, J.W., Liverman, D.M., Mote, P.W., Moser, S.C., Kumar, A., Pulwarty, R.S., Seyller, E.A., Turner, B.L., Washington, W.M., Wilbanks, T.J., 2013. Hell and High Water: Practice-Relevant Adaptation Science. *Science* 342, 696-698.
- Nordstrom, K.F., Armaroli, C., Jackson, N.L., Ciavola, P., 2015. Opportunities and constraints for managed retreat on exposed sandy shores: Examples from Emilia-Romagna, Italy. *Ocean & Coastal Management* 104, 11-21.
- Olazabal, M., Galarraga, I., Ford, J., Sainz De Murieta, E., Lesnikowski, A., 2019. Are local climate adaptation policies credible? A conceptual and operational assessment framework. *International Journal of Urban Sustainable Development* 11(3), 277-296
- Orton, P., Fernald, S., Marcell, K., Brooks, B., van Prooijen, B., Chen, Z., 2019. Surge Barrier Environmental Effects and Empirical Experience Workshop Report.
- Piggott-McKellar, A.E., McNamara, K.E., Nunn, P.D., Sekinini, S.T., 2019. Moving people in a changing climate: lessons from two case studies in Fiji. *Social Sciences* 8, 133.
- Piggott-McKellar, A.E., McNamara, K.E., Nunn, P.D., Watson, J.E., 2019. What are the barriers to successful community-based climate change adaptation? A review of grey literature. *Local Environment* 24, 374-390.
- Porro, R., Kim, K., Spirandelli, D., Lowry, K., 2020. Evaluating erosion management strategies in Waikiki, Hawaii. *Ocean & Coastal Management* 188, 105113.
- Poussin, J.K., Botzen, W.J.W., Aerts, J.C.J.H., 2013. Stimulating flood damage mitigation through insurance: an assessment of the French CatNat system. *Environmental Hazards* 12, 258-277.
- Rasmussen, D. J., Oppenheimer, M., Kopp, R., Strauss, B., Kulp, S., 2020. Physical extreme sea level metrics may misrepresent future flood risk. *Earth and Space Science Open Archive*, Published Online: Sat, 20 Jun 2020 <https://doi.org/10.1002/essoar.10503428.1>
- Rey-Valette, H., Rocle, N., Vye, D., Mineo-Kleiner, L., Longépée, E., Bazart, C., Lautredou-Audouy, N., 2019. Acceptabilité sociale des mesures d'adaptation au changement climatique en zones côtières: une revue de dix enquêtes menées en France métropolitaine. *VertigO-la revue électronique en sciences de l'environnement* 19.
- Rey-Valette, H., Robert, S., Rulleau, B., 2019. Resistance to relocation in flood-vulnerable coastal areas: a proposed composite index. *Climate Policy* 19, 206-218.
- Rey-Valette, H., Sauboua, P., André, C., Schauner, G., 2016. La gouvernance des territoires littoraux face aux enjeux de la relocalisation des biens et des activités en réponse à la montée du niveau de la mer. *Canadian Journal of Regional Science* 39, 61-67.

