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# 1 “Functional fit” versus “politics of scale” in the governance of 2 floodplain retention capacity.

## 3 Authors

4 Joana GUERRIN<sup>a</sup>, Gabrielle BOULEAU<sup>b</sup>, Frédéric GRELOT<sup>c</sup>

5 a/ Corresponding author - IRSTEA (French National Research Institute of Science and Technology for  
6 Environment and Agriculture). UMR G-Eau. 361, rue J.F.Breton. 34196 Montpellier, France.  
7 joana.guerrin@irstea.fr

8 Phone: +33 (0)4 67 04 63 23; Fax : +33 (0)4671664.40.

9 b/ Irstea, UR ADBX Aménités et dynamiques des espaces ruraux, F-33612 Gazinet Cestas, France.  
10 [gabrielle.bouleau@irstea.fr](mailto:gabrielle.bouleau@irstea.fr).

11 c/ IRSTEA. UMR G-EAU. 361, rue J.F.Breton. 34196 Montpellier, France. [frederic.grelot@irstea.fr](mailto:frederic.grelot@irstea.fr).

12

## 13 Abstract

14 After major floods occurred in 2003 on the Rhône River (France), the State and local authorities  
15 created a new institution at river level, in order to tackle flood issues at a supposedly more functional  
16 scale. Called *Plan Rhône*, this new partnership combined several policy sectors and several  
17 administrative levels, with the aim of developing the river territory and preserving floodplain retention  
18 capacity. The plan included a floodplain restoration project. However, after five years of negotiation,  
19 the project was finally abandoned. In this article, we analyze the drivers behind the failure to preserve  
20 floodplain retention capacity by focusing on scale issues, using two theoretical frameworks: the  
21 concept of “functional fit” between the scale of ecological issues and that of the institutions in charge  
22 of those issues, and the concept of “politics of scale” in which scale results from historical processes.  
23 We conclude that the scaling of an issue results from history. It legitimates a specific point of view  
24 and hampers alternative ways of seeing reality at other scales.

## 25 Keywords

26 Flood; Public Policy; Politics of scale; Functional fit; Floodplain restoration; Rhône; France.

27

## 28 **1. Introduction**

29 In many western countries, levees are no longer considered as an appropriate solution to flood  
30 management. Past events have shown that failure of these infrastructures cannot be completely  
31 avoided. Indeed, in cases of flooding, the presence of levees may serve to exacerbate the problem,  
32 causing damage and injury that could have been avoided had they not been in place. The robustness of  
33 dykes is questioned in the context of climate change, which may modify the very flood regime they  
34 were designed to protect against. The existence of levees fosters land use change, because inhabitants  
35 see them as a safety net. The socio-ecological processes leading to the construction of levees have  
36 proved to be unsustainable in many places. The multiple factors explaining these dynamics can be  
37 summarized as follow. Lowlands liable to flooding are fertile and easily accessible from river or road  
38 transport channels, therefore conducive to economic development. However, each flood is a threat to  
39 human life, induces business slowdown, and is harmful to perishable goods located at water level.  
40 Building levees around lowland will extend the operation period from one overflowing flood to  
41 another, and increase lowland profitability by removing water constraints. Despite this, water  
42 embankments result in higher flood levels due to narrowed beds and there being less space for the  
43 water to occupy, which in turn increases peak flood flows. From an environmental viewpoint, levees  
44 will prevent alluviation, groundwater recharge and proper development of a number of lifecycles.  
45 Although statistics from past floods help design a levee so that it is quite likely to resist previously  
46 known floods, the probability that such floods will occur changes over time. When poorly maintained,  
47 levees will fail. In urbanized catchment areas, land sealing and additional levees will ensure quicker  
48 water transfer to water courses and higher flood peak (Scarwell and Laganier, 2004). Lastly, climate  
49 change may induce more frequent extreme hydrological episodes, with a higher probability that water  
50 will flow over existing levees, or even destroy them. So dyke-raising is never enough.

51 Consensus has grown among water scientists that sustainable flood management requires “making  
52 space” for water by increasing retention capacity of floodplains (Maltby, 1991; Moss and Monstadt,  
53 2008; Warner et al., 2013). Retention areas are supposed to strengthen existing systems of flood  
54 protection, and thus the security of populations and goods exposed to floods (Montz and Tobin, 2008).  
55 Several experts recommend restoring the retention capacity of floodplains, i.e. to remove levees that  
56 protect non-urban areas, or to lower their protection potential by creating spillover. This is promoted  
57 for two supposed complementary objectives: development of flood retention areas and renaturation of  
58 floodplains. For the purpose of this article, we will use the term “floodplain restoration” to grasp this  
59 twofold idea. Renaturation is the practice of protecting environmental services found in floodplains,  
60 such as aquifer recharge, reduction of flood velocity, and natural habitats (Dufour and Piégay, 2009).  
61 However, this scientific consensus has proved to be very difficult to implement in practice. Political  
62 scholars explained this gap between theory and practice by institutional and governance related  
63 constraints to implementation (Moss, 2004; Tobin, 1995; Warner et al., 2013; Wesseling et al., 2012).

64 One attempt to adapt institutions and rules in order to foster floodplain restoration occurred in the  
65 Rhône valley. However, the new governance did not meet the goal of increasing floodplain retention  
66 capacity. It did not succeed in removing or lowering existing levees. Instead the height of other levees  
67 was further raised. In this paper, we try to understand why the governance of the Rhône floodplains  
68 failed to reach its ecological goals although participants explicitly sought a “functional fit”. Our  
69 central argument is that the correct scale of governance in this field cannot be defined as a fixed value  
70 from the outset. It is rather defined through political processes. This is because there is a multitude of  
71 uncertainties and controversies surrounding the scaling of key issues, including a variety of different  
72 knowledge claims and interests one can only examines when they operate at work. Some critical  
73 geographers characterize such situations as a “politics of scale” (Brenner, 2001; Buizer et al., 2011;  
74 Moore, 2008; Swyngedouw, 2004). Their analytical tools help us to understand the lack of legitimacy  
75 of rationally designed institutions.

