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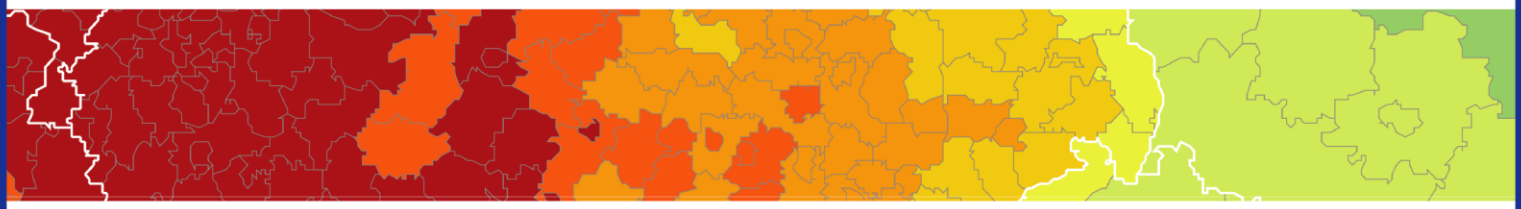

ESPON-TITAN
Territorial Impacts of Natural Disasters

Applied Research

Final Report – Case Studies Report
Nouvelle-Aquitaine (France)

June 2021

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Case Study Report

ESPON-TITAN
Territorial Impacts of Natural Disasters

Nouvelle-Aquitaine (France)

Table of contents

List of Tables

List of Figures

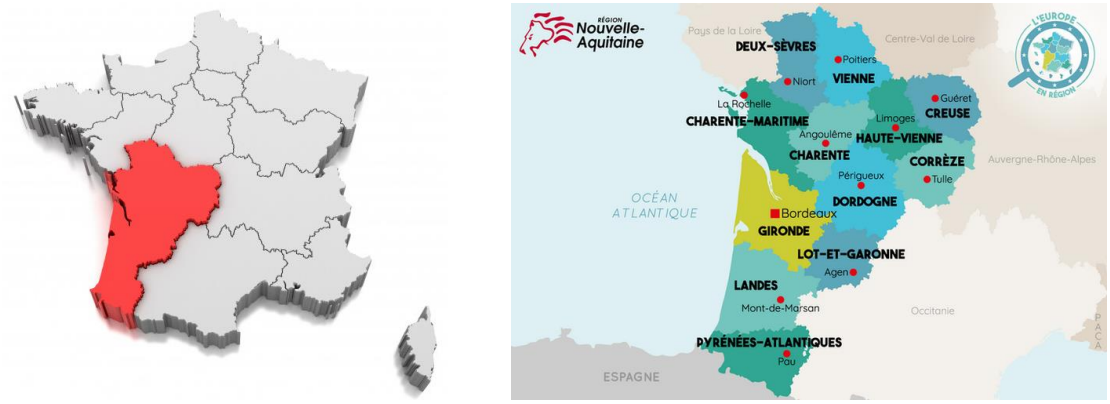
List of Abbreviations

DDRM	Regional Document on Major Risks (Document Départemental sur les Risques Majeurs)
DDTM	Departments of Territories and Sea (Directions Départements des Territoires et de la Mer)
EPCI	Public establishment for intermunicipal cooperation (Établissements publics de coopération intercommunale)
IRMa	Institute of Major Risks (Institut des Risques Majeurs de Grenoble)
ORRNA	The Regional Risk Observatorie of New Aquitaine (Observatoire regional des risques Nouvelle Aquitaine)
ORSEC	Civil Security Response Organization (Organisation de la Réponse de Sécurité Civile)
PAPI	Flood Prevention Action Program (Programme D'actions De Prévention Des Inondations)
PCAET	Territorial Air Energy Climate Plan (Plan Climat Air Énergie Territorial)
PLUI	local urban development plan (plan local d'urbanisme intercommunal)
PNACC	National Plan for Adaptation to Climate Change (Plan national d'adaptation au changement climatique)
PPRN	natural risk prevention plan (Plan de Prévention des Risques naturels)
PPRs	Risk Prevention Plans (Plan de Prévention des Risques)
PPR SM	Risk prevention Plan - Submersion Marine (Plan de Prévention du Risque de submersion marine)
PRPGD	Regional Waste Prevention and Management Plan (Plan Régional De Prévention et De Gestion des Déchets)
SRADDET	regional plan for planning, sustainable development and equality of territories (schéma régional d'aménagement, de développement durable et d' égalité des territoires)
SRCAE	Regional Climate Air Energy Scheme (Schéma Régional Climat Air Énergie)
SRCE	Regional Ecological Coherence Scheme (Schéma régional de cohérence écologique)
SRIT	Infrastructures, Transportations and Inter-modality Regional Plan (Schéma Régional des Infrastructures, des Transports et de l'Intermodalité)

1 Introduction

The Nouvelle-Aquitaine region is the largest administrative region in France, with a surface of 84.061 km^2 and a population of 5.956.978 inhabitants (2017), resulting in a density of 70 inhabitants/km^2. In 2018, the GDP reached EUR 159,8 billion, being the share per capita of EUR 26.825.

Figure 1. Nouvelle-Aquitaine region



Source: Left: https://www.touteleurope.eu/actualite/l-europe-en-region-la-nouvelle-aquitaine.html *Right:: https://www.freepik.es/fotos-premium/mapa-region-provence-alpes-cote-d-azur-francia_3140108.htm*

The main natural hazards for the region are: extreme temperatures (the heat waves are expected to occur 2 to 5 days a year, in average, and intense heat has caused deaths), intense weather phenomena, floods (especially in the foothills of the Pyrenees, this can also lead to landslides), flash floods (due more intense rainfall), sea level rise, coastal erosion, drought, forest fires (the seasonal rain frequency changes will cause longer drought periods, then increasing the forest fires and swelling-contraction of clay soils), windstorms and earthquakes. These hazards impact the water supply for aquiculture, agriculture, tourism; the coastal urban environments, the valuable coastal ecosystems (dune, lands), as well as transport infrastructures (TGV, Road Spain-Paris).

