



**HAL**  
open science

## Industrial risks by the coast: how people-place bonds impact acceptance of a red mud recycling project

Raquel Bertoldo, Thomas Berrhoun, Patricia Merdy

### ► To cite this version:

Raquel Bertoldo, Thomas Berrhoun, Patricia Merdy. Industrial risks by the coast: how people-place bonds impact acceptance of a red mud recycling project. *PsyEcology. Revista Bilingüe de Psicología Ambiental / Bilingual Journal of Environmental Psychology*, 2022, 13 (2), pp.201-231. 10.1080/21711976.2022.2043609 . hal-03692273

**HAL Id: hal-03692273**

**<https://hal.science/hal-03692273>**

Submitted on 9 Jun 2022

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25

**Industrial risks by the coast: How people-place bonds impact acceptance of a red mud recycling project**

Raquel Bertoldo, Thomas Berrhoun

Aix Marseille Univ, LPS, Aix-en-Provence, France

Patricia Merdy

Université de Toulon, PROTEE, UR 3819, 83957 La Garde, France

Acknowledgements:

This work was cofunded by the Labex DRIIHM, French programme "Investissements d'Avenir" (ANR-11-LABX-0010) which is managed by the ANR and research federation ECCOREV (FR 3039). We would like to thank Claire Mays for her attentive review of a previous version of this manuscript.

Corresponding author:

Raquel Bertoldo. Laboratoire de Psychologie Sociale (UR 879), Aix-Marseille Université, 29 Ave R. Schuman, 13621 Aix-en-Provence, France. Email: raquel.bohn-bertoldo@univ-amu.fr

26

27

### **Abstract**

28

29 Industries sometimes leaves invisible yet dangerous chemical memories of their activities.  
30 Because these compounds are invisible, people rely on heuristics informed in part by people-  
31 place relations to make a risk judgement. The Marseille region of France provides an  
32 interesting case to analyse how local risks are judged in relation to people-place variables.  
33 The perceived risks of a depollution project where “red mud” (an industrial residue) is used to  
34 neutralize lead-contaminated soil are analysed in relation to (1) place attachment; and (2) trust  
35 in several types of organisation. Results show that participants with stronger local attachment  
36 perceive their local environment as less polluted and consider the project as a greater threat.  
37 Furthermore, risks vs. benefits associated with the project are significantly explained by age  
38 (associated with perceived risk) and trust in societal organisations (associated with perceived  
39 benefits). Discussion considers how the diversity of local publics could lead to widely  
40 different reactions to the depollution project across the city’s social tissue.

41

42 *Keywords:* red mud; risk perception; place attachment; institutional trust; industrial pollution,  
43 Marseille.

44

45

46 Coastal areas are highly attractive territories. In France, demographic density along the  
47 coast is twice as high as that observed elsewhere (272 inhabitants / km<sup>2</sup> vs. 118) (Le Délézir,  
48 2008). This can be explained partly by economic factors such as the competitive advantage  
49 for employers of easy access to maritime transport (Miossec, 2001). The attraction of blue  
50 environments can also be explained psychologically, in terms of quality of life, as  
51 demonstrated by the positive effects of living by the coast upon wellbeing and health (White,  
52 2013).

53 Demographic pressure along the coasts as well as sometimes irreconcilable land uses or  
54 logics of occupation make coastal areas into “zones of tension” (Robert & Melin, 2016;  
55 Gomez & Picarzo, 2006). Different temporalities of land use too produce tensions, between  
56 e.g. the present-day urbanization of the coastal environments and the past industrial activities  
57 that have left significant chemical traces of their presence in Marseille, over the course of the  
58 last century (Mioche, 2011). Despite important advances in the reconditioning of previously  
59 polluted areas for urbanization, the necessary excavation and removal of soil is sometimes  
60 made difficult or impossible by present-day land use, such as when private buildings exist on  
61 the polluted land (e.g. Jadach-Sepiolo, Muszyńska-Jeleszyńska, & Spadlo, 2016). These  
62 difficulties force some local communities to manage polluted sites by integrating them into  
63 the present-day environment. This has been achieved in Marseille though the creation of a  
64 national parc integrating parts of these previously polluted sites (Claeys, Hérat, Barthélémy,  
65 & Deldrève, 2017).

66 The city of Marseille provides a good example of land uses from different times in  
67 conflict. In the early XIXth century waste from the booming local chemical industry was  
68 disposed of far from the city centre and away from the public eye (Barthélémy, 2016). Today  
69 Marseille has grown to be France’s second most populated city (behind Paris) and developed  
70 to a point where the urban sprawl has reached these polluted places (Desrousseaux, 2017).