76 The paper is organized as follows. In Section 2, we present the analytical tools of two theoretical  
77 approaches dealing with scale issues for natural resource management: the “functional fit” and the  
78 “politics of scale”. We then explain the methodology we used to apply them to our case. In Section 3,  
79 we present the case of the Rhône floodplains (France) and the objective of *Plan Rhône* as a new  
80 institution dealing with flood risk at the level of the river. In Section 4, we analyze the failure of *Plan*  
81 *Rhône* objectives to preserve and increase floodplain retention capacity in two steps: (4.1) the  
82 interaction between *Plan Rhône* and “functional fit” issues, and (4.2) *Plan Rhône* as the product of  
83 “politics of scale” in which it is inserted. We conclude by discussing the interests of both bodies of  
84 literature and proposing improvements regarding flood management and scale issues.

## 85 **2. Addressing the governance of floodplain restoration in terms of** 86 **“functional fit” or “politics of scale”**

87 For the purpose of this paper, we define scale as the spatial scope and the resolution used by any actor  
88 to represent a process having spatial dimensions. Individuals choose to address an issue at a specific  
89 scale according to their points of view and beliefs. Institutions, such as political mandates, economic  
90 sectors and administration levels, are vehicles for spreading specific beliefs on territories, populations  
91 and socio-ecological problems at specific scales they claim to be legitimate. Restoration of floodplains  
92 involves socio-ecological processes which are differently perceived by decision-makers according to  
93 their roles in policy-making or the economy. From their diverse points of view, they apprehend these  
94 processes at different scales. The governance of floodplain restoration must encompass multiple scales  
95 (Gregory et al., 2011; Molle and Mamanpoush, 2012; Wallis and Ison, 2011). It requires the  
96 collaboration of many stakeholders acting at different levels and the adjustment of the rules that were  
97 forged for living with levees. Systems whereby towns benefiting from floodplain restoration pay  
98 compensation to those losing out are hard to implement (Erdlenbuch et al, 2009). Scale issues can be

99 critical in respect of the success or failure of floodplain restoration projects. To highlight this  
100 challenge we identified two strands of literature that are not water-specific, but seem relevant to  
101 address this institutional issue related to flood management: one focuses on the “functional fit”, the  
102 other on the “politics of scale”.

### 103 *2.1 “Functional fit”*

104 Some scholars have addressed the issue of scale and environmental management as one of a  
105 “functional fit” of institutional design (Ekstrom and Young, 2009; Folke et al., 2007; Young, 2002).  
106 They argue that restoring ecological functions is a matter of reforming institutions and rules to make  
107 them more ecologically functional. They provide a methodology to check whether regulations and  
108 stakeholder jurisdictions are consistent with the protection of a natural resource at stake.

109 This approach is rather normative. It seeks to provide decision-makers with recommendations for  
110 sustaining ecological processes. Ekstrom and Young (2009) have aimed to assess how “the nature,  
111 functionality, and dynamics of a specific ecosystem” are taken into account by the institutions that  
112 influence it. In line with other institutionalist scholars working on environmental issues (Norgaard et  
113 al., 2008; Ostrom, 2009), they consider that mismatches between socio-ecological processes occurring  
114 at specific scales and institutional settings dealing with other scales may lead to failures to sustain  
115 natural resources. They have defined this question as a problem of “functional fit”.

116 From this perspective, institutionalists have noted several criteria for successful natural resource  
117 management. They notably advocate:

- 118 - Identifying all factors affecting or being affected by the natural resource (Cash et al., 2003);
- 119 - Defining clear boundaries of the ecological system to prevent misfits (Ekstrom and Young,  
120 2009; Ostrom, 1990);
- 121 - Establishing a set of regulations with clear-cut and effective compliance mechanisms (Young,  
122 1989).

123 Applied to the protection or restoration of floodplain retention capacity, this approach consists of  
124 listing the factors affecting flood patterns (increased runoff due to more impervious surfaces, higher  
125 water levels due to embankments, lower water levels due to retention, more extreme flows due to  
126 climate change, and levee failures) and activities threatened by floods. Focusing on the hydrological  
127 nature of floods, institutionalists generally recommend addressing the problem at the scale of the  
128 watershed. Seeking a “functional fit” calls for the creation of rules that are consistent with the  
129 restoration of floodplains. We shall first consider the question of consistency and then address the  
130 plurality of factors affecting the system.

131 In the context of multi-level governance<sup>1</sup> (van Tatenhove and Leroy, 2003), institutionalists no longer  
132 recommend designing a unique institution. They postulate that institutions and stakeholders situated at  
133 different scales must coordinate their actions and rules to govern ecological systems (Cash et al.,  
134 2006). They draw the analyst's attention to the set of binding regulations ruling the issue at stake and  
135 recommend checking its consistency. Rules are considered inconsistent when two regulations  
136 contradict each other and there is ambiguity regarding which prevails (Cash et al., 2006). Reviewing  
137 all rules requires a systematic approach. E. Ostrom dealt with multi-level governance considering that  
138 "all rules are nested in another set of rules that define how the first set of rules can be changed (...).  
139 Changes in the rules used to order action at one level occur within a currently "fixed" set of rules at a  
140 deeper level."(Ostrom, 1990:51). This nested approach assumes that the precedence of some rules over  
141 others do not depend on cases. It corresponds to situations where rights are ascertained and the  
142 boundaries of the resource well-defined (Sax et al., 2006:310-320). In European countries, where laws  
143 are based on codes, those codes are used as a basis for systematic reviews. With this approach, the  
144 civil code prevails over regional legislation, which in turn has power over local arrangements.  
145 Sustainability requires an adjustment of the rules at all relevant levels, so that existing stakeholders'  
146 rights and rivalries do not hamper environmental functionalities (Gerber et al., 2009; Varone et al.,  
147 2013)<sup>2</sup>.