The main five natural hazards registered in the region are: the wildfire in St Jean D`Illac (department 33), occurred on July 24th 2015; the river flood extreme event registered from 17th to 19th of June 2013, in which the mainly affected area was Gaves de Pau Bearnais, especially in the basin of the Adour in the Department 65; the Xynthia windstorm occurred from 27th to 28th February 2010; the exceptional heat wave of the summer of 2003 that was responsible for an estimated excess mortality of almost 15.000 deaths in France; and the earthquake in Arette (department 64) happened on the 13th of August 1967.

Annex 2 of ESPON-TITAN focuses on the specific economic impacts' analysis of the Xynthia storm, occurred in the year of 2010, that severely affected the region causing even human deaths. Xynthia violently hit the Atlantic, causing the death of a total of 59 inhabitants throughout the country, but mainly in the department of La Charente-Maritime. The consequences of the storm are varied:

- Erosion of the dunes along an important extension of the Atlantic coast covering from the Arcachon basin to the Atlantic Loir;
- Flood caused by the sea water entrance to land;
- Damages in buildings caused by erosion or direct action of the sea waves;
- Damages in infrastructure in the flooded areas including the ports, urban areas and the promenade.

2 Main characteristics of the administrative structure and planning system

2.1 Brief introduction to the administrative structure

Nouvelle-Aquitaine is one of the 13 regions of France, a unitary state with a semi-presidential system with long tradition of centralisation, although in the last years, a number of decentralization initiatives have taken place. France has a centralized administrative structure with political power in the regional level, but not in the departments or municipalities (both representing the local level). Regions are responsible for regional development (e.g.: regional plans for economic development), spatial planning (regional plans for territorial management, regional plans for transport, etc.), education (high schools and some universities), vocational training, culture and health, regional transport and some ports and airports.

As mentioned, Nouvelle-Aquitaine region is the largest administrative region in France, and was created in 2014 through the merge of three previous existing regions: Aquitaine, Limousin and Poitou-Charentes. It is divided in 12 departments and characterized by the mixture of the different geographies of the coast, the Pyreenes-Central Massif and the agricultural land. Vineyards are part of its landscape.

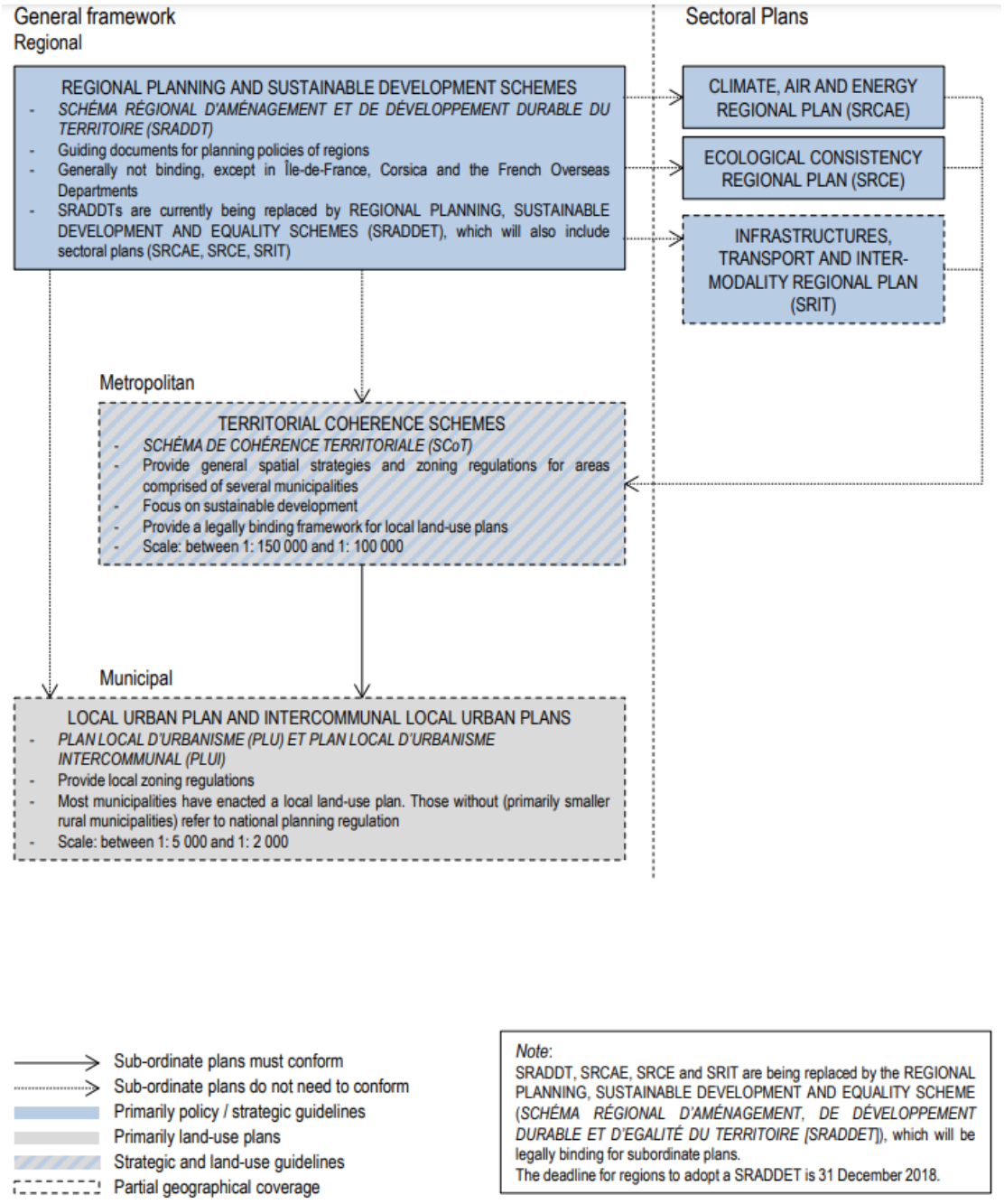
2.2 Brief introduction to the planning system

