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► **To cite this version:**

Emeline Comby, Yves-François Le Lay, Hervé Piégay. Power and Changing Riverscapes: The Socioecological Fix and Newspaper Discourse Concerning the Rhône River (France) Since 1945. *Annals of the American Association of Geographers*, 2019, 109 (6), pp.1671-1690. 10.1080/24694452.2019.1580134 . halshs-02125902

HAL Id: halshs-02125902

<https://shs.hal.science/halshs-02125902v1>

Submitted on 22 Jun 2021

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1 **Power and Changing Riverscapes.**
2 **The socio-ecological fix and newspaper discourse**
3 **concerning the Rhône River (France) since 1945**
4
5

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13

14 **Abstract**
15

16 Riverscapes are constructs that mix natural components with political, socio-economic, and technical
17 strategies. This article shows how the riverscapes of the Rhône in France have changed under the
18 influence of different power relations. We use newspapers to highlight the potential of news outlets as
19 a data source with which to apply Foucault's critical and genealogical methods and to develop a
20 political ecology of socio-ecological fixes. Media coverage is proxied by a content analysis and textual
21 data analysis of 1,079 articles published in *Le Monde*, from 1945 to 2013. We study variations of
22 newspaper discourse to create five chronological narratives: (i) the reconstruction of France and the
23 creation of new landscapes, (ii) the promotion of national development through navigation, (iii) the
24 quest for energy independence through dams and nuclear power plants, (iv) the abandonment of major
25 projects, and (v) the definition of pollution and flooding as national problems at the same time as the
26 rediscovery of landscapes as local amenities. River landscapes are related to national political
27 objectives, even though schemes for the Rhône seem to be ever less geared to national ambitions. In
28 specific contexts, bottom-up advocacy coalitions occasionally prove powerful enough to influence
29 socio-ecological trajectories: their power seems to be on the rise as the national project wanes. They
30 are often opposed to new socio-ecological fixes. While political drivers are instrumental in shaping the
31 Rhône, economic dynamics are crucial. Energy production seems to be a good indicator for
32 monitoring socio-ecological fixes along major rivers because it involves fixed capital.
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34
35

36 **Keywords**
37

38 *Construction of riverscape, discourse, political ecology, socio-ecological fix, temporal patterns.*
39

40 Introduction

41

42 Studies of political ecology (Bakker 2002), science and technology (Callon 1986), and critical
43 physical geography (Lave et al. 2014) all share a combined focus on the relationship between social
44 power and environmental change. Those studies examine the connection between landscapes and the
45 power relations that shape them (Lave 2015). Landscapes are “humanely transformed nature”, that is,
46 nature transformed to serve some intended purpose (Mitchell 2003). O’Neill (2006) shows how
47 political history and ideologies that consider rivers at a national scale greatly impact river development
48 planning. Thus, legal discourse and political and economic contexts all influence riverscapes
49 (Ashmore 2015). We consider riverscapes to be constructs that mix natural components with topical
50 political issues, economic or social challenges, and technical strategies. Social construction, discourse,
51 and scale are all reflected in riverscapes and in changing social relations (Budds 2009). Riverscapes
52 can be seen as the outcome of socio-ecological processes throughout history (Boyer et al. 2018).

53 In France, hydraulic engineering may mirror state power (Mukerji 2009). This article aims to show
54 how riverscapes on the French part of the Rhône changed under the influence of different power
55 relationships after the Second World War (WW2). The Rhône drains a catchment area of 98,000 km²
56 along its 718-kilometer course through Switzerland and France. In France, it has a 512-kilometer main
57 stem flowing from Lake Geneva to the Mediterranean Sea. The Rhône has not been the subject of
58 international disputes although it drains a watershed shared by Switzerland and France (90,500 km² in
59 southeastern France). Transboundary agreements existed on a sectorial basis (hydroelectricity) from
60 1970 to 2000 and attempts have been made to define new crossborder mechanisms between public
61 authorities over the past decade (Bréthaut and Pfliger 2013). The two countries have developed
62 different policies, which explains why the landscapes of the Rhône differ considerably between
63 Switzerland and France. Here we focus exclusively on the French stretch of the Rhône.

64 In the nineteenth century, the Rhône was a free-flowing river often with multiple flow channels.
65 However, its fluvial pattern began to change in 1860–1870 when the first embankments were built to
66 improve navigation (Bravard 2010) (Figure 1). In the late nineteenth century, engineering structures
67 known as *Casiers Girardon* and that look like groyne fields were built to narrow the Rhône’s channel,
68 concentrate its flow, and promote navigation. By 1945, 42 percent of the surface area covered by the
69 *Casiers Girardon* was terrestrialized, and nowadays only 10 percent is still aquatic (Thorel et al.
70 2018). During the nineteenth century, navigation was the main strategy for economic development.
71 That strategy produced geomorphological and ecological responses during the twentieth century.

72 After the Liberation of France in 1944 and the end of WW2 in 1945, the Fourth Republic was
73 founded. The Rhône’s riverscapes served to rebuild the political authority of central government and
74 to promote economic development. In 1957, the Treaty of Rome created the European Economic
75 Community and fostered new economic partnerships. The 1950s and 1960s saw the end of the French
76 colonial empire, in some places through relatively peaceful decolonization, in others through war. It

77 was during the Algerian War of Independence that de Gaulle created the Fifth Republic in 1958. These
78 geopolitical issues (European construction and the end of the colonial empire) highlighted the use of
79 the Rhône for transporting goods.

80 Even so, the Rhône has had new uses ever since 1945. The current complexity of its riverscapes arises
81 out of the many functions assigned to the Rhône since WW2 and the changes to them over time. After
82 WW1, an Act of Parliament of 1921 suggested three ways to develop the Rhône valley and indirectly
83 the rest of the country: navigation, hydroelectricity, and irrigation. In 1933, the state created the
84 *Compagnie Nationale du Rhône* (CNR) to carry out this program. However, before WW2, nothing had
85 really changed. Then, from 1945 to 1986, the CNR constructed 19 dams to produce hydroelectricity,
86 to ease navigation, and to irrigate agricultural land. Currently, the CNR generates 25 percent of
87 France's hydroelectricity. At the beginning of the twenty-first century, four nuclear power plants (out
88 of a total of 19 in France) draw water from the Rhône to cool their reactors. *Electricité de France*
89 (EDF), the national power company, produces 22 percent of France's nuclear energy along the Rhône
90 (Figure 2). Currently, the Rhône valley forms one of France's major transportation routes (highways,
91 high-speed railroads, and pipelines). A number of large urbanized areas are strung out along the
92 valley: Lyon (France's second largest urban area), Valence, Montélimar, Orange, Avignon, and Arles.

93 We take a retrospective approach to examine the Rhône's riverscapes after WW2 within the
94 framework of the socio-ecological fix. Different approaches to fixes coexist in the literature: fixes are
95 increasingly common in critical geography. Bok (2018) describes the fix as "a pliable enough
96 metaphor, [...] a chameleon-like character", which was used in the 1980s as a "spatial fix" by Harvey,
97 then in the 1990s as a "spatio-temporal fix" of regulationist-theoretical approaches, in the 2000s as a
98 "scalar fix" of state rescaling theory, and finally in the 2010s as the "environmental fixes of political-
99 ecological approaches". Yet, in 1967, Weinberg had already pointed out that solving problems by
100 technological fixes is a less "hard business" than solving them by social changes: technological
101 engineering is expensive to develop, but readily successful. In critical geography, a fix generally
102 denotes a reproduction of capitalism that entails iniquities, and such reproduction is due to different
103 negotiations and arrangements, despite crises (Castree and Christophers 2015). After Harvey (1996,
104 2001), Ekers and Prudham (2015) insist on a spatial fix defined as "an intensive and extensive
105 transformation of landscapes and processes", an entangled production of space and nature. The socio-
106 ecological fix explores "the ways in which crises of capitalist overaccumulation might be displaced
107 through spatial fixes that result in the production of nature" (Ekers and Prudham 2017). Moreover,
108 Swyngedouw (2014) also insists on the spatial and scalar dimension of a fix in developing the concept
109 of the hydroscale fix: despite crises, the economic challenges of capitalism generated the growth or
110 the reproduction of the same model of water development. The economic system was not in question:
111 it was developed elsewhere (and sometimes differently) and it transformed ever more space and
112 nature. Concerning the socio-ecological fix, Ekers and Prudham (2015) add another component
113 associated with social issues and that entails "shifts in the social regulation of productions of space and

114 nature in response to real and perceived crises of legitimacy”. Furthermore, Swyngedouw (2013)
115 insists on this social dimension of the fix and shows that a hydro-social fix reproduces the hegemony
116 of a few stakeholders, the most powerful (and often the richest) actors. Our case study illustrates our
117 interest in the framework of the socio-ecological fix considered as a synthesis of these different
118 approaches to fixes based on the technological, spatial, scalar, and social consequences of economic
119 crises. Cohen and Bakker (2014) argue that the fix displaces conflicts and crises, often through the
120 construction of ecological scales, “which simultaneously depoliticize and repoliticize governance”.
121 We also insist on another dimension of socio-ecological fixes by taking into account the ways in
122 which riverscapes are produced politically.