148 Ostrom initially considered that defining boundaries and identifying factors affecting the system could  
149 be achieved by providing more information about the system (Ostrom, 1990). Her followers have been  
150 less optimistic. They have tended to distance themselves from the notion of "functional fit" for dealing  
151 with complex environmental issues known as "wicked problems". These problems involve a large  
152 diversity of social groups. They have numerous and conflicting definitions, solutions that can create  
153 problems for others, and no rules for closing the debate (Lach et al., 2005; Rittel and Webber, 1973).  
154 Restoring floodplains is arguably a wicked problem because the development of floodplains is an  
155 uneven historical process resulting in much diversity among riparian populations. Removing levees is  
156 a solution that creates other problems. In case of controversial assessment of flood behavior, only the  
157 occurrence of floods can close the debate, which does not happen on demand. Cash et al. (2006) admit  
158 that ignorance and diversity are two cross-scale challenges. The former arises because "ignoring cross-  
159 scale dynamics within spatial and temporal dimensions is common". The latter refers to "the incorrect  
160 assumption that there is a single, correct, or best characterization of the scale and level challenge that  
161 applies to the system as a whole or for all actors". Moving away from the objective of a perfect

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<sup>1</sup>Government refers to State-centered public action. Governance means multiple stakeholders participating to the decision process. Institutionalists consider that "one important aspect of governance is the role of "institutions": the formal and informal rules that provide the framework for the behavior of human beings" (Pahl-Wostl, C. et al., 2008. The importance of social learning and culture for sustainable water management. *Ecological Economics*, 64(3): 484–495.)

<sup>2</sup> As one reviewer wisely noted, rules have no power by themselves. They are enacted by actors who may wield power by drawing upon rules. The institutionalist approach tends to consider that all rules are enacted.

162 institutional fit, these authors and others (Biswas, 2004; Folke et al., 2007; Mitchell, 2005; Moss,  
163 2012; Moss et al., 2009; Pahl-Wostl et al., 2008) recommend identifying such challenges and  
164 managing them through ad-hoc measures. Somehow they admit that stakeholders involved in wicked  
165 problems should have some leeway for adaptation that cannot be grasped through institutional design.

## 166 *2.2" Politics of scale"*

167 Proponents of the "politics of scale" approach have a more radical view: they consider that  
168 institutions, however well-crafted, never fully fit a function or a position on a scale. These critical  
169 geographers and political scientists are reluctant to position institutions on a scale because of political  
170 implications, which they refer to as the "politics of scale" (Brenner, 2001; Molle, 2007; Rangan and  
171 Kull, 2009; Swyngedouw, 1997). They consider that the argument "regional regulation prevails over  
172 local arrangements" is a claim for regional hegemony rather than a fact (Jessop et al., 2008) and  
173 assumes that the local is subject to the region's power. This should never be taken for granted because  
174 it depends on the legitimacy of the regional power on a specific issue. Legitimacy, as everything that  
175 deals with social life "is process-based, in a State of perpetual change, transformation and  
176 reconfiguration" (Swyngedouw, 2004:26). For the same reason, the spatial scope of institutions is not  
177 set once for all. These authors do not consider individuals and collective actors as "stakeholders"  
178 because they argue that participants of social movements and members of institutions change their  
179 perception of stakes in the process of interacting with others. The term "actors" better grasps the social  
180 ability to play with different scales in order to frame the meaning of the issue and the claim for  
181 regulation at different levels (Kurtz, 2003). Attention is drawn towards potential ambiguities in the  
182 definition of institutional responsibilities, in particular in cases of "trusteeship" defined "as the intent,  
183 which is expressed, by one source of agency, to develop the capacities of another" (Li, 2007:5).  
184 Critical political ecologists further contend that hierarchy does not exist once and for all in nature  
185 either. They consider that positioning actors on the ecological scale is a matter of knowledge claims -  
186 only valid within a specific range of assumptions - rather than a fixed law (Buizer et al., 2011;  
187 Forsyth, 2003; Rydin, 2007).

188 For these authors, it is vain to fit institutional scales into ecological ones, because neither category is  
189 fixed. More can be learnt from historical accounts of how institutions became legitimate to represent  
190 and tackle some socio-ecological problems at specific scales. This can explain which information was  
191 produced and which elements were ignored, leading to specific beliefs. In this approach, scale is no  
192 longer a category of analysis, but a category of practice (Moore, 2008). It is not something to be  
193 rationally crafted, but the result of historical conflicts and cooperation between actors. For these  
194 scholars it is not the role of science to design adequate institutions, but rather that of politics.  
195 Historical analysis allows for identifying:

196 - The political reasons why some actors rescaled their perception of a problem;

197 - How institutions spread beliefs inherited from past policies and power relations, which  
198 distort actors' perceptions.

199 These elements are place-specific. They are crucial to understanding why institutional models that  
200 were successful in one place failed when applied in a different place.

201 Our take on the “functional fit” and the “politics of scale” bodies of literature requires articulating both  
202 frameworks. We argue along the “politics of scale” that the discourse of “functional fit” is a political  
203 claim. We believe that several functionalist definitions of flood issues compete in the political arena,  
204 each of them best fitting one specific scale. Actors engaged in one definition try to rescale the issue to  
205 fit their cause. However, we will argue that rescaling strategies are constrained by past policies and  
206 longstanding beliefs spread by institutions.

207 Our case would appear to be an accurate example of this phenomenon. Since major floods occurred in  
208 2002 and 2003 on the Rhône River, State officers dealing with flood management have tried to move  
209 from a centralized flood policy to a river-basin level governance of this issue with the aim of  
210 preserving the floodplain retention capacity and if possible to enhance it. They set up a strategic and  
211 financial contract between all the actors involved in flood issues near the Rhône River, called *Plan*  
212 *Rhône*. They inscribed the floodplain restoration objective of *Plan Rhône* in several legally binding  
213 documents<sup>1</sup>. However, at the end of the process some higher dykes were built and no one was  
214 removed. The floodplain lost some retention capacity. The decentralized flood governance may have  
215 proved effective in some dimensions but it failed to achieve its main target. It must be noted that the  
216 effectiveness of governance is multi-dimensional and what may appear as a failure in one dimension  
217 may be a success in another (Young, 1994). However, this conclusion is not ours, but that of State  
218 officials working in *Plan Rhône*, the institution purposely crafted at river basin level to develop a  
219 sustainable floodplain. Our analysis first adopts the point of view of these actors and seeks to identify  
220 which institutional factors of success were missing for their goal using the “functional fit” literature  
221 (clear-cut boundaries, knowledge of interdependence factors, compliance mechanisms). Second, by  
222 elaborating on the “politics of scale”, we explain why State actors were not able to see that such  
223 factors were missing from the beginning, and why despite their blindness they remain legitimate  
224 spokespersons for local actors.