“France has three levels of spatial plans. Regional plans (SRADDT) are guiding documents for regional spatial policies and can show political investment priorities. In most parts of the country, they are not binding for lower level plans. Regional plans are supplemented by three additional plans; a Climate, Air and Energy Regional Plan (SRCAE), an Ecological Consistency Regional Plan (SRCE) and an Infrastructures, Transportations and Inter-modality Regional Plan (SRIT). These plans are intended to be combined into a single regional plan in the future.” (OECD, 2017).

Those SRADDETs are **spatial planning instruments** with strategic approach and characteristics such as co-construction and integration of sectoral decisions (cross-sectoral, integrated). They also strengthen the leading role of the regions to define the political vision of its prioritized issues. The Nouvelle-Aquitaine SRADDET defines objectives in the long and short-term for issues as climate change and energy transition among others. **Sectoral instruments** as Regional Ecological Coherence Scheme (Schéma régional de cohérence écologique - SRCE), Regional Climate Air Energy Scheme (Schéma Régional Climat Air Énergie - SRCAE), SRI, SRIT, PRPGD are replaced by the SRADDET.

At the local level, the main instrument is the Local Urban Plan (PLUI), that provide detailed zoning regulations.

Figure 2. Organisation of spatial and land-use planning in France



Source: OECD, 2017

3 Hazard profile and economic impacts of natural hazards in Nouvelle-Aquitaine

Among the natural hazards that affect the region of Nouvelle-Aquitaine are, according to the Observatory of Risks (ORRNA[1]), are, among others less frequent:

- **Floods:** Nouvelle-Aquitaine region has 2690 municipalities (source: GASPAR) affected by the phenomenon of flooding (overflow of rivers and marine submersion), nearly one in two municipalities;
- **Coastal erosion:** The erosion of the coastline is a natural phenomenon that affecting mainly marine facades, having some positive effects on environments and ecosystems, but negative effects by being a risk to the population. For example, the cliffs of the French-Basque coast (Pyrénées-Atlantiques) have been impacted by heavy rains at the end of 2020;
- **Wildfires:** Forest fire is when the fire is a minimum area of 0.5 hectares in one piece, and at least part of the shrub floors and/or tree floors (high parts) are destroyed. With 16 million hectares (30% of its surface), France, especially the Mediterranean regions (several million hectares of scrub) and Aquitaine (pine forests exploited by the forestry sector) face forest fires every year;
- **Storms:** In Western Europe, the storm risk is usually seasonal. These phenomena appear rather in autumn and winter, as evidenced by the 2013-2014 winter season in France;
- **Earthquakes:** Seismic hazard is the probability of a destructive earthquake occurring in a given region over a period of time;
- **Mountains associated risks:** Mountain environments lead to the presence of specific risks: avalanches, terrain movements and torrential hazards, all included in the Natural Risk Prevention Plans. In Nouvelle-Aquitaine is specially affected by some of them in the Pyrenees.

Special attention must be given to the windstorm Xynthia, a major weather depression that in 2010 struck several European countries. This storm was one of the deadliest because it coincided with a high-water spring tide, resulting in a fairly exceptional rise in water levels. It has caused 59 deaths and significant material damage. In France, the storm caused almost EUR 2,5 billion of damage (French Insurance Association, 2011). Around 500.000 people suffered material damages in France due to the storm (Genovese et al., 2012). The combination of strong winds and high tides resulted in a storm surge which caused major flooding in some coastal regions, mainly in Charente-Maritime, Vendée, and Côtes-d'Armo (Liberato et al, 2013). Failure of coastal flood defences led to widespread flooding along the coast and the death of 47 people in France alone (Liberato et al., 2013). The region of Charente-Maritime, in Nouvelle-Aquitaine, has been selected for this case study, since it suffered the highest number of damages (37,6% versus 16,4% in Vendée), including 12 fatalities (French Insurance Association, 2011). Detailed information on the analysis elaborated in ESPON-TITAN is included in Annex 2.

[1] https://observatoire-risques-nouvelle-aquitaine.fr/

4 Disaster Risk Management in Nouvelle-Aquitaine

4.1 General remarks

In the **regulatory framework** for risk management the main instruments are the Risk Prevention Plans: they tackle many hazards (flood, marine submersion, land movement, forest fires, etc.), delimitate them and propose specific measures.

In addition, there are tools to encourage communities to implement actions to reduce vulnerability, e.g., the Flood Prevention Action Program (Programme D'actions De Prévention Des Inondations - PAPI), led by local government, and aimed at flood risk and vulnerability reduction. In Nouvelle-Aquitaine has framed several flood prevention action programmes, which aims to define a strategy and action programmes in order to reduce the vulnerability of the territory, according to specifications defined at national level.