123 Ekers and Prudham (2015) emphasize that “little scholarship [...] has systematically developed [...] a
124 political ecology of capitalist crises, that is the role of socio-natural transformations” in (re)producing
125 accumulation. We seek to understand broader trajectories of socio-natural change of the Rhône’s
126 riverscapes since 1945. Frioux and Lemire (2012) explain that the 1970s are often considered as a new
127 political and environmental moment in French environmental history, but the origins of this moment
128 and even more the post-1970s are frequently forgotten: they evoke “a chronological myopia”.
129 Pritchard (2011) has already drawn attention to the joint construction of the Rhône and of society
130 based on historical archives and on the concepts of science and technology studies. In this paper, we
131 emphasize the power relationships linked to the conceptual framework of political ecology
132 (Swyngedouw 1999). This implies focusing on the various political and economic actors and the
133 interests they defend, as well as on the discourses establishing the current understanding of the themes
134 and problems involved. We shed light on the different physical and discursive constructions of the
135 Rhône’s riverscapes over 68 years, from 1945 to 2013.

136 Our first hypothesis assumes that the Rhône has undergone many changes, primarily due to different
137 top-down decisions made at the national level since 1945. Our second hypothesis considers that the
138 Rhône’s riverscapes have been shaped by capitalism and its crises since 1945.

139

140

141 **Discourse, social problems, and policies**

142

143 Discourse, considered as a practice with material consequences, can be explored to study the overlap
144 between social and natural components (Bakker 1999). Representation and discourse analysis explain
145 a way of being, living, and speaking (Foucault 1966). Knowledge, discourse, and practice are situated
146 in power relationships (Swyngedouw 2015). Considering discourse as a social act, Fairclough (2010)
147 adopts a three-scale approach: a micro-approach based on words; a meso-approach based on the
148 production, circulation, and reception of discourse; and a macro-approach based on the social
149 construction of discourse (production and reproduction in society). As explained by Smith and Joffe

150 (2009), three information sources contribute to public knowledge: experience, social relationships, and
151 the media.

152 Newspapers are convenient sources of information for understanding how past reality was built,
153 without any memory bias (Gregory and Rowlands 1990; Vuorisalo, Lahtinen, and Laaksonen 2001)
154 and with a record over quite a long period (Ibsen and Brunsden 1996). Despite their use of
155 personalization, dramatization, and novelty (Boykoff and Boykoff 2007), the media play a major role
156 in *mediating* between science, policy, and the public (Lester 2010; Boykoff 2011). Media discourse
157 can offer a “critical” perspective that “distinguishes the forms of exclusion, limitation and
158 appropriation” and a “genealogical” approach that examines “how series of discourse are formed, [...]”
159 what were the specific norms for each, and what were their conditions of appearance, growth and
160 variation” (Foucault 1971). From a Foucauldian perspective, we use newspaper discourse to highlight
161 the potential of news outlets as a data source for developing critical and genealogical perspectives and
162 for developing a political ecology of socio-natural changes and socio-ecological fixes.

163 Some stakeholders consider socio-ecological fixes to be a solution to various social problems. A social
164 problem is “a putative condition or situation that is labeled a problem in the arenas of public discourse
165 and action” (Hilgartner and Bosk 1988, p. 55). Discourse witnesses and (re)produces social problems.
166 After selection and competition among different issues (for example floods, biodiversity, droughts,
167 etc.), social groups recognize certain situations as problems; this explains the rise and fall of social
168 problems. The scope and speed with which a social problem develops can be explained by the forms in
169 which the problem is expressed, its subject matter, and the intensity of the interest it elicits. A social
170 problem may entail political decisions and choices when different actors share the same definition of a
171 social problem (such as the development of a river) and come together to make their voices heard
172 (Comby, Le Lay, and Piégay 2014b). To explain how an arena can become powerful enough to make
173 policy changes, we use the advocacy coalition framework (ACF).

174 Sabatier (1988) develops the ACF which insists on the requirement of a time perspective of at least
175 one decade in order to understand the process of policy change and to obtain a worthwhile assessment
176 of policy impacts. A policy involves priorities as to values, perceptions of current problems, causal
177 relationships, and requires effective policy instruments. Actors are grouped into many arenas which
178 may become an advocacy coalition. The members of an advocacy coalition share a set of normative
179 beliefs about the world and perceptions of it, and they act together to translate their beliefs into public
180 policies. The conceptual framework of the ACF is based on two types of indicators: relatively stable
181 parameters (attributes of the problem, distribution of natural resources, values, structures) and external
182 events (socioeconomic conditions, public opinion, etc.). Through their modification, relatively stable
183 parameters and events are able to bring about political changes despite coalitions of actors operating
184 over the long term. The biophysical characteristics of the river system, water resources, economic
185 structures, and public perceptions may be considered relatively stable parameters (Sabatier and
186 Jenkins-Smith 1993). Such parameters constrain the political subsystem, which is itself made up of

187 various advocacy coalitions. The latter may influence the political subsystem and change certain
188 environmental perceptions (Comby, Le Lay, and Piégay 2014a). Initially, proponents of ACF
189 suggested that external events were more likely to change the system and generate top-down policies.
190 However, this framework has become more complex. A second, more endogenous set of factors seems
191 able to change those core beliefs: a situation of a damaging stalemate in which everyone considers the
192 status quo to be unacceptable; participation by stakeholders; decision rules based on consensus; time; a
193 competent policy broker; mutual trust; and learning among coalitions (Sabatier 2010).
194 Advocacy coalitions propose different physical and discursive constructions of riverscapes over time.
195 Indeed, advocacy coalitions themselves rise and fall over time. The shift from one social problem to
196 another reflects and (re)produces the power relationships among different advocacy coalitions. We
197 attempt to identify different periods to reveal the changes in topical issues, the power relationships
198 between different advocacy coalitions, and their political and physical consequences for the Rhône
199 River.

200

201

202 **Material and methods**

203

204 *A corpus: The Rhône River in Le Monde (1945–2013)*

205

206 The principal dataset addresses the description and the perception of the Rhône River in the national
207 daily newspaper *Le Monde*. Merrill (2000) explains that *Le Monde* is one of the world's great
208 newspapers because of the quality of the information it provides, its editorial freedom, its detailed
209 analyses, its sparing use of pictures, and its un-spectacular approach. This newspaper has already been
210 used by researchers such as Brossard et al. (2004) to represent the French point of view on climate
211 change. We chose *Le Monde* because it was created in 1944, towards the end of WW2, enabling us to
212 work on almost 70 years with the same proxy as part of a retrospective approach. In 2013, *Le Monde*
213 was France's second best-selling national newspaper. The size of its readership underlies its
214 legitimacy as a provider of data.

215 We collected newspaper articles from two digital databases: the first is made available by the
216 newspaper itself and allows subscribers to request articles; the second is Europresse. We searched for
217 the word "Rhône" from 1945 to 2013. This involved sorting through a huge number of articles
218 because "Rhône" forms part of the name of an administrative region (Rhône-Alpes), and it is also the
219 name of two lower tiers of government (*département* and *commune*). The final raw material comprises
220 1,079 articles published from 1945 to 2013.

221

222 *Methods: a critical discourse analysis*

223

224 We used a mixed method combining content analysis (Berelson 1952) and textual data analysis
225 (Lebart, Salem, and Berry 1998). Content analysis includes qualitative data in a quantitative form
226 (Hayward and Osborne 1973). After reading each article, categories were created to gather the
227 information from each item (Boholm 2009). This standard method enables investigators to compare
228 different texts (Mayring 2000). To avoid intercoder variability, one analyst read all the texts and coded
229 certain categories, such as the main themes of each article.

230 To supplement this, lexicometric analyses consider graphical forms only such as words (Lebart,
231 Salem, and Berry 1998). Textual data analyses created in the 1970s were based on inferences and
232 interpretations of statistical results of texts (Benzécri and Benzécri 1980). We used the TXM open-
233 source platform (Heiden 2010) and IRaMuTeQ software (Ratinaud and Marchand 2012) to perform
234 our textual data analyses. IRaMuTeQ reproduces the top-down classification developed by Reinert
235 (1983); this method creates text segments, performs lemmatization, and then proposes different
236 statistics (Cottet et al. 2015).