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<sup>1</sup> This objective was inscribed in 2005 within a State-Regional Plan Contract (CPER), funded partly through European Funds (European Regional Development Fund). This objective was included in the Water Development and Management Plan defined at the level of the watershed (SDAGE). The SDAGE reinforces the binding character of this objective since local urbanization plans (at the municipal level) must be consistent with SDAGE objectives.



### 225 **2.3 Methodology for studying the governance and the scaling of flood issues in the Rhône** 226 **valley (France)**

227 Our methodology is based on what actors say and write. We analyze their discourses in order to  
228 identify how actors understand flood issues in terms of system boundaries, impacting factors and rules.  
229 We seek to identify at what scale actors apprehend flood issues in the Rhône valley, at what scale the  
230 information they can rely on is represented, and what their beliefs and understanding of flood  
231 governance are.

232 Our empirical data came from interviews with actors engaged in flood governance on the Rhône River  
233 during the 2003-2013 years and the literature they produced (expertise, information provided to the  
234 general public) on floods in general and on the Rhône River in particular. Between 2009 and 2013, we  
235 conducted and transcribed 62 semi-structured interviews with *Plan Rhône* participants, central and  
236 local State officials and elected representatives, as well as opponents to the floodplain restoration  
237 project (inhabitants, associations, local governments). In order to follow changes in problem definition  
238 and issue rescaling, we systematically compared how the proponents defined and mapped the problem  
239 of flood at different periods, in interviews and public documents. We related these definitions and  
240 scales to what actors believed, what solutions they promoted and the factors of success or failure they  
241 identified.

242 In a second step, we sought in second hand literature the origin of what *Plan Rhône* actors *a posteriori*  
243 considered as their own wrong beliefs. We looked for beliefs inherited from past policies and power  
244 relations, which influence actors' perceptions. For this purpose, we consulted literature written by  
245 historians and geographers on the history of the Rhône and its infrastructure. We also examined how  
246 public projects were justified in archives relating to the construction of a dam and dykes located near  
247 the floodplain earmarked for restoration.

### 248 **3. Case Study Presentation**

249 The Rhône is one of the main French rivers, rising in Switzerland and running towards southeastern  
250 France, ending in the Mediterranean Sea by the Camargue delta. The river operation and governance  
251 changed through history. After the Second World War, the semi-public company CNR (Rhône  
252 National Company) was created by French State representatives and was given the concession for  
253 managing the Rhône River, with the aim of developing three missions: hydropower production,  
254 navigation, and developing irrigation. From 1935 to 1986, CNR built 19 hydropower stations (with  
255 dams and dykes) along the river, between the Swiss border and the upstream part of the delta. CNR is  
256 responsible for operating and managing the Rhône infrastructures within this territory. The  
257 management of infrastructures within the delta is left to local authorities.

258 Four major floods occurred on the Rhône River in the 1990s and 2000s. Those floods sparked conflict  
259 between inhabitants, the State, and the CNR. Inhabitants blamed the CNR works for exacerbating the

260 impact of floods through dyke and dam construction. They also believed that these developments were  
261 indirectly responsible for agricultural dyke failures in the delta. After the floods in the 1990s, the State  
262 asked the recently-created river association (Territoire Rhône) to carry out a study on flood risks and  
263 propose risk reduction strategies. Results were released just before the 2003 floods. The State was then  
264 accused of knowing that dykes were fragile, but not putting in place any kind of flood reduction  
265 strategy. In 2003, several actors were entrusted with the problem of floods in the Rhône valley.  
266 However, a lack of clear-cut responsibility created political crises.

267 As an answer to these issues, the State, along with other local representatives, created a governance  
268 system (*Plan Rhône*) to manage flood risks and other issues at river level. *Plan Rhône* was initially  
269 created to tackle floods, before being extended to cover other issues such as tourism, culture, energy,  
270 water quality, and transport. This institution was designed in 2007 as a strategic and financial contract  
271 signed between the State, Regional authorities, CNR, and the European Union (ERDF). This provided  
272 175M€, 200 M€, 185M€ and 33 M€ of funding respectively. Beyond these main partners, *Plan Rhône*  
273 brought together other actors, by means of a steering committee: Departments, and main municipal  
274 authorities located along the Rhône. Through consultative committees, local inhabitants and  
275 associations were also associated. *Plan Rhône* was a financial partnership allowed to grant funds to  
276 local governments, project managers or inhabitants wishing to implement projects consistent with  
277 *Plan Rhône* strategy. As such, *Plan Rhône* was operating a kind of “trusteeship” (Li, 2007) on local  
278 actors. Table 1 summarizes the spatial scope and the responsibilities of actors and institutions in  
279 relation to flood management on the Rhône valley.

280 **Table 1: Spatial scope and responsibilities of actors and institutions in relation to flood**  
281 **management in the area covered by the *Plan Rhône***

282 Nb: All figures have been adjusted to the area covered by the 5 regions involved in *Plan Rhône*.

## 283 4. Analysis

### 284 4.1 The “functional fit” of *Plan Rhône* according to its leaders

285 State officials at regional level were responsible for mapping flood risks at river basin level and  
286 steering *Plan Rhône* process. They considered that flood was the primary issue to address in the area<sup>1</sup>.  
287 The flood section of *Plan Rhône* accounted for half of all funding. The reading of *Plan Rhône* official  
288 documents reveals that participants understood the problem of flood in the Rhône valley as a lack of

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<sup>1</sup> « the 2003 flood event provoked the creation of Plan Rhône. In 2004, the prime Minister assigned the Rhône ‘préfet’ (State official) to create a global strategy to prevent floods on the Rhône River » (interview with a State official at River basin level, May 2010) ; « the flood issue was the historical problem, the rallying theme. [Plan Rhône] sought to provide an answer to flood issues. At this period, the unique theme to address was flood. » (interview with a State official at River basin level - October 2012).