- Robert, S., Schleyer-Lindenmann, A., 2021. How ready are we to cope with climate change? Extent of adaptation to sea level rise and coastal risks in local planning documents of southern France. *Land Use Policy* 104, 105354.
- Rocle, N., Rey-Valette, H., Bertrand, F., Becu, N., Long, N., Bazart, C., Vye, D., Meur-Ferec, C., Beck, E., Amalric, M., Lautrédou-Audouy, N., 2020. Paving the way to coastal adaptation pathways: An interdisciplinary approach based on territorial archetypes. *Environmental Science & Policy* 110, 34-45.
- Rocle, N., Salles, D., 2018. "Pioneers but not guinea pigs": experimenting with climate change adaptation in French coastal areas. *Policy Sciences* 51, 231-247.
- Rocle, N., 2017. L'adaptation des littoraux au changement climatique : une gouvernance performative par expérimentations et stratégies d'action publique. Thèse de doctorat en sociologie, Université de Bordeaux, <https://tel.archives-ouvertes.fr/tel-01769993/document>
- Rulleau, B., Rey-Valette, H., Clément, V., 2016. Impact of justice and solidarity on the acceptability of managed realignment. *Climate Policy* 17(3), 361-377.
- Rulleau, B., Rey-Valette, H., 2017. Forward planning to maintain the attractiveness of coastal areas: choosing between seawalls and managed retreat. *Environmental Science & Policy* 72, 12-19
- Sanderson, I., 2002. Evaluation, policy learning and evidence-based policy making. *Public Administration* 80(1), 1–22.
- Scata, J., 2020. A Rising Tide Lifts All Damage Costs: The Need for a Federal Flood Protection Standard. *Natural Resources & Environment* 34(4), 21-24.
- Schneider, P., Lawrence, J., Glavovic, B., Ryan, E., & Blackett, P., 2020. A rising tide of adaptation action: Comparing two coastal regions of Aotearoa-New Zealand. *Climate Risk Management* 30, 100244.
- Serra-Llobet, A., Conrad, E., Schaefer, K., 2016. Governing for integrated water and flood risk management: comparing top-down and bottom-up approaches in Spain and California. *Water* 8(10), 445.
- Shi, L., 2019. Promise and paradox of metropolitan regional climate adaptation. *Environmental Science & Policy* 92, 262-274.
- Shi, L., & Varuzzo, A. M., 2020. Surging seas, rising fiscal stress: Exploring municipal fiscal vulnerability to climate change. *Cities* 100, 102658.
- Siders, A.R., Keenan, J.M., 2020. Variables shaping coastal adaptation decisions to armor, nourish, and retreat in North Carolina. *Ocean & Coastal Management* 183, 105023.
- Siders, A.R., 2019. Managed Retreat in the United States. *One Earth* 1, 216-225.
- Sterzel, T., Lüdeke, M.K., Walther, C., Kok, M.T., Sietz, D., Lucas, P.L., 2020. Typology of coastal urban vulnerability under rapid urbanization. *Plos one* 15, e0220936.

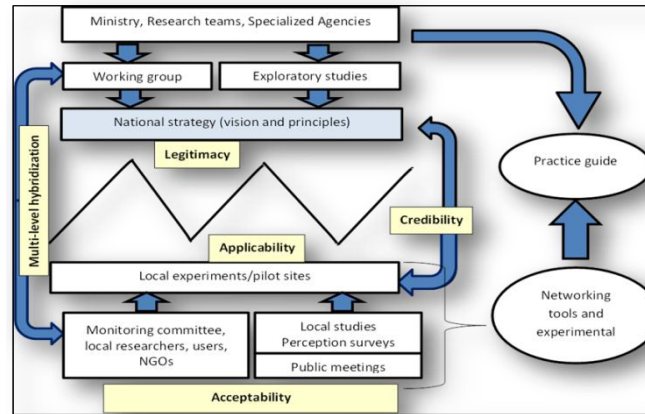
- Teurer, G., Broad, K., Meyer, R., 2018. Using simulations to forecast homeowner response to sea level rise in South Florida : will stay or will they go ? *Global environmental change* 48, 108-118.
- Werners, S.E., Wise, R.M., Butler, J.R.A., Totin, E., Vincent, K., 2021. Adaptation pathways: A review of approaches and a learning framework. *Environmental Science and Policy* 116, 266-275.
- Zandvoort, M., Campos, I.S., Vizinho, A., Penha-Lopes, G., Lorencová, E.K., van der Brugge, R., van der Vlist, M.J., van den Brink, A., Jeuken, A.B., 2017. Adaptation pathways in planning for uncertain climate change: Applications in Portugal, the Czech Republic and the Netherlands. *Environmental Science & Policy* 78, 18-26.

Towards the legitimization and operationalization of relocation in France

What are the institutional factors that are determinant for relocation in the French context?

Need for a reflective assessment of relocation actions to identify feasibility and appropriation constraints

Interactions within the relocation governance mechanism



Synergy factors

The role of “political entrepreneurs”
The emergence of “communities of practice”

Factors of inertia

The insurance system
Heterogeneous preferences



Ocean and Coastal
Management

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