71           The invisibility and cumulated effects of chemical pollutants means that the perception  
72 that one is exposed, and the extent of this exposure is based on locally crafted logics, which  
73 are part of people-place bonds (Dixon & Durrheim, 2000). This singular context of coastal  
74 pollution presents an opportunity to analyse how industrial pollution risks are perceived and  
75 how they concern inhabitants who might be more or less attached to a place (e.g. Wakefield,  
76 Elliott, Cole, & Eyles, 2001). This article presents a study where the perceived risks  
77 associated with a depollution project are examined. More precisely we inquire how place  
78 attachment (e.g. Bonaiuto, Alves, De Dominicis, & Petruccelli, 2016) and trust in  
79 organisations (e.g. Engdahl & Lidskog, 2014) explain the different reactions to a possible  
80 depollution project.

81           In the following sections we start by reviewing the historical context of the industrial  
82 pollution in the region, the issue of “red mud” (an alkaline industrial residue) and how this  
83 particular residue could be applied to depollute other affected soils. Then, we present our  
84 analytical framework guiding our survey study, and finally show how the variables associated  
85 with people-environment relations (place attachment and trust) can explain the risks people  
86 associate with the red mud depollution proposal.

87

88           *Historical context: the industrial past in Marseille*

89           Metal manufacturing and trade expanded significantly during the industrialisation of the  
90 Marseille region. In the early XIX<sup>th</sup> century the region grew with development of the steel  
91 industry (Daumalin & Raveux, 2001) and the important connections between the port of  
92 Marseille and other regions supplying raw materials. Among the activities that took root in the  
93 region at that time, the lead and the alumina (aluminum oxide) industry were of paramount  
94 importance (Daviet, 2000).

95           The lead industries mainly worked with two smaller ports near Marseille - Les Goudes  
96 and Escalette (Desrousseaux, 2017). Placed at a convenient distance from the city centre, they  
97 successfully harboured lead industries enjoying easy access to both the main Marseille port  
98 and the Mediterranean Sea used as a dumping ground. The soil around these places today is  
99 still contaminated by heavy metals including lead (Testiati, 2012). Importantly, the toxicity  
100 associated with these metals is dependent upon the acidity of the soil - the more acidic it is,  
101 the greater the toxicity of the metals for living organisms (Peijnenburg & Jager, 2003;  
102 Smolders et al., 2009). The local authorities assessed the threat of this site to the local  
103 population in 2005, resulting in restrictions of access to the area. The population was  
104 informed through billboards in the region (Desrousseaux, 2017) although local inhabitants  
105 systematically removed them.

106           The other chemical residue that has more recently stirred the local public opinion is the  
107 local environmental destiny of 'red mud'. Red mud results from the production of alumina - a  
108 material used in aluminium smelting, advanced ceramics and other chemical processes. The  
109 Barcelona Convention<sup>1</sup> halted this type of production in the Mediterranean basin as of 2016;  
110 however, the existing alumina factory obtained an exemption, also enabling disposal of only  
111 processed aqueous remainders in the Mediterranean Sea. This exemption was locally highly  
112 contested (Reig, Belbachir & Massenot, 2016) motivating opposition even by the  
113 Environment Minister at the time (see Barraqué, 2017). In this way, since 2016 red mud must  
114 be dewatered and the liquid part processed before disposal to reduce volume and metal  
115 content, in order to decrease environmental burden. Regarding the solid residues, because the

---

<sup>1</sup> Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean ([http://ec.europa.eu/environment/marine/international-cooperation/regional-sea-conventions/barcelona-convention/index\\_en.htm](http://ec.europa.eu/environment/marine/international-cooperation/regional-sea-conventions/barcelona-convention/index_en.htm))

116 sea can no longer receive them new alternatives must be found for sub-products disposal (e.g.  
117 the Mange Garri disposal site in Bouc Bel Air) or, ideally, recycling<sup>2</sup>.

118 Therefore, this article presents the analysis of the public's response to use the alkaline  
119 'red mud' residues, to *neutralize* the acid pH of the lead-contaminated soils around Marseille.  
120 Application of red mud residues on lead-polluted soils would recycle waste that would  
121 otherwise be disposed of on land, using it to neutralise the acidity of lead-contaminated soils  
122 around Marseille. This pH neutralisation would reduce the bioavailability and the toxicity of  
123 metals and metalloids present in the soil of these regions (Merdy et al., 2017). This  
124 depollution proposal would present an interesting synergy in sustainable waste management.  
125 Still, considering the public controversies it could raise, we decided to analyse the public's  
126 reaction to the project. Therefore a direct 'treatment' of the Escalette site was excluded: the  
127 robustness and long-term efficiency of the red mud recycling process was to be tested *ex situ*  
128 using some contaminated soil and slag excavated from the Escalette area.

129 The idea that pollutants could be used to neutralize other pollutants might seem counter-  
130 intuitive. Moreover, in a context where the industrial memory also witnesses struggles over  
131 power and the right to pollute (Loison & Pezet, 2006), it is important to analyse the extent to  
132 which the local populations in Marseille (1) are aware of the environmental situation  
133 surrounding them in general, and about the red mud, in particular; and (2) perceive the risks  
134 vs. benefits associated with this red mud recycling project. In the following section we will  
135 present two variables hypothesised to influence the perception of this project: place  
136 attachment and institutional trust.