289 flood retention capacity of rural areas. The Plan asserts an overall economic goal: “reducing flood  
290 damages”. This was to be achieved by a twofold strategy: (1) raising and strengthening some dykes in  
291 urban areas in order to avoid frequent flooding: “reducing flood discharges that are the most  
292 damageable to densely populated areas”, (2) lowering dykes in rural areas in order to store water  
293 during extreme floods: “enabling the riverbed to accommodate the rise in water levels”, “preserving  
294 floodplain retention capacity”, “optimizing the flooding in some plains”.

295 One of the main target sites of the flood section was located in the Lower Rhône region, where major  
296 floods had occurred. Entitled “Floodplains Optimization Program”, the strategy consisted of  
297 modifying the distribution of risk by: i) enhancing the protection of plains experiencing frequent  
298 flooding (on average once every ten years) ii) increasing water storage capacity by adding a spillway  
299 onto a CNR dyke protecting a rural floodplain against 1000 year return period floods. This latter was  
300 entitled “floodplain restoration project”. Besides this Floodplains Optimization Program, *Plan Rhône*  
301 was supposed to finance dyke reinforcement around the Rhône delta. Figure 1 represents *Plan Rhône*  
302 territory and identifies floodplains concerned by the Floodplains Optimization Program.

303 **Figure 2: Map of *Plan Rhône* territories: the Regions, the sub-basin areas and the floodplain**  
304 **restoration program**

305 As flood experts, *Plan Rhône* leaders understood the issues in hydrological terms. Based on  
306 hydrological knowledge, they calculated the dynamic pattern of a 100-year flood taken as a reference  
307 of extreme flows. They estimated the amount of water that could safely flow between the consolidated  
308 levees and dykes in urban areas. By deduction they determined the retention capacity that was to be  
309 found for preventing levee failure. They screened the existing levees that could be lowered in rural  
310 areas without threatening buildings and found that one levee owned by CNR for hydropower and  
311 navigation purposes would be a good candidate for implementing a spillover. The floodplain to be  
312 restored was on the territory of two rural municipalities Piolenc and Mornas. *Plan Rhône* became the  
313 arena where actors could meet and cooperate to implement this project.

314 *Plan Rhône* leaders paid attention to the dynamic of urbanization. Floodplains earmarked for  
315 restoration were ruled by a no-construction provision in a State-approved urban planning document.  
316 They also identified that economic considerations would loom large as factors possibly affecting the  
317 project. The cost of the spillover was to be covered by financial provisions of the contract. The  
318 benefits downstream urban areas would get from the project could cover the farming losses upstream  
319 rural areas may suffer, according what *Plan Rhône* leaders called “river-basin solidarity”. The  
320 economic loss CNR may experience due to the spillover had to be negotiated within the concession  
321 contract between CNR and the State. The overall contract included a clear-cut and deemed effective  
322 compliance mechanism: EU funds were subjected to the effective implementation of floodplain  
323 restoration project.

324 As expressed in interviews, State officials steering the *Plan Rhône* considered that this system of  
325 governance corresponded to the definition of a “functional fit” for the following reasons:

326 - Its spatial scope was clearly defined and coincided with that of the flood issues (the watershed level),  
327 including the floodplains.

328 - Actors involved in flood issues were also involved in the governance. State actors responsible for  
329 mapping flood risks steered *Plan Rhône* process. Regions were included in *Plan Rhône* as strategic  
330 and financial partners. Other floodplain stakeholders such as Departments, municipal authorities and  
331 inhabitants participated to steering committees.

332 - *Plan Rhône* contributed to enhance the knowledge of other factors possibly affecting flood risks by  
333 financing:

- 334 • Hydraulic studies in order to understand floodplain and dyke behaviors and the potential  
335 hydraulic effects of the modification of the system;
- 336 • Economic studies in order to assess the economic efficiency of the hydraulic-sound strategies;
- 337 • Sociological studies in order to assess the perception of flood risk among riparian inhabitants.

338 - Some compliance mechanisms preexisted:

- 339 • The planning document defined at river level (SDAGE) imposed to offset the effects of any  
340 dyke-raising project with hydraulic compensation (particularly through floodplain restoration);
- 341 • Municipal urban plans designed by municipalities and validated by the State limited  
342 construction in floodplains.

343 - Others compliance mechanisms were settled under the stewardship of *Plan Rhône*:

- 344 • EU funding was granted under the condition of not being used for mere dyke-raising.

345 Between 2007 and 2012, State officials in charge of coordinating the flood section tried to persuade  
346 local governments to take responsibility for the implementation of the Floodplains optimization  
347 program through *Plan Rhône* funds. However, the floodplain restoration project proved to be very  
348 controversial among Rhône stakeholders, particularly municipalities. It was finally abandoned in 2012,  
349 spelling the end of the Floodplains Optimization Program. In the end, the main achievement of *Plan*  
350 *Rhône* (2007-2013) was the enhancement of existing dykes and the construction of new ones, without  
351 any real progress in terms of improving floodplain retention capacity. Using “functional fit”  
352 arguments, *Plan Rhône* leaders attributed this failure to a number of factors:

353 - Detailed studies revealed uncertainties and constrains that were not identified when *Plan Rhône*  
354 objectives were defined. The planning document *Plan Rhône* leaders relied on, did not mention  
355 already built areas. Detailed floodplain topography at higher resolution revealed less retention capacity  
356 than expected. Storing flows in the floodplain proved to be a possible threat on the high speed railway  
357 infrastructure crossing the area. Such constraints raised the costs associated with *Plan Rhône*.