237 We combined these analyses with a qualitative approach through different quotations to create
238 narratives. These methods replace the three tools (the saw, the wedge, and the axe) described in the
239 famous “allegory for historians” of Leopold (1949) when he cut down his “good oak” (showing 80
240 growth rings). They allow us to operate across the years (like the saw) and to work in radial splits (like
241 the wedge) but also to function at a diagonal angle to the years (like the axe).

242

243

244 **Results: Building a “new” Rhône River**

245

246 *Temporal variations in newspaper discourse on the Rhône River (1945–2013)*

247

248 An average of 16 articles about the Rhône River were published per year, with a fairly wide range
249 from 2 to 46. While the number of publications in *Le Monde* was high until the end of the 1970s, the
250 frequency tended to decline afterwards (Figure 3). The median number of articles was reached in June
251 1975, reflecting a concentration of publications at the beginning of the period. In three separate years,
252 more than 40 articles were published: in 1975, 1960, and 1955, in decreasing order of appearance. In
253 1955, flooding was the main theme, with a secondary topic being dams. In 1960, articles mostly
254 focused on the Rhine-Rhône Canal and the irrigation of the lower Rhône valley (Bas-Rhône). Lastly,
255 in 1975, articles mainly revolved around the controversial Rhine-Rhône Canal and water pollution.
256 Since 1983, the number of annual occurrences has tended to be low, with the exception of 1987 and
257 four periods, 1993–1994, 1996–1997, 2000–2003, and 2007–2009. These four phases correspond to
258 flooding, the abandoning of the Rhine-Rhône Canal project, and PCB (Polychlorinated Biphenyl)
259 pollution of the Rhône. National media coverage of the Rhône during the last thirty years has been

260 because of major crises. Consequently, we observe a decline in the number of articles relating to the
261 Rhône.

262 A total of 431 articles focus on navigation, 205 cover flooding, 154 are about dams, and 104 address
263 pollution (Figure 4). Other themes are prominent in fewer than 35 articles. These topics show a wide
264 interannual variability from 1945 to 2013 (Figure 5). Navigation was found to be the main theme from
265 1959 to 1997. The second most frequently mentioned topic (floods) was very regularly quoted from
266 1950 to 1971; this topic then became more discreet until it made a comeback in media coverage from
267 1990 to 2004. Dams were a key theme from 1945 to 1957 (with maxima in 1945, 1946, and 1948),
268 from 1965 to 1971, from 1979 to 1984, in 1987, in 1993, in 2000, and in 2010. Lastly, pollution is
269 frequently mentioned between 1960 and 1986, with peaks in 1976, 1977, 1986, and from 2007 to
270 2011. Waterfront redevelopments emerged as a major theme in the 1980s and from 1999 to the end of
271 the period.

272

273 *An (inter)national development*

274

275 Using IRaMuTeQ, a clustering tree (Figure 6) is structured around three main poles: (i) the first
276 emphasizes environmental risks such as flooding and protection of the Camargue (classes 6 and 7), (ii)
277 the second is organized around three economic functions of the Rhône (classes 1, 2, and 5), and (iii)
278 the third presents the main stakeholders in the Rhône and public debate (classes 3, 4, and 8). Despite
279 changes in environmental dynamics, society cannot tame the Rhône. Class 6 addresses biodiversity
280 and sheds light on a unique place: the Camargue at the heart of the Rhône delta. Class 7 handles
281 flooding, including descriptions of situations, damage, and comparison with other rivers. Three
282 functions are central: energy (class 5), navigation (class 2), and the industrial development of the
283 Rhône valley (class 1). The Rhône River landscapes are linked to reconstruction, industrialization, and
284 the quest for energy independence in postwar France. The Rhône River landscapes are created by
285 policies (classes 3, 4, and 8). The State is prominent in class 3. Class 4 insists on a greater diversity of
286 levels of decision-making within communes, departments, and regions. Class 8 focuses on
287 environmental degradation and debate linked with this new design through two topics: pollution and
288 waterfront redevelopments.

289 We focused on place names mentioned more than 50 times. The spaces specifically mentioned are
290 mostly outside the Rhône watershed. Figure 7 shows 33 toponyms far from the Rhône, while 28
291 toponyms are along the Rhône. The Rhône appears as a resource from an exogenous perspective. The
292 national scale plays an important role through the terms 'France' and 'Paris'. An overrepresentation of
293 the East of France appears with Alsace, Moselle, Strasbourg, Doubs, East, Lorraine, Mulhouse,
294 Franche-Comté, and Besançon, which may extend to a European perspective with Germany and
295 Switzerland. In the same way, although France's other major rivers all appear, the easternmost of
296 them, the Rhine, is the most cited. Another axis emerges, namely, the Rhône-Mediterranean, which

297 connects southern “poles” such as Marseille and Fos-sur-Mer to broader European dynamics. Lastly,
298 non-French toponyms are located in Europe, in Switzerland (Geneva or Lake Geneva) and highlight
299 European spaces with a certain economic prosperity, such as Rotterdam, Europe’s leading port, and
300 Germany.

301

302 *Rhône River narratives combining time and space*

303

304 Reconstructing France and developing the Rhône River (1945–1960)

305

306 WW2 entailed a multifaceted crisis: (a) international competition was essential to understanding the
307 CNR project and dam construction to ensure the nation’s renewed geopolitical influence and economic
308 development; (b) nationally, the presidential function had to be reaffirmed to rebuild the state’s
309 authority; and (c) economically, energy was in too short supply to ensure new economic prestige. The
310 capitalist system became both a political and economic project based on dams. From 1945 to 1960,
311 284 articles were published. Of them 35 percent covered floods, 29 percent were about dams, and 23
312 percent discussed navigation.

313 After WW2, the Rhône River project was based on a U.S. model. The New Deal was seen as a policy
314 that was easy to replicate. Water was a resource that could be used to lift the country out of its
315 economic crisis. Although the CNR was created by the 1921 Act, the Tennessee Valley Authority
316 (TVA) set up in 1933 served nevertheless as a benchmark for it. *Le Monde* compared the CNR to the
317 TVA 21 times. “The Rhône River has the biggest lock in the world. The development of the middle
318 reach of the Rhône River between Donzère and Mondragon will have considerable consequences for
319 agriculture as for industry throughout the southeast. This huge undertaking is, at the European level,
320 what the planning of the Tennessee Valley was to the US” (*Le Monde*, 8 June 1948). Furthermore, in
321 1936 Franklin D. Roosevelt nicknamed CNR president Léon Perrier the “Father of the Tennessee
322 Valley Authority” (Bethemont 1972). The circulation of ideas across the Atlantic Ocean was
323 facilitated by two books published after WW2 in France. First, J. Huxley wrote *TVA: Adventure in*
324 *Planning*, the 1944 French title of which was *La Vallée du miracle. “TVA”, une aventure dans le*
325 *domaine de l’économie planifiée*. Then, D. E. Lilienthal published in 1944 *TVA: Democracy on the*
326 *March*. The TVA aimed at promoting flood control, electrification, rural development, and
327 conservation (Pritchard 2011), whereas the CNR had three objectives: hydroelectricity production,
328 improvement of agricultural methods (such as irrigation), and navigation. “From Tennessee Valley
329 Authority dams to the Donzère-Mondragon project. There are few American institutions which are as
330 well known and so poorly known, [...] as the famous Tennessee Valley Authority. [...] Two small
331 books published after the Liberation (Julian Huxley’s *Valley of the Miracle*, and David Lilienthal’s
332 *TVA*) made known to the French public this work of truly American proportions” (*Le Monde*, 20
333 August 1949). The construction of multi-purpose dams explained the comparison. Moreover,

334 journalists seemed to be fascinated by the United States and the importance of the economic and
335 landscape changes there. The flow of capital was also linked with the United States: Marshall Plan
336 funds helped to build dams. Pritchard (2011, p. 72) suggests that this story often went unreported in
337 order to distance “the project from its financial dependency on the United States and consequently
338 reinforced its supposed ‘Frenchness’”. Nevertheless, the journalists of *Le Monde* did not ignore this
339 point: from 1948 to 1957, the Marshall Plan was referred to nine times. The United States also
340 appeared as a competitor to France’s international standing (“*rayonnement*”) (Pritchard 2004).
341 Journalists focused on the potential narrowing of the development gap. The development of the Rhône
342 involved shared interests and joint capital investments between France and the United States. The
343 projects for the Rhône were indicative of relations between France and the United States after the war.
344 The Rhône provided the image of an economic and political resource that reaffirmed France’s
345 international prestige. *Le Monde* highlighted presidential visits, such as Tito’s in May 1950 and
346 Khrushchev’s in March 1960. The Rhône was the subject of curiosity for tourists looking to visit a
347 changing France. In March 1956, 22 German journalists came to witness and report back on the river’s
348 development. The Rhône was one of the prime places for admiring the post-war reconstruction of
349 France, which while reasserting the authority of central government was also creating dependence on
350 the U.S. economic model.