The competence regarding the prevention of risks in Nouvelle-Aquitaine is distinguished in the Public establishment for intermunicipal cooperation (Établissements publics de coopération intercommunale – EPCI) with own funding (resources independent of communal contributions).

An overview of major risk management in France (definition of a major risk, the seven principles of major risk prevention policy in France, prevention actors and the international sharing of the French experience) was published by the Ministry of the Environment in 2011[2], which indicates correspondent missions and competences, which roles are presented in the following table.

[2]http://www.mementodumaire.net/responsabilites-du-maire-2/r2-intercommunalite-et-prevention-des-risques-majeurs/

Table 1.Actors and missions for each prevention instrument

Dispositif de prévention	Missions de l'**État**, par l'intermédiaire du **préfet**	Mission de la **commune**, sous la responsabilité du **maire**	Mission des **EPCI**	Devoir du **citoyen**
Analyse des risques	**Évaluer** les risques. **Localiser** les risques. **Afficher** les risques : l'État a le devoir d'informer les collectivités des risques majeurs présents sur le territoire grâce au porté à connaissance (PAC) *[art. L.121-2, R.121-1 et suivants du Code de l'urbanisme].*	Une meilleure connaissance des risques et des pratiques locales pour y faire face est à l'initiative des collectivités (pas d'obligation légale). Mise en place des **repères de crues**. **Transmettre** : lorsque le maire est en possession d'informations utiles, il a l'obligation de les transmettre au préfet *[art. L.2212-2-5° du CGCT].* **Prévenir** le risque : à partir du PAC, la commune met en œuvre des mesures de prévention pour gérer le territoire, gérer la crise et informer la population	Si une des compétences mobilisées par le dispositif de prévention a été transférée, l'EPCI est responsable de la mise en œuvre des mesures appropriées. Les pouvoirs de police du maire ne peuvent être transférés.	**Transmettre** sa connaissance. **S'informer**, être acteur de sa sécurité
Gestion du territoire	Élaboration du plan de prévention des risques (**PPR**) *[art. L.562 du Code de l'environnement».* Imposition de Servitude d'Utilité Publique (**SUP**) *[art. R.126-1 du Code de l'urbanisme)].* **Association** dans les documents d'urbanisme. A posteriori, **contrôle de légalité** sur les documents d'urbanisme. **Délocalisation** (expropriation, acquisition amiable). Gestion du **FPRNM**. **Commission départementale** des risques naturels majeurs.	Prise en compte des risques dans les **documents de planification** *[art. L.121-1 du Code l'urbanisme].* Intégration des **servitudes**. **Autorisation d'urbanisme** : un permis de construire peut être refusé ou n'être accordé que sous réserve de prescriptions spéciales *[art. R.111-2 du Code de l'urbanisme].* **Travaux** de protection et de prévention. **Politique foncière**. **Urbanisme opérationnel** (OPAH).	Prise en compte des risques dans la gestion du territoire via le **SCOT** (compétences obligatoires en aménagement de l'espace et développement économique).	Respect des règles et recommandations (PPR notamment)
Information préventive de la population	Élaboration du dossier départemental des risques majeurs (**DDRM**). **PAC** (anciens dossiers communaux synthétiques, DCS). Information des acquéreurs et locataires de biens immobiliers (**IAL**).	**Pouvoir de police** du maire. à partir du PAC, conduite de l'information préventive (**DICRIM, réunions publiques**, etc.)	Possibilité de conduire l'information préventive « intercommunale » (DICRIM intercommunaux, réunions publiques, etc.)	**Informer** (IAL, CatNat) et **s'informer**
Gestion de la crise	Organisation, déclenchement, mise en œuvre, direction et financement des **plans de secours** dans le département (ORSEC, PPI, etc.). Schéma départemental d'analyse et de couverture des risques (**SDACR**). **Pouvoir de substitution** au maire *[art. L.2215-1 du CGCT].*	**Pouvoirs de police** du maire *[art. L.2212-2 et L.2212-4 du CGCT].* Élaboration du plan communal et intercommunal de sauvegarde (**PCS et PICS**) *[loi n°2004-811 et décret n°2005-1156].*	Possibilité d'élaboration du plan intercommunal de sauvegarde (**PICS**) *[loi n°2004-811 et décret n°2005-1156].*	S'informer, se préparer. Signaler. Appliquer les consignes.

Source: Ministry of Environment, Sustainability and Energy (2008, 2011)

4.2 Risk assessment

Mapping the territorial distribution of risks, makes it possible to envisage their management by controlling land-use, consisting of either prohibiting or limiting the constructions in exposed areas. Information and knowledge on risks is primarily the responsibility of the State: the State informs, at different stages, of current knowledge of the risks present in a territory, using different instruments as:

- the Regional Document on Major Risks (document départemental sur les risques majeurs – DDRM);
- the development of PPRs (Risk Prevention Plans). The methodological frame for the risk prevention plans has its origin in 1997, being the main instrument the Risk prevention Plan - Submersion Marine (PPR SM). The objective of the PPR SM is to prevent and reduce the vulnerability of existing settlements and goods with the main focus on human