358 - Opposition to the project revealed that some stakeholders gained a *de facto* “veto power” that State  
359 actors had ignored. The project entailed modifying a dyke owned by the CNR. State actors wrongly  
360 believed they had the power to impose the change. CNR’s interests were vested in a concession  
361 contract fostering hydropower, transportation and irrigation, not flood management. Beyond economic  
362 considerations, CNR did not want to take responsibility in flood management. In addition, State  
363 officials, acting as trustees rather than initiators, did not have the power to implement the project  
364 themselves. Whereas in theory, local stakeholders had to comply with river-basin regulations, in  
365 practice, they gained a “veto power” because they could refuse to initiate projects complying with the  
366 aims of *Plan Rhône*. State officials did not manage to convince local stakeholders to take  
367 responsibility for the project. The vested interest of local stakeholders (localized flood protection) can  
368 explain this refusal.

369 - Compliance mechanisms were not restrictive enough to oblige stakeholders to implement the project.  
370 No whistle-blower voiced the lack of compliance to the SDAGE or the lack of compliance to EU  
371 funding rules to national or European courts. Dykes were raised without restoring the floodplain as  
372 compensation.

373 The “functional fit” approach allows us to identify the *a posteriori* weaknesses of *Plan Rhône*  
374 implementation, despite the *a priori* consistency of its rules. In the institutional design of *Plan Rhône*,  
375 stakeholders considered the issue of consistent rules and financial compliance mechanisms. However,  
376 the responsibility to initiate projects (such as constructing a spillover or dismantling a levee) was not  
377 given sufficient attention. In this case, the absence of a defined project leader at the design stage of  
378 *Plan Rhône* partly explains the project failure. This phenomenon of inconsistency between the  
379 objectives of a program and the project leaders for its implementation echoes the lack of « institutional  
380 congruence » as defined by Junier *et al.* (2011). State actors who steered the process underestimated  
381 uncertainties, vested interests and veto-players in the first place.

382 Paradoxically State officials remained legitimate spokespersons of *Plan Rhône*. However,  
383 municipalities and inhabitants called for a rescaling of the problem at State level. Inhabitants of flood  
384 prone areas claimed recognition of their status by the State. They raised the issue in Parliament, but in  
385 vain. *Plan Rhône* leaders argued in favor of this legal status for flood prone landowners with no more  
386 success. Then, they asked the government to modify a law to be able to initiate the floodplain  
387 restoration project in the name of the State. This solution of last resort failed too. This raises the  
388 question of State level legitimacy for local actors. The political weight of the State must be analyzed  
389 through the use of “politics of scale” literature.

#### 390 **4.2 *Plan Rhône* and the “politics of scale”**

391 Unlike *Plan Rhône* leaders, other actors in *Plan Rhône* did not perceive the flood issues in terms of  
392 retention capacity. According to their vested interests and leeway for action they rescaled the issue

393 during the process. Their definition of the problem drew different system boundaries and another level  
394 of legitimate governance, that of the State. The legitimacy of the State results from a long story of  
395 State intervention on the Rhône River. Despite their willingness to implement a decentralized  
396 governance at river-basin level, State officials are imbued with beliefs inherited from State-level  
397 institutions.

#### 398 *4.2.1 Rescaling flood issue at the national scale*

399 In opposition to the strategy built by State officials, other actors defined the problem of floods at  
400 another scale, competing with *Plan Rhône* boundaries. Instead, municipalities, CNR and local  
401 authorities attempted to define flood issue at the scale of the nation.

#### 402 *Municipalities rescaling of flood issue*

403 For municipalities, the problem of floods should be dealt with at the national scale for two reasons.

404 First, areas defined as *flood prone* and subjected to construction limitations are negotiated between  
405 municipalities and the State. The State allows financial support to municipalities depending on the size  
406 of their population. Therefore, municipalities that managed to develop before the implementation of  
407 flood prevention plans, and were then allowed to reinforce their dykes, had advantages over others.  
408 Municipalities located behind dykes have interest to define the problem at a national scale.

409 The second reason for this statement is that in France, the authorities are logistically and financially  
410 best equipped to deal with flooding at national level. This is based on solidarity: i.e. the whole country  
411 should bear the cost of repairing flood damage. A solidarity scheme (called CatNat), financed through  
412 taxes on insurance premiums (Barraqué, 2014), is managed at the national level, and covers repair  
413 costs in case of ‘natural disasters’, in order to avoid insurance companies being bankrupted by a  
414 sudden influx of high-value claims. The government has the final say on which floods are recognized  
415 as ‘national disasters’, and aims to encourage municipalities to limit their urban development in flood-  
416 prone areas. Municipalities therefore argue for a national frame-scale of the problem.

417 Municipalities did not wish to implement the Floodplains Optimization Program defined by *Plan*  
418 *Rhône* officials, and instead demanded that the national government recognize a legal status for  
419 inhabitants living in floodplains<sup>1</sup>. Municipalities found it difficult to identify any positive impacts of  
420 the project designed by *Plan Rhône* officials on their inhabitants' welfare. The preexisting CatNat  
421 system seemed less uncertain. This echoes the article of Erdlenbruch et al. (2009), which highlights  
422 the difficulties in organizing local financial compensation schemes in case of floods because of the  
423 high risk of local water management institutions going bankrupt in case of major floods . Instead of

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<sup>1</sup> Two Laws were proposed by deputies to the government, in vain (Law proposals were N° 2739 (2005) and Law proposal N° 2596 (2010): “aiming at granting a particular status to municipalities and inhabitants living in floodplains”

424 modifying the local share of risk, municipalities referred to the national scale in order to demand a  
425 public treatment of flood-management strategy by protecting all floodplains.

#### 426 *CNR rescaling of flood issue*

427 The main reason for CNR to define flood issue at the national level was its reluctance to take  
428 responsibility for this problem. In particular, they refused to take in charge the implementation of the  
429 Floodplains optimization project. CNR was fearing to be held responsible for the damages in case of  
430 floods. A legal study realized by State officials revealed the “strong reluctance” of CNR to undertake  
431 the works planned by the Floodplains optimization project. Moreover, a letter from CNR legal services  
432 addressed to State officials recalls that “the objective of the floodplain restoration project is out of the  
433 scope of CNR’s responsibilities” and that “there is no mission neither objective within the concession  
434 contract giving responsibility to CNR to manage Rhône floods”<sup>1</sup>.