351 The development of the Rhône became a symbol of national reconstruction and promoted France’s
352 image abroad. The inscription “The Rhône in the service of the nation” on the Seyssel dam still
353 testifies to how the national project for developing the river was intended to entrench the state’s
354 authority. The presidents of the French Republic also played a prominent part in re-envisioning the
355 Rhône River: Auriol (1947–1954) was mentioned 25 times, Coty (1954–1959) 6 times, and de Gaulle
356 (1959–1969) 27 times. Politicians used the engineering achievements on the Rhône for grandstanding.
357 Auriol affirmed in Génissiat: “Produce and rebuild: Between a sharp decline and rapid revival there is
358 no intermediate solution” (*Le Monde*, 3 August 1948). In 1947, Gravier published *Paris et le désert*
359 *français* [*Paris and the French Desert*], which highlighted the need to reduce spatial and economic
360 disparities between regions. The Rhône was the emblem of state interventionism in an unusually
361 centralized country, because political and economic strategies were intertwined. Rhône River planning
362 was a top-down policy: it aimed at striking a better balance in national development by industrializing
363 the Rhône valley. Some of its inhabitants were members of the CNR, such as its president, Perrier.
364 Herriot, the mayor of Lyon, was one of the leading supporters of the project. The shareholders of the
365 CNR were the city of Paris, 14 *départements*, several cities along the Rhône valley, a railroad
366 company, and various manufacturers. The state itself though not a shareholder still played an
367 important role (Giandou 1999). These *ex nihilo* constructions came in for criticism: “French industry’s
368 needs are very important. But we should not fall into what is called the snobbery of kilowatts. Dam
369 construction removes villages; it disturbs the tranquility of working populations. Yesterday Tignes
370 was sacrificed. The creation of Donzère-Mondragon damaged some of the neighboring populations”

371 (*Le Monde*, 18 February 1954). The development of the Rhône symbolized the assertion of state
372 authority, even though the CNR involved both national and local stakeholders.

373 From 1945 to 1960, the CNR built five dams and created a new pattern of landscape. A diversion dam
374 split the Rhône into a by-passed main channel (sometimes called the *Vieux Rhône* [Old Rhône River])
375 and a new canal with a hydroelectric power plant. These landscapes bear witness to the role of WW2
376 in socio-natural transformations and the creation of a resource through the accumulation of economic
377 capital. This is our first socio-ecological fix based primarily on a technological fix. Many other dams
378 were planned at the time and built in the next period.

379

380 Promoting national territorial development and improving navigation (1961–1972)

381

382 As of 1961, the main topic was different: 34 articles were published in 1961, 27 of which concerned
383 navigation. From 1961 to 1972, 58 percent of articles were about navigation. The crisis was linked
384 with economic and political drivers: energy prices, decolonization, the creation of a European common
385 market, and the ideology of *aménagement du territoire national* [French national planning] to reduce
386 uneven national development. As oil prices were low, hydroelectricity was less profitable. Le Lannou,
387 a geographer at the University of Lyon, affirmed that “electricity is no longer able to finance large
388 investments. We must therefore provide a development method for multiple purposes, no one service
389 of which is profitable in itself, whereas together they make for a very worthwhile investment” (*Le*
390 *Monde*, 31 July 1972). Two new main objectives were developed both with a European ambition: (i)
391 to make the Rhône River navigable by larger vessels within a continuous network of wide-gauge
392 waterways, and (ii) to build the Rhine-Rhône Canal.

393 Locks were built to open a waterway connection between Lyon and Marseille. Navigation was seen as
394 a means of developing southeastern France. First, at national and regional scales, central government
395 decided that Lyon and Marseille were *métropoles d'équilibre* [i.e. metropolises that could
396 counterbalance the domination of the capital city Paris and develop their regions through knock-on
397 benefits] to reduce uneven development. In the 1950s and 1960s, F. Perroux’s growth pole theory was
398 widely discussed in France: it argues that economic development depends on different poles (or
399 clusters) and growth industries located in different regions. Thus the creation of an economically
400 dominant region was based on propulsive industries, that could engender positive externalities—what
401 he called *effet d'entraînement* [“propulsive effect”]—and consequently economic growth. The Rhône
402 valley is the extended region of two “countervailing” metropolises, Lyon and Marseille. Then,
403 internationally, the closure of the Suez Canal (from 1967 to 1975) and decolonization invited actors to
404 look less to the Mediterranean Sea and more toward northern and eastern Europe, especially to
405 Germany. The development of a common market since the 1950s and the prosperity of certain
406 economic areas also explain this shift. The Rhine-Rhône Canal was the missing link in the European-
407 wide waterway and could help the economic development of the “countervailing metropolises”. The

408 French president was committed to the Rhine-Rhône Canal project. Mayors of certain cities in the
409 hinterland of the Rhône lobbied extensively, including Defferre, mayor of Marseille, and Pflimlin,
410 mayor of Strasbourg. In response to Defferre, President de Gaulle suggested: “Marseille has no reason
411 to fear the future in regard to the Canal, it is indeed a necessary decision. We made the decision to
412 construct it. As soon as the current studies have been completed, the connection will be made” (*Le*
413 *Monde*, 13 November 1961). However, this project was very expensive. Navigation as a profitable
414 venture was increasingly criticized at a time when sections of the A7 highway and the pipelines along
415 the Rhône River were earning a reputation for technical advancement.

416 The urbanization and industrialization of the Rhône valley generated problems. The issue of water
417 treatment was becoming more prevalent in the 1960s: could the Rhône be an open sewer? The 1964
418 Water Act meant water quality was emerging as a major concern: the Rhône, polluted as it was by
419 industrial and domestic waste, did not have a good record. The *Conseil supérieur de la Pêche*
420 [National Fishing Council] stigmatized the chemical plants within Lyon’s urban area. “The Rhône
421 River carries those masses of red or blue foam, depending on the day, in waste from riverside plants”
422 (*Le Monde*, 16 June 1972). The urbanization and industrialization of the Rhône valley led to a
423 degradation of water quality.

424 Moreover, nuanced discourse on dams seemed to increase. Locals felt dispossessed. Farmers
425 sometimes expressed their disapproval, notably at the time of a violent expropriation operation in
426 March 1968 in Avignon, which delayed some dam constructions. Similarly, in September 1971, two
427 brothers kidnapped a CNR employee so as to secure higher compensation. These two news stories
428 were isolated events but reflected local anger at the loss of good farmland. These examples also show
429 ambivalence between the desire to develop an irrigated and productive agriculture and the sacrifice of
430 farmland. The management strategies of central government were questioned at the local level because
431 of the awareness of consequences, the refusal of new disturbances, and uncertain economic equilibria.
432 However, although the construction and reproduction of similar landscapes along the Rhône were the
433 subject of negotiations with various local political actors, they illustrated the triumph of a national
434 project. Energy prices played a significant role in this new socio-ecological fix. This fix was mainly
435 based on a hydroscale fix (the creation of a homogenized valley linked with Europe) and a
436 technological fix. The redevelopment of the Rhône re-envisioned it as a canal which would help the
437 economic development of outlying parts of the nation thanks to navigation. This development was
438 viewed from a European perspective at the time of decolonization.