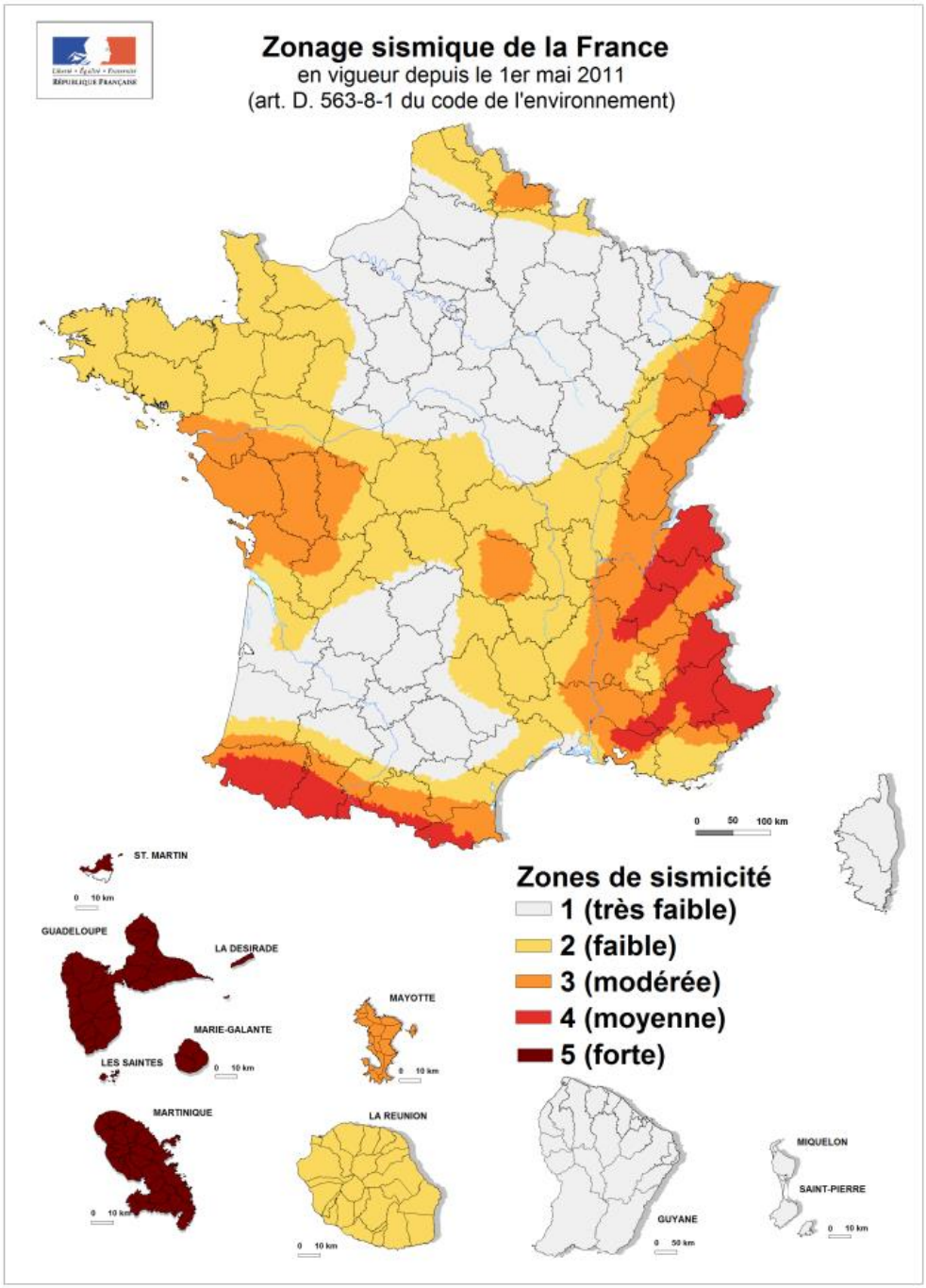
security. Mainly, the mission of this instrument is to avoid the increasing of the existing risks for people and properties. The tool for this is the urban planning of those areas exposed to sea water immersions. Technical characteristics, influence of urban areas, as well as inhabitant's specific vulnerability, are considered as qualification criteria;

- The circular letter on the development of the natural coastal risk prevention plans (2011) incorporated on them the effects of climate change and the evaluation of the protection structures. It also updated the national methodology guide, the frame for the elaboration of the plans: this new methodology incorporates the definition of a reference risk and a long-term risk based on the sea level rise expected to the year 2100;
- Information to buyers and tenants;
- Bring buyers and tenants to the attention of the town planning documents.

The Regional Risk Observatorie of Nouvelle-Aquitaine (Observatoire regional des risques Nouvelle Aquitaine - ORRNA) have developed a portal supported by the State, with multi-partners on 3 types of risks: health, natural and technological, with the objective of spreading knowledge on this matter. The observatory offers:

- Real-time surveillance. Open access cartography on meteorological surveillance, flooding, quality of air and road traffic;
- The maps of the Observatory of Cartography contain general information and regulations on risk for the region but is not yet complete at its scale. This information is permanently updated;
- The cartography of indicators. The mapping of statistics is based on indicators for specific risks.

Figure 3.Seismic zones



Source: New Acquitaine risk observatory. https://observatoire-risques-nouvelle-aquitaine.fr/risques/risques-naturels/seisme/

The report from the National Assembly #2697 - "The reasons for the damage caused by storm Xynthia" (2010) contains an annex with the maps of the Communes of Charente-Maritime and Vendée in which the flooded areas are identified.

Figure 4.Localization of registered deaths caused by Xynthia

Source: Assessment of Selected Climate Change Adaptation Measures for Coastal Areas (Audrey B, Manuel G, Thomas B, 2020)

4.3 Risk management

The **risk prevention policy** is defined at the **national level** (central administration such as the DGPR for risks), which **implementation** is in charge of the **Departmental level** through the Departments of Territories and Sea (Directions Départements des Territoires et de la Mer - DDTM), with **regional coordination** (the DREAL). The **regional level** carries out the **flood management** at a scale that incorporates hydrographic basins coherently. The data is published on Vigicrues.