435 CNR claimed that their company was governed by national rules that prevailed over the local issue of  
436 flood management. This argument is integral to a “politics of scale”. which favors energy production  
437 at the expense of flood security, arguing that one is for the benefit of the whole country, whereas the  
438 other is deemed more local. CNR began to focus more on what national law defined as its  
439 responsibility, i.e. energy, navigation and irrigation. They denied any impact of the company's works  
440 on flood patterns. CNR claimed to fulfil its responsibilities with regards to energy and boat traffic at  
441 national level. Given the growing level of uncertainty regarding flood damage caused by spillway  
442 implementation, the company officials decided that there was no advantage to deal with floods,  
443 because of the resulting legal liability and high costs that would be incurred should they be  
444 unsuccessful.

445 The rescaling of Rhône flood issues at the national level by municipalities and CNR illustrates their  
446 interests to define a problem at a particular scale, but also beliefs inherited from Rhône development  
447 history.

#### 448 *4.2.2 Beliefs inherited from State level institutions*

449 State legitimacy for governing flood issues and the Rhône River development has gradually grown in  
450 the public mind, given the long history of State intervention in building levees and controlling the  
451 river. The strength of this *heritage* is illustrated in the action of State officials. In spite of their attempt  
452 to define flood issue at *Plan Rhône* level, they reproduced the national framing.

#### 453 *The Rhône River development, a national history*

454 Until the 19<sup>th</sup> Century, Rhône River floods were dealt with at community level (Bethemont, 1972;  
455 Champion, 2000). Instances of flooding were opportunities for the Imperial government to exercise its

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<sup>1</sup> Larrouy-Castera, DREAL Rhône-Alpes, 2011, “Mission d’assistance juridique sur les conditions de mise en œuvre du schéma de gestion des inondations du Rhône en aval de Viviers dans le cadre du Plan Rhône”.

456 legitimacy by granting occasional donations or advantages (Favier, 2007). The major flood events in  
457 1840 and 1856 represented “critical junctures” used by the emerging centralized and modern State to  
458 legitimate its domination. The “compassionate journey” of Napoleon III along the Rhône after the  
459 1856 event illustrated the attempt by the State to construct its legitimacy following this event (Picon et  
460 al., 2006). The Emperor came to see the victims and to observe the damage. Through this visit and  
461 State support, the Rhone and its victims gained national interest, and the State, personified by  
462 Napoleon, was sending a message of national involvement in recovery from loss. This symbolic  
463 journey was the starting point of a flood protection public policy<sup>1</sup>, based on dyke construction around  
464 cities, drawing on the expertise of State-employed engineers<sup>2</sup> and public financial support. Large-scale  
465 flood prevention infrastructure was built between 1860 and 1880. After the works in 1856, 30 000 ha  
466 of land were protected from ordinary flood events (Bethemont, 1972, p.136). The risk of flooding  
467 became a public issue to be dealt with at a national level. Rescaling the issue at the national level gave  
468 legitimacy to the State by providing protection for citizens. The scale (from local to national), the  
469 funding (from local to State-financial participation) and the actors<sup>3</sup> involved in flood protection  
470 changed. This mindset remained in place until the 1990s. Thanks to a long period without flooding,  
471 this governance system remained unchallenged until major floods in the 20<sup>th</sup> Century.

472 The Rhône was the theater of a second “critical juncture” in State legitimization in 1945. After the  
473 Second World War, the government undertook major modernization works, in particular on the  
474 Rhône. The government set up a public company, CNR, with the aim of exploiting hydropower and  
475 navigation from upstream of Lyon down to the delta. Large-scale modern dykes replaced or  
476 supplemented infrastructures built in the 19<sup>th</sup> Century, in order to create hydroelectric dams. From the  
477 1980s on, the government allowed another public company (EDF) to install four nuclear power  
478 stations along the river, taking advantage of the cooling potential of the Rhone and of the existing  
479 dykes. These works reinforced the dominant position of national-level river management (Hecht,  
480 1998; Pritchard, 2004). The initial shareholder composition of CNR testified to the nationalization of  
481 the River Rhone: Paris city and its region possessed 25%; the public railway company 25%; the Rhone  
482 local governments 25%; and the remaining 25% went to industrial shareholders, including EDF  
483 (Giandou, 1999). The State required EDF’s and CNR’s to avoid modifying Rhône flood regime.  
484 However, compliance with this rule was hard to monitor, given the complex relationship between dyke

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<sup>1</sup> The “public policy” concept refers to interventions by a public authority benefiting from governmental legitimacy over a particular domain of society or a territory, e.g. a regional public policy for disabled people; a national public policy for housing, etc. (Boussaguet, L., Jacquot, S., Revinet, P. (Eds.), 2006. Dictionnaire des politiques publiques, Paris.)

<sup>2</sup>The “Ponts et Chaussées” public body of engineers was created during the previous century (in 1716) under the Absolutist Monarchy. However, its importance regarding flood prevention on the Rhône increased after the major floods in 1840 and 1856.

<sup>3</sup> In addition to the “Ponts et Chaussées” (Bridges and Roads), after the 1840 floods, a special administrative body was created to deal with Rhone issues: the Rhone Special Service.



485 raising and land use changes. Hydropower works, through dyke construction, transformed landscapes  
486 and floodplains. However, CNR was not entitled to protect citizens from floods.

487 Between 1950 and 1993, no major floods occurred on the Rhône River. These 40 years of peaceful  
488 climate, along with major public works (EDF and CNR) and discourse about security, as well as the  
489 belief in technological progress, culminated in the removal of flood risk from the political agenda. No  
490 “critical juncture” occurred to change the organization of flood governance on the Rhône, until the  
491 1990s. In the meantime, the Rhone valley had undergone development behind CNR dykes.

492 The national history of the Rhône favored the scaling of flood issues at the national level. In spite of  
493 their attempt to implement a flood management policy at the level of the River through a new  
494 institution and a new boundary, State officials have reproduced the conditions favoring the national  
495 framing of the issue.

#### 496 *Plan Rhône promoters in between competing scales*

497 State officials operating at the Rhône basin level took charge of developing a flood management  
498 strategy at the river level. However, in their attempt of restoring a floodplain, their project suffered  
499 from uncertainties that participated to its failure. However, those uncertainties can be seen as *blind*  
500 *spots* created by their framing of the flood issue at the national level.