439

440 Achieving energy independence and seeing the Rhône disappear (1973–1981)

441

442 From 1973 to 1981, navigation was the main issue, featuring in 62 percent of news items. Pollution
443 became topical (17 percent of articles). In 1974, the first article to tackle nuclear energy was
444 published. From 1973 to 1981, 13 percent of articles cover energy issues (dams and nuclear power

445 plants). The 1973 and 1979 oil shocks led to higher heating prices, with two consequences for the
446 Rhône: the renewed importance of hydroelectric projects and the affirmation of nuclear energy as a
447 solution. This international crisis entailed a socio-ecological fix, i.e. the production of new landscapes
448 (nuclear riverscapes) and the reproduction of a familiar riverscape (dams and canals).
449 This public perception was not unanimous, since the last lock on the Rhône River was implemented in
450 1980. “This is another Rhône River. The eyes get used to it, and even better, it will be less and less the
451 memory of what was. [...] We have mollified the Rhône” (*Le Monde*, 1 October 1979). The use of the
452 term “river highway” reflected this straightening of the Rhône: some actors used the metaphor of the
453 staircase to evoke its dams. It also echoed the development of automobile traffic in the Rhône valley, a
454 sign of the country’s modernization and unification. It entailed a standardization of landscapes, in
455 which local peculiarities were erased in favor of a national (or world) view of what a navigable river
456 should be. The new banks lined an easily navigable and so more profitable route: time was saved, and
457 the standardization of the fleet and harbor facilities limited the effects of transshipments. On the 22
458 June 1972, French author B. Clavel explained in *Le Monde*: “I have no illusions. I know very well—
459 the entire history of mankind is there to teach us—that never have painters, poets, songwriters, writers
460 or lovers of nature triumphed over politicians allied with bankers and merchants. In a word: neither
461 reason nor good feelings can triumph over money. [...] I saw the Rhône River die, my second home,
462 and I now hear the complaint of residents who did nothing to save it. I hear the boatmen cry still. They
463 killed it”. Clavel emphasized the political and economic shaping of the Rhône and the disconnection
464 between national objectives and an almost visceral local attachment to its lost landscapes. Such words
465 are emblematic of the awareness among some local players that the Rhône was gone and had been
466 sacrificed for “the lies of the nation state”, to use one of Clavel’s expressions. The arrangements of
467 previous periods seemed to have been destabilized.

468 The 1970s oil crisis prompted the French state to rethink the national energy mix and legitimized the
469 hydroelectric development of the Rhône, which had previously been considered uneconomic. The new
470 dams—Caderousse in 1975, Avignon in 1973, and Vallabrègues-Arles in 1973—were less grandiose
471 constructions. However, specific criticisms emerged about the impact of development on the ecology
472 and landscapes of the river: central government planning increasingly encountered regional and local
473 opposition. Despite these reservations, ongoing projects were accelerated and suspended projects
474 resumed. Thus, the development of the Rhône was not linear over time but occurred in fits and starts
475 dictated by a political and economic rationale. This politico-economic outlook saw dams as things of
476 national utility and the Upper Rhône as under-exploited. Accordingly, the dam at Chautagne was built
477 in 1980 and five other dams planned. Nuclear energy also appeared as a solution to the oil shocks.
478 Environmentalists and some scientists warned of the issue of thermal pollution, one of the arguments
479 against nuclear power plants. Despite criticism or nuanced positions, Creys-Malville, Bugey, and
480 Tricastin were the first constructions in what would become the world’s most heavily nuclearized
481 valley. Hydroelectric and nuclear energy became the new means of restoring France’s prestige and

482 independence. These new constructions depended on the river's economic stakeholders: the CNR in
483 conjunction with Swiss energy stakeholders for dams and EDF for nuclear power plants.
484 Local mobilization (with environmentalists, scientists, anglers, and local elected officials) might
485 promote new standards, regulations, or alert levels to produce another idea of the river, thereby
486 reducing the damage done (e.g. during dam flushing) by serving political and economic precepts
487 alone. Meanwhile, local discourse on pollution and on the deterioration of the river more generally
488 proliferated and was very much present at national level. Vallin and Porelli were both mayors and
489 presidents of associations who successfully federated local councils to transform local mobilization
490 into regional commitment. Local stakeholders tried to change perceptions of the Rhône to stop further
491 damage to it. Industrial accidents, particularly in the chemical sector near Lyon, highlighted the
492 Rhône's pollution problems. Industrial discharge had a very visible effect on the river. "We fished 367
493 tons of dead fish over dozens of kilometers downstream from Lyon, and angling federations of five
494 *départements* have brought civil action in this case" (*Le Monde*, 27 April 1977). The courts found a
495 company liable. This ecological disaster in 1976 marked a turning point: economics did not justify
496 uncontrolled spillage and an absence of liability. This naming and shaming over pollution of the
497 Rhône was also highlighted nationally by the consequences of the damage for the Mediterranean Sea.
498 The Mediterranean benefits from major commitment in terms of the fight against pollution because of
499 the place it holds in peoples' imaginations and its symbolic status in history, the mobilization of
500 economic actors in fisheries and aquaculture, and geopolitical relations among the various coastal
501 states. Local mobilization was structured around the Rhône to put an end to noticeable local pollution.
502 The last lock on the Rhône, new dams, and new nuclear power plants were evidence of this socio-
503 ecological fix through technological and hydroscale fixes. Landscape changes entailed local
504 mobilization that was very much present but not all-powerful. Power relations were to change in the
505 next period.

506

507 Abandoning major development projects and not taming the Rhône (1982–1997)

508

509 From 1982 to 1997, 209 articles were published. Of these 46 percent addressed navigation. Eighteen
510 percent of the articles covered floods: from 1966 to 1982, only seven articles had been about floods.
511 Eleven percent of the articles dealt with pollution and 10 percent referred to energy production (mostly
512 dams). The crisis was due to a local refusal of new intensive transformations of landscapes. Capitalism
513 was in competition with other values such as nature, landscapes, and a sense of place.

514 Although the state had appeared favorable to the Rhine-Rhône Canal in the previous periods, a change
515 in the parliamentary majority and the coming to power of the Jospin government in June 1997 saw the
516 Socialists and the Greens criticize the project. A top-down decision sealed the fate of the Rhine-Rhône
517 Canal project, which was no longer seen as a development in the national interest. Barthélémy (2006)
518 claims that this decision might have been connected to the Rhône's 10-year program of hydraulic and

519 ecological restoration: out of 39 persons interviewed, 12 believed that this program was linked to the
520 abandonment of the Rhine-Rhône Canal, which was seen by some as a victory by others as a defeat.
521 After 1997, media coverage of navigation was very limited: from 1998 to 2013, only eight articles
522 about navigation were published. Clearly the end of plans for the Rhine-Rhône Canal meant the river
523 was less newsworthy.

524 Local criticisms were exacerbated by the return of repeated flooding, which seemed to have been
525 forgotten in the previous period. Although the dams on the Rhône were not designed for flood
526 management, residents still felt protected. After 30 years without notable events, the floods of 1990,
527 1993, and 1994 were a reminder of the dangers of living near such a river. “We were scared; we felt
528 powerless in front of this body of water [...] The Rhône was tamed, they said, but if the Rhône River
529 wanted to be nasty, nothing stopped it. We had already seen it angry, that was perhaps forty years ago;
530 we forgot it, but it reminded us” (*Le Monde*, 11 October 1993). By increasing channelization and
531 restricting its natural corridor, the Rhône had been made more dangerous. In addition, the dikes, some
532 of them old, had not always been maintained and failed to serve their main purpose. Restoring the
533 river’s original course would be one way to manage the rising waters. Fast-growing urbanization
534 increased vulnerability. Consequently, although these floods were normal occurrences, they were
535 perceived as unexpected and as different from the events people had already experienced: the damage
536 caused was a reminder of the risk run.

537 This period was marked by the announcement of new dams on the Rhône, with four constructions
538 programmed upstream from Lyon. National perceptions affirmed the need to use every drop of water
539 so as not to waste money (even though this manna was a fiction in the absence of dams). However,
540 these constructions met with strong local reticence: some advocacy coalitions managed to influence
541 projects at a time when public inquiries became mandatory and when local mobilization was strong.
542 Local actors refused to make fresh sacrifices for the nation. Ecological impacts were increasingly
543 taken into account thanks to an environmental coalition. This episode coincided with the strengthening
544 of a coalition that had first appeared during the previous period. It brought together scientists,
545 environmentalists, anglers, and local politicians, and together they obtained an increase in minimum
546 flow. The Rhône dam chain was only partially completed: Sault-Brénaz was considered as the last
547 major project on the Rhône, a status conferred by the abandonment of the Loyettes and Miribel-Thil
548 projects.

549 Thus, the accelerating nationwide demand for river development was confronted with local refusal.
550 Despite sporadic local mobilization since the 1960s, power relations were not disrupted until the
551 1980s. This powerful coalition was indicative of a change in perception: the Rhône could not be seen
552 as merely serving the nation and as a subject of top-down policies. However, the socio-ecological fix
553 did not stop and was still noticeable in the creation of dams and nuclear power plants, both
554 technological and hydro-scalar fixes.

555

556 Defining national problems and rediscovering local amenities (1998–2013)

557

558 Media coverage decreased in this period with only 152 articles published. They dealt with floods (47
559 percent of news items), pollution (19 percent), energy (13 percent), and the rediscovery of urban
560 waterscapes (10 percent). The topics were more diverse than in the previous periods. External
561 parameters seemed to be weaker. The crises were due to the rediscovery of historical pollution and the
562 degradation of urban riverscapes.