The region works to prevent risks in three dimensions: natural, health and technological. The implementation of the Regional Planning, Sustainable Development and Equality of Territories plan (SRADDET), allows to identify risk areas and community vulnerabilities in advance. The risk prevention is associated to the location of the urban areas and the

regulations of the urbanization (avoiding the urbanization in areas with risks, specially floods in the coastal area).

The local governments have developed strategies for the involvement of the public and stakeholders in the protection of the communities, some of these initiatives are:

- Survey 17 project: For Charente Maritime leaded by Unima;
- MAREA project: supported by the Autonomous Community of the Basque Country;
- Seamaphor tool: Intercommunal Union of Arcachon Basin.

Despite the above, the consequence of some territorial reforms is the centralization of the decision making in larger territories (new regions and new intermunicipal territories) which can make it difficult for the general society and stakeholders to receive the information and participate. In this context, it is necessary that the Nouvelle-Aquitaine region uses wisely the available tools.

The 2004 law for the modernization of the civil security improved the instruments for the crisis management, which is regulated by general prescriptions that apply independently of the cause of the crisis. The Civil Security Response Organization (ORSEC) takes actions that are flexible and adapt to the scale of the problem. Specific Intervention Plans for certain risks contain the regulations for those risks. Anyway, these instruments do not involve directly the local authorities (regions).

The amended law of 13 July 1982 has defined a mechanism for the government – in collaboration with the insurance sector – to offer citizens who have been affected by natural hazards a compensation for the losses. It is directed to those events uncovered by the conventional insurances.

5 Climate Change Adaptation in Nouvelle-Aquitaine

5.1 General remarks

At the **international level,** and in relation to this case study, an agreement among France, Spain and Andorra are led by the Nouvelle-Aquitaine region to join forces aimed to protect the Pyrenees.

At the **national level**, the National Plan for Adaptation to Climate Change (PNACC), focuses on helping actors to adapt to still unknown climate changes. The stage N2 of the development of the PNACC, recommends actions related to adaptation and resilience.

In **Nouvelle-Aquitaine region,** legal instruments are developed at regional scale, as determined in the PNACC (national level), that are key to decreasing climate change impacts through a change in the actors' ways of proceeding. The planning for this is wide and includes regional planning, economic planning and protection to the communities from the natural risks related to global warming. Instruments at the **regional level** related to climate change matters are the Regional Climate Air Energy Scheme (Schéma Régional Climat Air Énergie - SRCAE), the Regional Ecological Coherence Scheme (SRCE).

At the **subregional level**, the Territorial Air Energy Climate Plan (Plan Climat Air Énergie Territorial - PCAET) is mandatory for the intercommunity that exceed 20.000 inhabitants. In turn, local governments have developed strategies for the involvement of the public and stakeholders in the protection of the communities. In this sense, this case study confirms spatial planning tradition, with strong cross-sectoral coordination in a clear top-down (hierarchical) approach.

5.2 Climate change impact assessment

In the Nouvelle-Aquitaine, the whole coast is exposed to erosion and coastal line retreat while the main areas exposed to flooding are located mainly in the basin of Arcachon, San Juan de Luz bay (Basque Country) and in the surroundings of the estuaries (Figure 5).

The Assessment of Selected Climate Change Adaptation Measures for Coastal Areas (Audrey, Manuel & Thomas, 2020) is a document that provides an inventory of possible adaptation measures for the erosion and flood risks in the Nouvelle-Aquitaine coastal zone.

Figure 5.Indicative risk-prone areas in the Nouvelle-Aquitaine cost

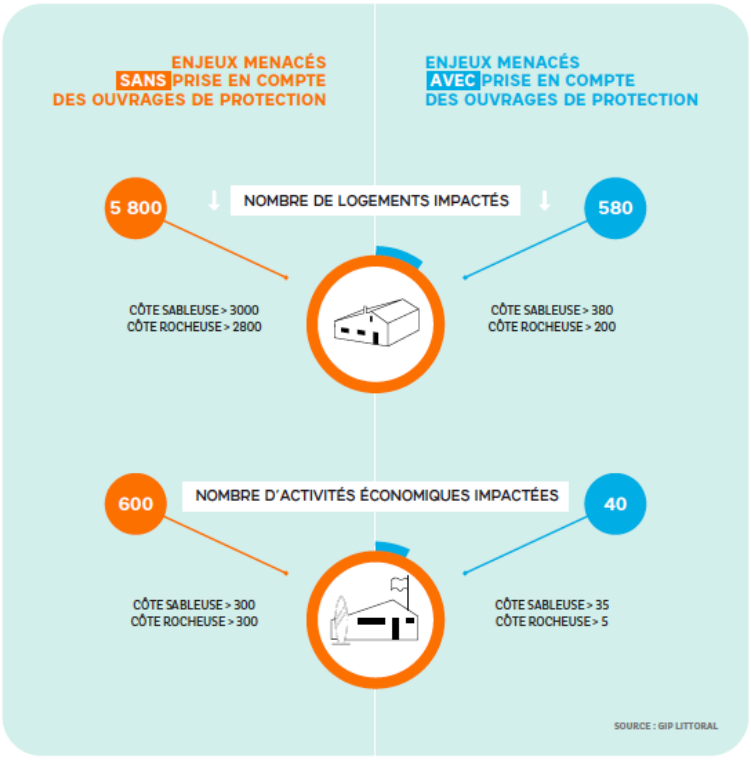
Source: Assessment of Selected Climate Change Adaptation Measures for Coastal Areas (Audrey B, Manuel G, Thomas B, 2020)

Among the tools to construct and provide information to face climate change in the region are:

