

Institutional Analysis of Coastal Vulnerability to Climate Change in the Languedoc Coastal Region, Southern France

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1 Part I: System Structure - Collective Action

The Languedoc coastal zone is located in the delta region of the river Rhone bordering the Mediterranean Sea between Montpellier and the Petite Camargue in southern France. The study site also encompasses 20 km (12.43 miles) of the inland area, including numerous communities of various sizes, the Lez and Vistre rivers, coastal lagoons and basins, and a mix of freshwater and brackish wetlands. The Languedoc study area is characterized by an action arena in which (1) rapid population growth is actively fostered by policymakers who facilitate the concomitant overappropriation of space and freshwater resources through unsustainable hard infrastructure development (e.g., interbasin water transfers, road and housing development in ecologically sensitive areas). (2) A reliance on the amenity industry and high unemployment in conjunction with an influx of affluent "equity refugees" heeding policymakers' calls is leading to community fracturing and dual socio-economic structures. Finally, (3) potentially polycentric rule structures and local empowerment measures are undermined by government austerity measures and aggregation rules which is leading to confusion as to what rules apply when, lack of coordination between intercommunalities, and a blurring of responsibilities between citizens and public infrastructure providers.

The key resource relevant to the commons dilemma faced by communities in the Languedoc are the affordances provided by urban, rural, and agricultural spaces, freshwater resources, and the interconnected processes and self-generating mechanisms of biodiversity.

This report is one of three coastal social-ecological systems (SESs) examined in collaboration with researchers in Britain, France, and South Africa as part of the *Multi-Scale Adaptations to Climate Change and Social-Ecological Sustainability in Coastal Areas* (MAGIC) research project funded by a Belmont grant. Information on the two other case studies, as well as the synthesis report of all three SESs, are located in the database as follows: Cornwall, Britain - case no. 297, Eden District, South Africa - case no. 299, and the synthesis analysis of all three sites - case no. 310.

1.1 The Commons Dilemma

- **The potential over-appropriation/poor coordination of appropriation problem:**

Overappropriation of space and freshwater resources:

- The Languedoc study site is experiencing rapid population growth (approx. 1.5 percent annually) with the majority of newcomers settling in cities along the coast. The public

policy response to this population increase is facilitating the over-appropriation of limited freshwater resources through inter-basin water transfer via the diversion of water from the Rhone river basin.

- Freshwater over-appropriation is further magnified by agriculture’s increased irrigation needs due to climate-change induced drought conditions and the economic strategies of farmers to maximize profits.
- Over-pumping of scarce surface and groundwater for irrigation and increased human consumption is contributing to saltwater intrusion into groundwater supplies.
- The influx of a large number of people into the region is also leading to an escalation in human urbanization and land development (for increased housing and transportation needs) which often occurs in environmentally sensitive areas and areas vulnerable to wildfire and flooding (sea and rivers).
- **The potential under-provisioning of public infrastructure:** No critical under-provisioning of public infrastructure identified.

1.2 Biophysical Context (IAD)

- **Natural infrastructure:** The Languedoc region is characterized by the flat, sandy littoral of the Mediterranean coast which is very sensitive to sea level rise, flooding, and erosion. Geological patterns are characterized by short and small coastal river water sheds which are prone to flash flooding. The Mediterranean climate is subject to summer droughts and heavy rains in the fall. Climate change is anticipated to increase the number and duration of drought events in the region due to less precipitation, higher average temperatures, thereby contributing to an increased frequency of flash flood events (from rivers and due to the volume of intense rain storms) and potentially impacting viticulture. More storms affecting the coastline will cause more damage.

Rapid changes in land cover and land use due to population growth and the needs of an amenity-oriented economy are threatening biodiversity conservation and the buffering capacity of coastal ecosystems. The climate change-facilitated persistence of introduced Tiger mosquitoes in southern France and the associated public health risk of contracting the chikungunya virus and/or dengue fever is leading to social/environmental dilemmas that pit regional mosquito management issues and public health concerns against local biodiversity dynamics and wetland conservation goals.

- **Hard human-made infrastructure: Public hard human-made infrastructure** is dominated by big infrastructure projects (e.g. high speed rail, A9 freeway) that are being developed in sensitive ecological corridors along the Mediterranean coast to alleviate local traffic congestion and to connect the region with other areas in Europe (mainly Spain and Italy). Also includes dikes to protect from floods, breakwaters, and groyne restoration projects, as well as the development of canal systems to bring more freshwater to the region from elsewhere (existing Bas Rhone canal system and the planned Aqua Domitia project).

Private hard human-made infrastructure is subject to asymmetrical vulnerabilities to severe climate change events due to community fragmentation and dual socio-economic structures. Affluent newcomers, who generally have greater access to financial resources, are socially and economically more capable of withstanding natural catastrophes due to greater access to financial resources.