563 The issues involving the Rhône prompted the state to reformulate its policy on flood management and
564 PCB pollutions. Repeated flooding in France in 2000, 2001, 2002, and 2003 had serious
565 consequences. Following the 2002 floods, R. Bachelot, Minister for Ecology and Sustainable
566 Development, promised a new risk-based law in France to be enacted in 2003. Furthermore, the
567 rediscovery of PCB pollutions of the Rhône between 2005 and 2007 led to fresh analyses of other
568 French rivers and the discovery of a national issue. This gave rise to a national plan against PCB
569 pollutions in France’s rivers (Comby, Le Lay, and Piégay 2014b). Thus, the Rhône revealed certain
570 failings in national policies with regard to rivers.

571 The “rediscovery” of the Rhône involved a revaluation of these landscapes locally. Urban waterfront
572 redevelopment projects multiplied. The river came to be seen as an attractive resource for cities
573 looking to be competitive in terms of metropolitanization but also to improve the quality of everyday
574 life of their inhabitants. The proposed reorganization reflected nostalgia with automobile amenities
575 (such as parking lots and roads) being replaced by facilities for leisure and tourism. Waterfront
576 redevelopment coexisted with the issue of pollution. Better water quality made it possible to
577 rediscover the river banks. The aim was to turn water into an attractive resource. Landscapes became
578 prominent local features, but this should be viewed in the context of a time when a growing number of
579 cities were using waterfront redevelopments to become more attractive.

580 During this period, crises were related to earlier strategies to industrialize and urbanize the Rhône
581 valley (especially pollution and waterfront development). The Rhône riverscapes were produced by a
582 techno-managerial fix. The primary scale seemed to be the local level although it was intertwined with
583 national decisions. Yet, this finding must be put in perspective: media coverage of issues involving the
584 Rhône was very low during this final period. Consequently, even the issues cited most often received
585 comparatively little coverage.

586

587

588 **Discussion**

589

590 *Developing a national river: top-down policy and major rivers*

591

592 We show that river landscapes are linked to political objectives. This top-down policy gives rise to
593 local opposition and conflict that only partly confirm our first hypothesis. Different powers exist, and
594 in specific contexts, occasionally, bottom-up advocacy coalitions can be powerful enough to influence
595 socio-ecological trajectories.

596 After WW2, the reconstruction and modernization of France was partly based on the construction of
597 new Rhône River landscapes. The Rhône embodied a political will that was materialized through
598 planning and actions carried out mainly by the state. This chronology corresponds to that established
599 by Swyngedouw (2015) for Spain. Although political regimes may be different in nature, it seems that
600 since WW2 different European states have used major rivers as a means to assert their political power
601 and authority both nationally and internationally.

602 We emphasize that the development of a major river may be influenced internationally by experience
603 gained with other rivers. International dynamics, such as the prestige of other countries,
604 decolonization, and cooperation over the Mediterranean Sea all had consequences for the landscapes
605 of the Rhône, intensifying the number of changes or leading to the creation of standards in the context
606 of globalization. These external events generated a top-down policy in which central government
607 reproduced existing models, re-used previously abandoned projects, or created new ones. This
608 dynamic is based on admiration, competition, and partnership.

609 Until the 1960s, this top-down policy was based on an image of the state as a strong executive power.
610 However, beginning in the 1960s, tension meant greater account had to be taken of the expectations of
611 local residents. Some local advocacy coalitions opposed this top-down policy and legitimized other
612 processes of discussion and problem-solving. These inhabitants were troubled to varying degrees by
613 the disappearance of landscapes for which they felt an attachment. Mobilization was structured around
614 four main issues: (i) agriculture and land dispossession, (ii) pollution and degradation of water quality,
615 (iii) flooding, and (iv) threats to certain historical activities. This discourse still feeds some
616 contemporary controversies and generates current demands made of the state and energy companies:
617 the ongoing ecological restoration of the Rhône fits into this context (Barthélémy and Armani 2015).
618 Some internal events, such as pollution and hydrologic extremes, have generated environmental
619 awareness and entailed new policies. The formation of heterogeneous collectives has brought together
620 different perceptions of environmental problems.

621 However, after the 1980s, media coverage of the Rhône River tended to fade, which might suggest
622 that the construction of a national project around the Rhône had been eclipsed. The state then
623 intervened during major crises (mainly flooding and pollution), operating in an emergency context and
624 in a less structured way. However, past developments and investments have largely structured the
625 river's landscapes and productive functions.

626 Events must be viewed in a national setting in order to understand the current landscape, which
627 reflects political and economic concerns and contexts. However, the mobilization of local inhabitants
628 should not be forgotten: it has prevented even more extensive human transformation of the landscapes.

629

630 *Monitoring socio-ecological fixes*

631

632 Socio-ecological fixes explore the relationships between crises, capitalist over-accumulation, and
633 nature (Ekers and Prudham 2017). While political drivers are very powerful in shaping the
634 development of the Rhône, it is clear that economic dynamics are also crucial, and this validates our
635 second hypothesis. They determine many political choices.

636 The energy mix seems to be a good indicator for monitoring capital circulation and socio-ecological
637 fixes along major rivers because it involves fixed capital (Harvey 2001). During the 1970s and 1980s,
638 oil shocks entailed economic crises and the “necessity” of using more water, more nuclear energy, and
639 less oil. The creation of more dams and five nuclear power plants is a footprint or proof that underlines
640 the merging of “tertiary circuits” involving flows of capital into the reproduction of capitalism (Ekers
641 and Prudham 2017). Dams and nuclear power plants are seen as spatially fixed capital contributing to
642 energy supply and to economic independence.

643 We can question the possibility of an energy transition. In the face of the oil crises in the 1970s and
644 1980s, money flowed elsewhere. The circulation of capital was constant: production modes (dams,
645 nuclear power plants, wind turbines, micro-hydroelectric plants, and photovoltaic power stations) were
646 superimposed, without necessarily replacing one another. There is no real succession in the Rhône
647 valley despite the closure of Superphénix (a nuclear power plant), only accumulation.

648 This fix generated significant mobilization. Barthélémy (2006, p. 24) writes that the Brégnier-Cordon
649 dam in the 1980s was the first case study of the Rhône River in which negotiations over environmental
650 issues were very important because of its ecological value: the minimum flow of 100 m³/s was
651 negotiated thanks to “environmentalist entrepreneurs”, the CNR, and the ministry. The same actors
652 could play different roles in the system because of their different social and political functions: one
653 mayor was also a professor of geography, and another an ecologist and a professor of biology.
654 Bouleau (2014) discussed this coproduction of scientific knowledge and waterscapes along the Rhône.
655 The minimum flow was ascertained from indicators arrived at by compromise and negotiation
656 (Fernandez 2014). Behind the numbers, minimum flow might give the impression that it is a scientific
657 truth. These data arose as a choice involving different powers. Cubic meters per second were
658 considered as a triumph of one camp over another: less water in the river would mean the economic
659 agents had won with water being used for hydroelectricity and irrigation and consequently for making
660 money. According to the environmentalist advocacy coalition, water is water, whereas in a more
661 economic (and mainstream?) approach, water is energy and money. This reference to minimum flow
662 synthesized different perceptions of the river, among them hydrological, political, economic, technical,

663 social, or symbolic components. No one coalition won the amount of water it wanted, even if that
664 number appeared as a victory for the environmentalists. As the minimum flow was higher, the energy
665 company created micro-hydroelectric plants to partly offset lost production capacity and to make some
666 money regardless. Thus, micro-hydroelectricity is a new mask for the hydroscale fix (Swyngedouw
667 2014) because of the new places and plant that became productive. Advocacy coalitions can modify
668 the trajectory of the production of nature and space, but perhaps only at a local scale, at the margins,
669 and potentially for a limited period of time.

670 Urban waterfront revitalization projects can also be read as a socio-ecological fix at an urban-area
671 scale. Lyon changed its parking lots into walkable spaces beside the Rhône in 2007 (Comby 2013).
672 Here, the use of cars was abandoned so as to return the riverbanks to “the people”. The new uses of
673 these riverbanks are economically more cost-effective thanks to tourism, new restaurants, and bars.
674 Socio-ecological fixes shed light on how city stakeholders have treated their riverfronts over time and
675 how the spatial relations of city and river constrain (or not) relationships between urban populations
676 and their rivers.

677 Methods with which to observe socio-ecological fixes are crucial. Most political ecology is based on
678 historical analyses, studying “sedimented social relations” and environmental practices (Perreault et al.
679 2015). Even though our proxy has a bias, media discourse is quite efficient in reconstructing
680 discursive trajectories and political strategies. Our results are very similar to those of Pritchard (2011),
681 even though the perspectives are quite different. We assume that a national newspaper is an
682 appropriate form of data if the topic under study is associated with national aims and measures.