- Regarding the development of new coastal erosion models, the laboratories Nouvelle-Aquitaine have developed, in collaboration with researchers from the laboratories BRGM, Criham (Université de Poitiers), EPOC (UMR Université de Bordeaux - CNRS), ETBX (Irstea), GREThA (UMR Université de Bordeaux - CNRS), LIENSs (UMR Universidad de La Rochelle - CNRS), ONF, SIAME (Universidad de Pau y Pays de l'Adour), a set of researches on the *physical risks in coastal zones, its developments as a result of climate change and the socio-economic and political dynamics in play regarding adaptation measures and strategies.* A series of coastal evolution models based on hybrid approaches have been developed by the Nouvelle-Aquitaine Labs in collaboration with international laboratories. The LX-Shore model jointly developed with the laboratories EPOC y BRGM, one of the more robust coastal evolution models around the world, uses the hybrid approach which makes it useful to make simulations on the coastal line position variation in a wide variety of time frames

as a few hours (for storms) to various decades. Protection structures in the coastal area are expected to decrease from 5.800 to 580 impacted accommodations (from 3.000 to 380 on the sandy coast and from 2.800 to 200 on the rocky coast), as well as from 600 to 40 impacted economic activities (from 300 to 35 on the sand coast and from 300 to 5 on the rocky coast) as shown in the following image.

Figure 6.Expected impacts with and without protection structures



Source: Climate Change and Risks for the Coastline: Scientific Contributions for a Sustainable and Just Adaptation (Rocle, Mallet, Castelle & Chaumillon, 2019)

- As per the desire of the Regional Council of Nouvelle-Aquitaine, the Regional Scientific Committee on Climate Change (Comité Scientifique Régional sur le Changement Climatique – Acclimaterra) is, since 2018, a permanent and independent association that reunites research institutions and researchers from the academia of the Nouvelle-Aquitaine region. Its objective is to provide information on climate change to local stakeholders, including decision makers, for their adaptation strategy. It covers the areas of: "*agriculture, biodiversity, climatology, economy, history, environmental law, environmental health, energy, territories, quality of natural environments, coastline, fishing and shellfish farming, mountain ranges, availability of water, forest, sociology"* through a multidisciplinary committee.

5.3 Climate change adaptation

At the regional level, the Nouvelle-Aquitaine Region Council leads the climate change prevention and adaptation for all the communities in its jurisdiction. It is also the responsible for the protection of natural spaces (Regional Natural Parks and Regional Natural Reserves). Some of the legal instruments at this level are:

The Regional Council leads the development of tools on energy transition oriented to strengthen the capacity of the economic sectors as tourism, through the Regional Climate Air Energy Scheme (Schéma Régional Climat Air Énergie - SRCAE) and the Territorial Air Energy Climate Plan (Plan Climat Air Énergie Territorial - PCAET) at the subregional level.

The current Regional Climate Air Energy Scheme (SRCAE) is the main document to deal with climate matters at the regional scale involving mitigation and adaptation guidelines. It has been developed in the three previously joint regions of Nouvelle-Aquitaine and will be evaluated to be considered for the redaction of the Regional Planning, Sustainable Development and Equality Scheme (SRADDET): a new regional plan with a global approach.

Even though the land-use policy and the climate change policy are designed separately at territorial and country scale, and they are not dependent one from the other, the urban planning system incorporates decisions to fight climate change.

Specifically, the Planning Code is the instrument that regulates the land-use, although it contains only one mention to climate change in the general objectives of the document. Something similar happens to other urban planning instruments as the Territorial Coherence Schemes, Local Town Planning Plans, Municipal Maps and more specific tools for authorising individual interventions as building permits: they do not consider measures related to climate change. At the international level, the Pyrenees Work Community – Euroregion Aquitaine – Euskadi, a formal international cooperation organization, since 2011 integrated by the Nouvelle-Aquitaine region in France and Basque Country autonomous community and Navarra foral community (both in Spain), defined in 2014 four strategic orientations included in the strategic action plan 2014-2020:

- Euroregional citizenship;
- Knowledge economy, innovation, business competitiveness;
- Sustainable territory;
- Open governance.

This institution develops international cooperation in climate change adaptation.

6 Vertical and horizontal cooperation system in DRM and CCA in Nouvelle-Aquitaine

"Formal vertical coordination mechanisms between levels of government are limited and are primarily related to the hierarchical structure of the planning system, in which lower levels of government must align their plans to higher level plans. Plans at the same hierarchical level must consider each other, which is less demanding and implies only that one plan does not block the measures foreseen in the other. Horizontal coordination is provided by the newly created Public Action Territorial Conferences. These meetings assemble all regional and local authorities under the chairmanship of the regional council president and are supposed to facilitate an integrated and cross-disciplinary planning process." (OECD, 2017)

The follow information on cooperation, in terms of risk prevention, has been extracted from the document *Memento of the mayor and local councillors – prevention of natural and technological risks*[3]**,** published by the Institute of Major Risks (IRMa)[4].

As previously mentioned, the Public Establishment for Intermunicipal Cooperation (EPCI): brings together several municipalities to formulate joint projects on regional development and planning. They work at own funding (independent of municipal contributions) which group together communities of communes, conurbation communities and urban communities.

The EPCIs are not bound by any particular obligation in terms of major risk prevention, a competence that they may however exercise on an optional basis. The existence of a series of specific competences gives the EPCI the possibility of intervening in different risks.

The ALUR law, which gives the Metropolis responsibility for formulating a local urban development plan (PLUI), implies that major risks must be considered in its preparation.