501 First, State officials have long ignored the detailed topography of the floodplain supposed to be  
502 restored. Mayors of this area demanded a detailed survey of the potential impact of flooding their  
503 territory, This study<sup>1</sup> revealed that houses and firms (i.e 900 inhabitants) would be impacted adversely  
504 by floods. Moreover, it revealed that the topography of the plain was less prone to store water than  
505 planned. Second, State officials ignored that the high-speed railway, installed in the floodplain, would  
506 hamper the development of the project. A study<sup>2</sup> realized by State officials revealed that its structure  
507 would not support the strength of the water stored in the floodplain in case of floods. Last, State  
508 officials overestimated their capacity to influence the State at central level to enable the project  
509 implementation. The creation of a new law was needed to allow them to implement the project by  
510 themselves, or to oblige CNR to implement it. However, the central government did not follow onto  
511 this legal pathway. This belief came from their position as public actors, supposedly enabled to  
512 negotiate local stakes at the national level. However, they overestimated their power to act on national-  
513 level decision making.

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<sup>1</sup> BLR Ingénierie, 2008, « Etude approfondie des conditions d’inondation de la plaine Mornas-Piolenc-Orange et notamment des conditions de remise en eau de cette plaine par le Rhône. Phase 1 et 2 : Approche hydrologique et analyse des enjeux »,

<sup>2</sup> DREAL Rhône-Alpes, 2011, « Compléments techniques à l’étude de faisabilité de remise en eau de la plaine de Piolenc-Mornas-Orange. Problématique liée à la présence de la ligne LGV », étude réalisée par ISL Ingénierie, Décembre 2011.

514 Consistent with ideas put forward in functionalist literature, uncertainties regarding the floodplain  
515 restoration project negatively impacted its implementation. But such uncertainties were only revealed  
516 afterwards. Similarly the veto power of municipalities did not appear at first to the actors of *Plan*  
517 *Rhône*, but happened *a posteriori* in implementation. Finally, compliance mechanisms, which first  
518 appeared as strict constraints, were circumvented more easily than anticipated. This analysis helps  
519 understanding the weaknesses of a governance system but it does so *a posteriori*. This analysis only  
520 provides us with limited advice since information about scientific uncertainties and compliance  
521 mechanism failure was not accessible before implementation and was instead a product of the  
522 implementation process.

523 What we characterized as *uncertainties* in the “functional fit” framework appears as *blind spots*  
524 through a “politics of scale” analysis. Indeed, those uncertainties were created by the focus of State  
525 officials on higher scales than the local one. Referring to the national scale created their ignorance of  
526 the stakes located on the floodplain, and their overestimation of their influence on public (State level)  
527 infrastructure and legislative production. This framing, through the production of *blind spots*, created  
528 the conditions for the failure of the project.

529 The analysis of *Plan Rhône*’s failure through “politics of scale” revealed other implementation  
530 constraints, linked to competing definition of the problem. In the implementation process, actors  
531 revised their understanding of the problem through their interests and their beliefs. These were the  
532 product of the river development history, built at a national level. These beliefs, shared by State  
533 officials, were the cause of “blind-spots” that caused major uncertainties and misunderstandings of the  
534 local situation, provoking the project failure.

## 535 **5. Conclusion**

536 Floods are typical physical issues that go beyond existing administrative frontiers. Experts advocate  
537 managing floods at the river basin scale through the creation of dedicated institutions in order to fit the  
538 governance system with the ecological system. Such an institution was created on the Rhone to tackle  
539 flood issues. *Plan Rhône* stakeholders launched a new strategy of flood management that consisted of  
540 restoring one rural floodplain. However, this floodplain restoration strategy failed. Some reasons for  
541 this failure can be highlighted thanks to “functional fit” literature. However, these reasons do not  
542 exhaust the case study analysis. In contrast, analysis through “politics of scale” literature revealed  
543 other reasons for failure, linked to competing scales over flood management.

544 This analysis reveals that scales are historical products built through “critical junctures” and attempts  
545 by institutions to build their legitimacy. It explains why actors do not naturally collaborate, even when  
546 associated within a “fitting” institution. Actors and institutions can have conflicting views depending  
547 on how they frame their respective interests, and the way in which they see problems. Conflicting  
548 interests and representations can be highlighted through historical analysis focused on scale issues.

549 Confronting two different bodies of literature over a single case study draws us to several statements  
550 and recommendations:

551 - The idea of fitting an institution to a particular problem implies that the representation of a problem  
552 is uniformly perceived among actors. Scientific uncertainty around flood issues increases the  
553 conflicting representations relating to the phenomenon, and therefore generates conflicting views as to  
554 how it should be managed.

555 - The functionalist approach of fit and misfit involves in itself a particular representation of the  
556 problem and of the institution legitimate to take it in charge. However, the definition of the scale of a  
557 problem, and the institution legitimate to take it in charge, are submitted to conflicting representations,  
558 that can hamper development of particular problem-solving strategies.

559 - The legitimization of a particular scale depends on history, interests, and representations. Scales are  
560 historical products, and as such can hardly be modified by the willingness of some project holders.

561 -. Scales are political constructs rather than physical realities. Processes to change the level of an issue  
562 require the support of the actors concerned, but can simultaneously trigger conflicting claims.  
563 Defining the appropriate level to tackle an issue is the product of negotiations between political  
564 interests, but once a level is institutionalized, it constrains the actors to manage the risk at this  
565 particular level (Lebel, 2005).

566 - Addressing socio-ecological phenomena through institutional creation or modification should  
567 overcome the functionalist definition of a scale. Long-term and political analysis can contribute to  
568 increased knowledge about conflicting representations and interests over scales. So-called “wicked  
569 issues” may be better addressed when actors and institutions are aware of the diversity of  
570 representations regarding scales. Presenting a scale as ecologically sound is not sufficient to resolve  
571 “wicked issues”. Rather, social and political drivers should be given more attention before considering  
572 solving a problem at a particular scale.

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