683
684

685 **Conclusions**

686

687 This temporal approach to discourse in the national press aims to understand the landscape trajectories
688 of the Rhône River from different angles. Politically, the river initially appeared to be a necessary
689 medium for various top-down national strategies; but it has also become a medium for a more bottom-
690 up local policy to address new challenges such as environmental protection. Economically, the Rhône
691 has been a resource that allows the region to be identified as a major contributor to the national
692 economy, but it also reflects an excessive concentration of development, which may increase certain
693 forms of vulnerability. Socially and culturally, the Rhône is the locus of historical practices, some of
694 which are destabilized by the changes underway. Technically, the Rhône landscapes reflect a sought-
695 after mastery of natural elements by engineers, but the river is also a watercourse that cannot be fully
696 tamed or totally purified. Physically, the new Rhône that has been developed embodies continuity with

697 respect to the transversal dikes that have been in place since the nineteenth century; but it also
698 embodies change because of the extent to which its course has been straightened.

699 The changing landscapes can be viewed in terms of power relationships associated with political and
700 economic values. As for the Rhône riverscapes, navigation and energy entail new landscapes but also
701 new risks. They are also linked with the industrialization of the valley. The location of energy
702 development on the Rhône is an illustration of a hydroscale fix: capitalism has generated the growth
703 of new plant to produce energy and to transform water into a “valuable” resource. We insist on the
704 materiality of socioecological fixes: different transformation schemes overlap and landscapes change
705 forever. Currently, these anthropic changes of discharge and of channel and floodplain morphology are
706 the principal threats to the Rhône (Lamouroux et al. 2015). Moore (2011) explains that capitalism is an
707 “ecological regime” and could be thought of as a “world-ecology”. We can surmise that the Rhône has
708 (re)produced a capitalist ecology the creation of which can be monitored through historical archives
709 such as newspapers.

710

711

712 **Acknowledgment**

713 We thank Fanny Arnaud, who collected historical maps and images.

714

715 **Funding**

716 This work was funded by the French program “Investissements d’Avenir” (ANR-11-LABX-0010),
717 which is managed by the ANR. It was supported by the OHM Vallée du Rhône. This research project
718 was part of a program of Rhône Basin Long-Term Ecosystem Research (LTER, ZABR).

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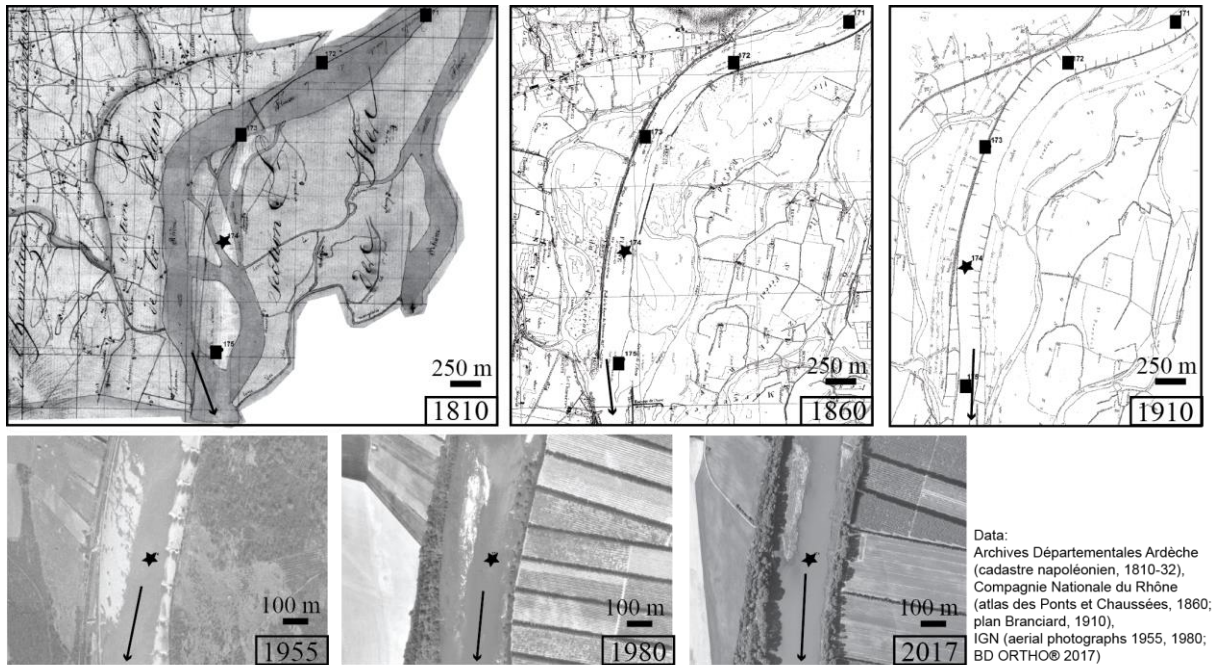
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881 **Figure captions**

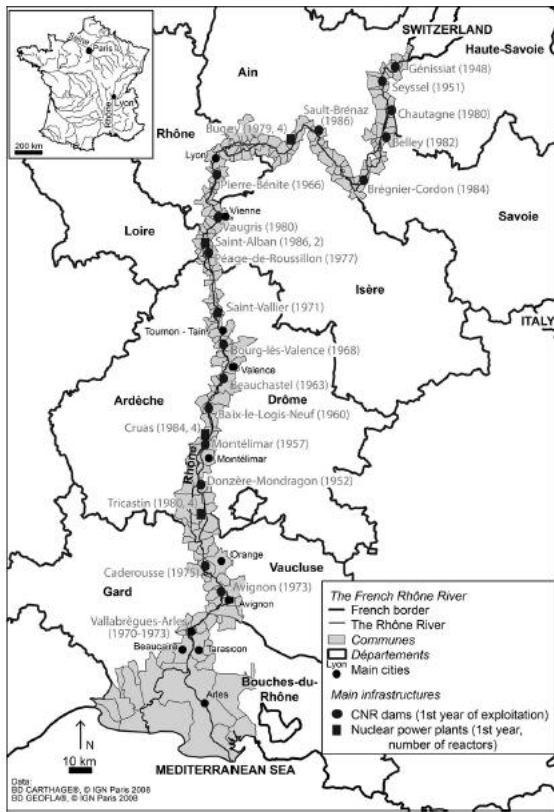
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883 **Figure 1. Historical maps and images of the Rhône riverscapes at Saint-Montan (Ardèche, France)**