1.3 Attributes of the Community (IAD)

- **Social Infrastructure** The Languedoc-Roussillon coastal region consists of heterogeneous communities that vary in size and composition. It is one of the poorest regions in France with a high rate of unemployment. Social cohesion and trust in many communities is felt to be threatened by the influx of newcomers who are moving to the region to experience the "Mediterranean way of life." Rural residents, in particular, feel that their strong cultural identity is being undermined by the influx of (1) wealthy "equity refugees" (i.e., people who move to the area from other parts of France because of its proximity to recreational/cultural opportunities, and who are generally financially independent), who drive up market/property prices making living in the community unaffordable to its native inhabitants; (2) poor unemployed urban dwellers who are on government assistance and unable to afford living in the metropolitan areas; and (3) North African migrants and refugees from war-torn countries who compete with locals for jobs. Most affluent newcomers are looking to buy single family residences, instead of apartment space, which has exacerbated the need to generate more urban space and set the pace of urban development at twice the rate of population growth. The high level of inequity among the population coupled with a high unemployment rate and different cultural backgrounds is leading to increasing social tensions. Most of the urban and rural poor are politically and economically weak and feel a lack of empowerment with regard to coastal development policies. A predominant focus on amenity-oriented economy (tourism) is driving a high cost of living and facilitating a dual socio-economic structure.
- **Human Infrastructure** The average existing human infrastructure in the Languedoc coastal region is assumed to be good because most community members have reasonable educational attainment, they are highly skilled and culturally embedded in their communities. The *débat public*, which is a government-implemented public participation/decision making process that includes community meetings organized by impartial persons and guided by expert information, provides a collective action forum in which new skills and knowledge are generated and exchanged facilitating a common understanding of the governance structures and rules regarding resource extraction. However, study findings indicate asymmetrical access to such collective action forums with poorer communities being left out of decision-making processes (inferred).

1.4 Rules in Use (IAD)

- **Position Rules:** At this time, no critical position rules have been identified.
- **Boundary Rules:** The distinction between resource user/citizen and local public infrastructure provider positions, as well as between public infrastructure providers at the collective choice and constitutional level, is being blurred by government restructuring processes and related negotiations and power struggles.
- **Choice Rules:**
 - Politicians may advance local tax cut campaigns and land use zoning changes to become elected.
 - Insurance companies must insure private structures built or rebuilt in flood plain areas.
 - Regional government and Montpellier city officials are actively attracting outsiders to move to the region due to revenue considerations and a prevailing ideology of growth, progress, attractability. Slogan: "Montpellier, the over-gifted."

- **Aggregation Rules:** Even though choice rules assign multiple positions partial control over the governance of the coastal resource system, there appears to be a lack of aggregation rules that specify who/which governmental entity is to decide which action or set of activities is to be undertaken.
- **Scope rules:**
 - Decision by politicians to advocate local tax cuts is diminishing the local level tax base and the ability to implement policies and procedures that mitigate the effects of global climate change.
 - Decision by newcomers to purchase single family homes is increasing the amount of land necessary for human development and leading to the increased conversion of natural habitat.
 - Government devolution to the local level combined with austerity measures is introducing fragility into the existing social safety net.
 - Rules mandating continued insurance coverage on structures built in areas subject to flooding increase citizens' vulnerability to climate change-related environmental changes.
 - The implementation of the Territorial Coherence Scheme (SCOT) imposes strict obligations on city/town mayors to implement mitigation measures, otherwise they can be held legally liable for harm/death of citizens due to severe weather events.
- **Information Rules:** Collective action forums (débat public) exist for knowledge generation and exchange between community members and policy-makers but may not be accessible to the urban/rural poor and/or migrants (inferred).
- **Payoff Rules:**
 - Policymakers' decision-making influenced by "short-term political cycle" concerns instead of long-term climate change adaptation goals.
 - Focus on tourism as the primary vehicle for regional economic growth contributing to socio-economic inequity and impairing climate change mitigation/adaptation strategies (inferred).

1.5 Summary

The Languedoc coastal region SES with its mosaic of lagoons, marshes, and garrigues is one of the world's biodiversity hotspots. The cultural heritage of the region with its historic villages and traditions is also renowned throughout the world. However, a focus on an amenity-oriented economy has led to development schemes that prioritize sandy beaches over resilient coastal buffer zones and the conversion of large plots of land for single family homes instead of high density development. Local and regional policymakers actively cultivate unrestrained population growth which has resulted in an influx of affluent "equity refugees" seeking the Mediterranean lifestyle whose financial independence is driving up the cost of living in an area characterized by high unemployment rates. This growth rate is facilitated by coastal development and water policies that transfer water and convert land spaces in an unsustainable and inequitable manner. Although collective action forums exist to exchange knowledge and communicate with policymakers, many of the rural/urban poor and migrants remain spatially segregated and politically and economically weak.

Government restructuring processes in 2015/2016 and concomitant devolution of responsibility from the national government to local government and individual citizens without an appropriate aggregation rule structure to guide decision-making and rule implementation

is leading to a blurring of the distinction between citizens and local public infrastructure providers, as well as between public infrastructure providers at the collective choice and constitutional level creating power struggles and negotiation processes between these groups. Austerity measures and lack of funding is inhibiting implementation of the new rule structure leading to further disempowerment of citizens and local officials. Finally, the use of framework policies that guide (not mandate) local land and watershed development is leading to the uncoordinated implementation of policies at the sectoral and spatial scale, i.e., each intercommunality's interpretation and implementation of land development and watershed management rules can be different and lead to conflicting outcomes, and there is no coordination among intercommunalities with regard to the effects of their policy implementations on other intercommunalities.

In essence, it seems that the national government's attempts to create a polycentric, adaptive government design that can respond efficiently to social and ecological changes and empowers local policymakers and citizens has been foiled by a lack of funding and aggregation rules/coordination of policy implementation. The existing institutional framework appears fractured, impeded by unclear authority structures, and marred by power struggles greatly reducing SES robustness to change.

2 Part II. Dynamic Analysis - Robustness

2.1 Update on the Commons Dilemma

This report is based on a preliminary study analysis, since research at the Languedoc study site is ongoing. Accordingly, there is no update on the commons dilemma.

3 Part III. Case Contributors

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