According to Urban Planning Code articles, the municipalities and competent EPCIs included within the perimeter of the territorial coherence plan are grouped together in a specific EPCI or a joint association competent to formulate territorial coherence plans at the local level. When the local urban development plan is designed by the competent EPCI, it must cover the entire territory of the establishment. According to this code, regional maps can also be created within this framework. The urban planning competence makes it possible to take risks into account since related documents must determine the conditions that make it possible to ensure, in compliance with the objectives of sustainable development, the prevention of foreseeable natural risks. In all cases, this transfer of planning competence does not imply a transfer of competence to issue land-use authorisations, which remains the competence of the local authority, unless transferred voluntarily to the president of the EPCI.

[3] http://www.mementodumaire.net/responsabilites-du-maire-2/r2-intercommunalite-et-prevention-des-risques-majeurs/

[4] http://www.irma-grenoble.com/

EPCIs whose scope of intervention is covered in whole or in part by a natural risk prevention plan (PPRN) are involved in preparing the plan: the responsible collects their opinion on the draft plan, which is then submitted to a public enquiry (Environment Code). PPRNs are formulated and implemented, considering foreseeable natural risks such as floods, land movements, avalanches, forest fires, earthquakes, volcanic eruptions, storms or cyclones. The EPCIs are aware that these plans may, in particular, define the prevention, protection and safeguard measures that must be taken, in the areas it delimits, by public authorities within the scope of their powers (Environment Code).

7 Lessons learned

7.1 Strengths and weaknesses in dealing with natural hazards and climate change impacts

Given the hierarchical structure of the French planning system, the lower levels of government subordinate their plans to those of higher levels. The plans must take into account those of their same level, but basically to guarantee that they do not block each other. In this way the vertical coordination is limited. Likewise, the configuration of new and larger regions can strengthen centralization and thus hinder participation and decision-making at the local level.

The policy for tackling climate change and the policy for land-use are formulated separately and do not depend on each other. In this sense, the integration into a single instrument (STRADDET) of spatial and sectoral planning (Regional Plan for Ecological Coherence - SRCE, Regional Plan for Climate, Energy and Air - SRCAE, Regional Plan for Infrastructures, Transport and Intermodality - SRIT, Regional Waste Prevention and Management Plan - PRPGD) can facilitate the integration of different approaches to decision-making based on risk prevention and adaptation to climate change.

The risk prevention plans (formulated at the supra-municipal level) consider both the threat and the vulnerability and incorporate future forecasts of risk change due to global warming. Prevention is based on this knowledge applied to the determination of urban and buildable areas. Municipal planning must consider risks, however, the Planning Code, which is the instrument that regulates land-use, contains only one mention of climate change in the general objectives of the document. A deep vertical coordination and local participation seems to be a key factor for the practical application in the territory of planning decisions to deal with climate change and changing natural hazards and vulnerability.

A **strength** in the development of risk prevention plan (PPR), is that one of the hazard maps is performed after 100 years, in the case of marine submersion hazard to consider the effects of climate change. A force is the existence of different tools to encourage the reduction of the vulnerability of territories: Flood Prevention Action Programme (PAPI).

The experience after the occurrence of the extreme event of storm Xynthia highlighted the **difficulties** to define impacts in terms of physical extension and intensity based on the interpretation of meteorological previsions specially in the coastal areas as the information and mapping of risks are based on larger scales or longer scenarios than the ones specific for this events. In these cases, the usefulness for the risk management is partial.

Some **teachings of the process of dealing with the Xynthia storm** are:

- In addition to deficiencies in the surveillance, alert and rescue systems, progress has been made and it is imperative to create an alert network for the community that provides the necessary results;

- There is a compensation system which weak point is the implementation, specifically coordination;
- Decisions made when the event had just occurred were hasty and resulted in non-priority spending and even violation of regulations;
- Urban planning irregularities were revealed and are associated with high costs. To protect people's lives and incur the lowest costs, the most effective solution is to avoid the urbanization of high-risk areas;
- The state has not been strong enough in preventing the pressures exerted by real estate developers and public officials who even encourage urbanization in unprofitable areas;
- The construction of more ambitious infrastructures for sea protection works and the rapid immersion plan must be based on a coherent prioritization;
- The governance of the levees – whose maintenance and future safety can only be ensured if responsibility for them lies with clearly identified officials – remains to be resolved. The governance of rivers is in a similar situation in terms of governance since they are not publicly owned but owned by residents without the ability to invest in and maintain them. Urgent measures must be taken, and a flood prevention program must also be established, that responds to a comprehensive strategy.

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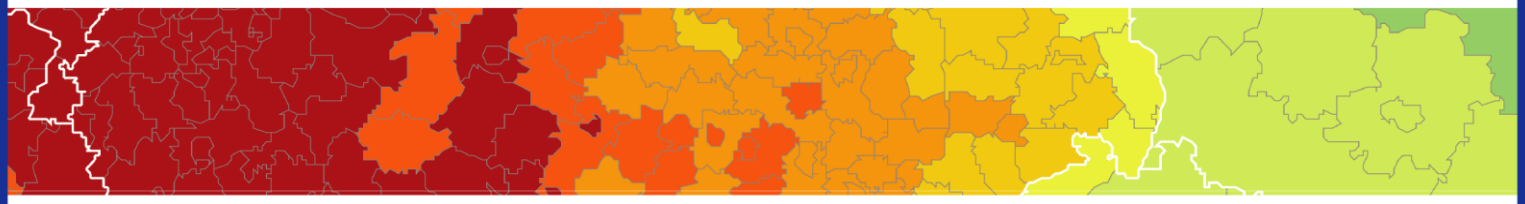

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