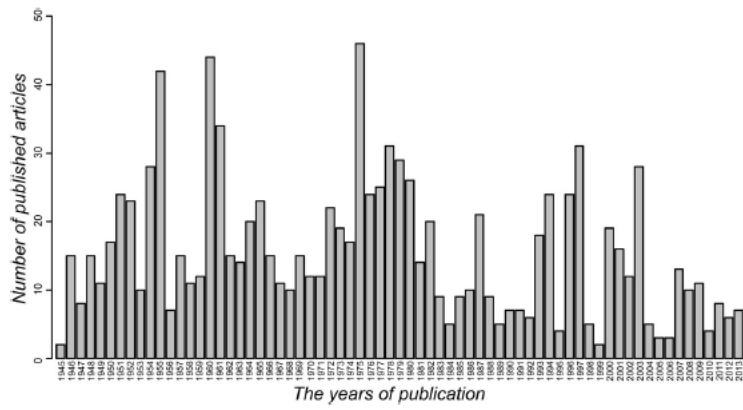
884

885 Figure 2. Location map of the Rhône River valley



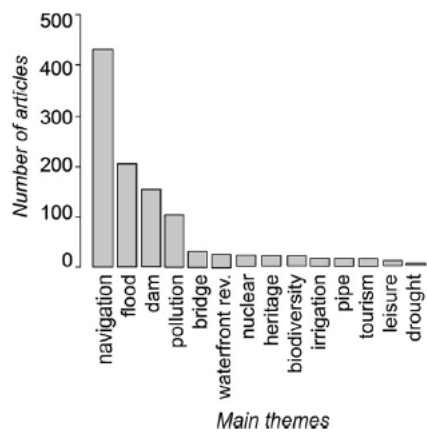
886

887 Figure 3. Distribution of articles about the Rhône River from 1945 to 2013 in *Le Monde* (n=1,079)



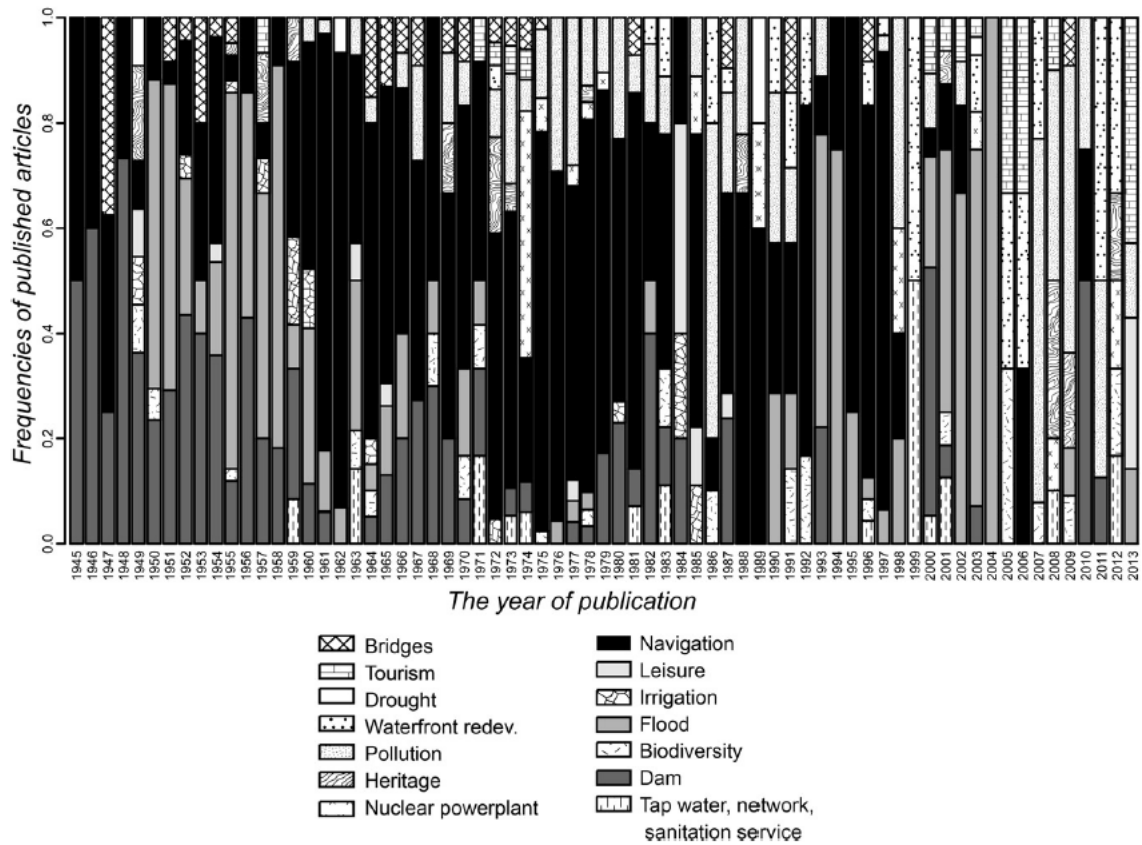
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889 Figure 4. Main topics from 1945 to 2013 in *Le Monde* (n=1,079)



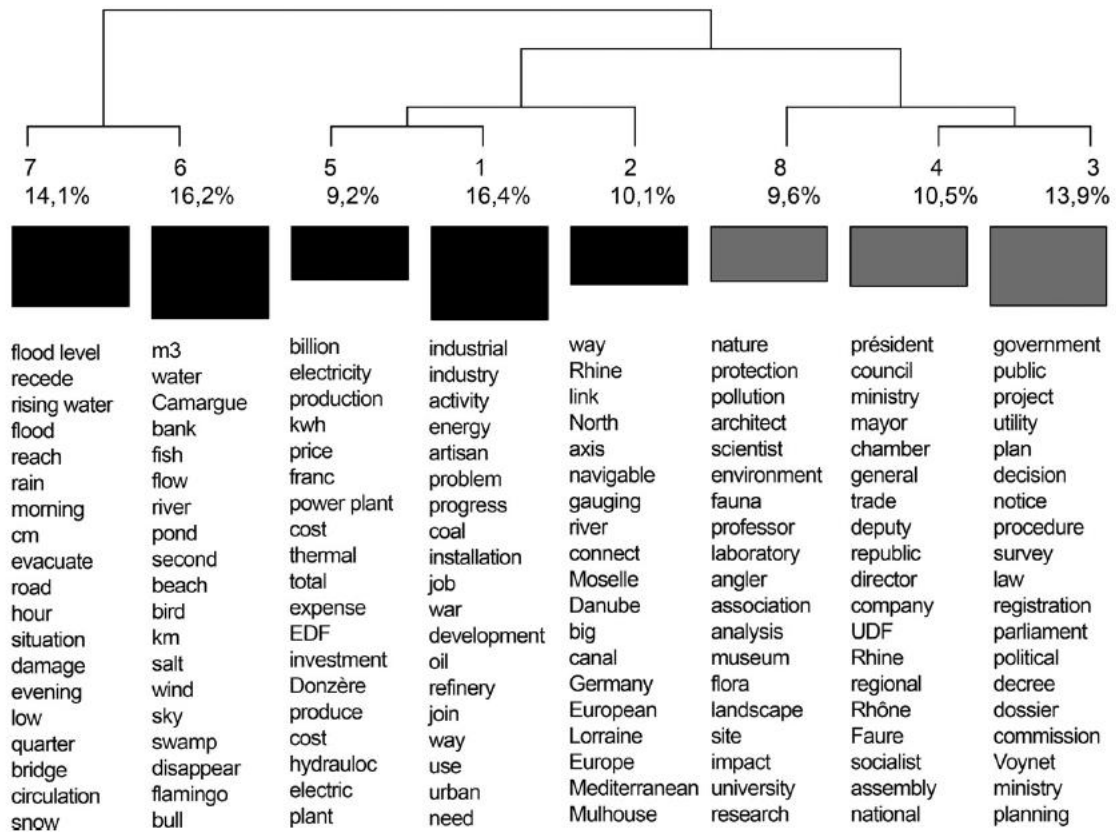
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891 Figure 5. Temporal variations in themes expressed by articles focused on the Rhône River



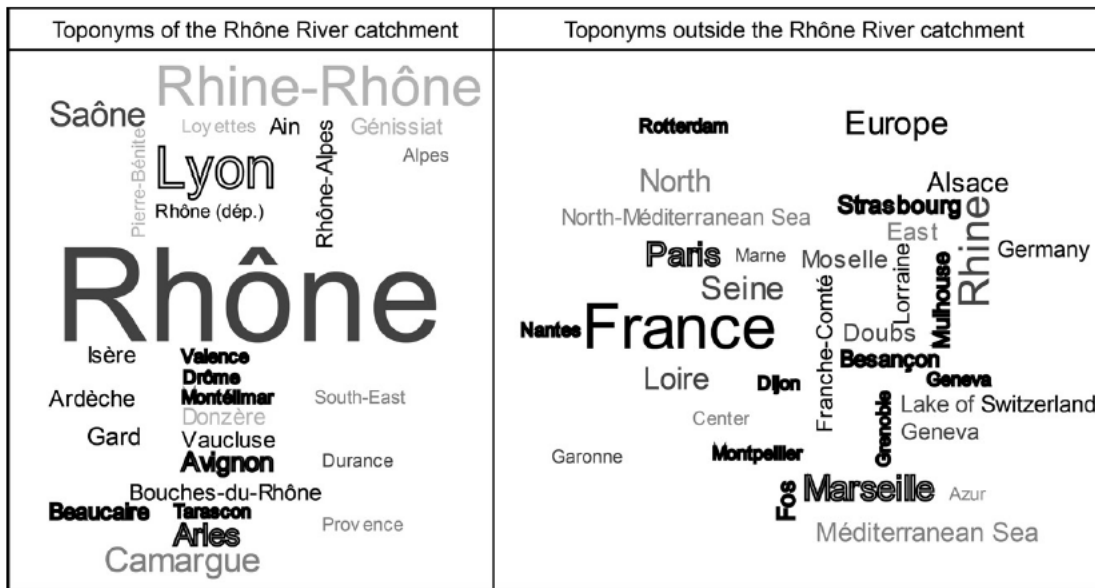
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893 Figure 6. Clustering tree after a top-down hierarchical clustering on *Le Monde* (1945–2013)



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Types of toponyms

- Department and regions
- Cities
- Rivers and lake
- Dams and canals
- Regions or blurred areas

Number of quotations

- L** 710 occurrences
- Arles** 270 occurrences
- Isère 121 occurrences
- Azur 70 occurrences