137

---

<sup>2</sup> Local decree creating an expert committee to monitor the changes Alteo (the emitting industry) made to comply with regulations: [http://www.calanques-parcnational.fr/sites/calanques-parcnational.fr/files/atoms/files/20160331\\_ap\\_creation\\_csirm.pdf](http://www.calanques-parcnational.fr/sites/calanques-parcnational.fr/files/atoms/files/20160331_ap_creation_csirm.pdf)

138 *Place attachment*

139 Place attachment corresponds to the complex affective bonds individuals and groups  
140 progressively build with the place where they live, visit or with which they are familiar  
141 (Devine-Wright, 2009). People-environment bonds can be understood in a variety of ways  
142 (Patterson & Williams, 2006) or differently depicted according to whether research aims are  
143 predominantly qualitative or psychometric (Lewicka, 2011). In our study we favoured a  
144 conceptualization of place attachment as an emotional bond that drives an individual to  
145 preserve an association with a given place (Hidalgo & Hernández, 2001). “It is the propensity  
146 of human beings and other animals to seek out the place where they were born or find a place  
147 in which they feel comfortable and secure” (Hidalgo & Hernández, 2001, p. 274). These  
148 bonds may often be more significant with towns or cities than with nations: “compared to  
149 countries which may change their territories and frontiers, cities are stable and continuous  
150 through time” (Lewicka, 2011, p. 212).

151 The problem arises when these cherished and resourceful places are seen to represent a  
152 threat (Breakwell, 2001). When this happens, an inverse relationship is often observed  
153 between place attachment and risk perception (Bonaiuto, Breakwell, & Can, 1996; Breakwell,  
154 2001; Uzzell, 2000). For example, Bonaiuto et al. (1996) described how residents in the UK  
155 who felt more attached to their local environment (town and nation) perceived their local  
156 beaches as less polluted than those in other towns and nations – irrespective of official EU  
157 rankings for beach pollution. This inverse relationship between place attachment and risk  
158 perception was then demonstrated by Uzzell (2000) through a cross-cultural study (Australia,  
159 England, Ireland and Slovakia) where local “environmental quality” was compared to  
160 increasingly more global environmental scales - me, town, country, continent and the world.  
161 An inverse effect was consistently found between risk perceived at local vs. global scales:  
162 environmental quality is perceived as worse the farther away the geographic unit is from the



163 perceiver, an effect Uzzell (2000) calls environmental hyperopia. This trend to perceive local  
 164 risks as smaller is interpreted by Breakwell (2001) as an adaptative effort in the face of an  
 165 identity-based threat to local people's continuity, distinctiveness, self-efficacy or self-esteem.  
 166 In this sense, local communities are more willing to share representations that contribute to  
 167 individuals' identity protection (Breakwell, 2001). In some cases this propensity can be a  
 168 dangerous 'illusion' observed among people who are attached to their environment and  
 169 downplay the risks it represents, as seen in regard e.g. to flood risks in Italy (Bonaiuto, 2011)  
 170 or in France (Michel-Guillou & Meur-Ferec, 2017), or to seismic risks (Lima, 2003) or  
 171 coastal risks (Luís et al., 2016) in Portugal. These latter Portuguese studies illustrate how  
 172 individuals living in areas highly prone to natural risks tend to 'naturalise' these risks to cope  
 173 with the risks (Bertoldo et al., 2021; Luís et al., 2016).

174 However, a positive or direct relation between place attachment and risk perception has  
 175 also been found (Bonaiuto et al., 2016), i.e. the more people are attached, the greater exposure  
 176 to risk they perceive. For example, attachment to a precise tsunami-prone coast was described  
 177 as an important predictor of the intention to evacuate (Ariccio et al., 2020).

178 Bernardo (2013) provides a convincing description of how locally attached participants  
 179 perceive familiar and less dangerous risks as 'more likely'; while rare and potentially  
 180 catastrophic risks are seen as 'less likely'. This study shows that people adapt the likelihood  
 181 an event to how catastrophic it is, and therefore illustrates how people-place bonds can protect  
 182 self-esteem from perceived threats (Breakwell, 2001).

183 Systematic literature reviews have underlined the pivotal role played by risk perception  
 184 – and indirectly by place attachment as we have presented above – and by institutional trust as  
 185 predictors of risk preparedness (Wachinger et al., 2013). The following section presents a  
 186 review of how institutional trust impacts risk management.

187 *Trust in institutions*

188 In the past, a part of community tradition was knowledge of local risks and a set of risk  
189 prevention or mitigation practices. Beck (1992) suggests, however, that modern technologies  
190 expose communities to risks that transcend any attempt they may make to protect themselves.  
191 People can cope with this lack of knowledge by relying on ‘social trust’ to reduce the  
192 complexity of the issues they are faced with (Earle & Cvetkovich, 1995; Siegrist &  
193 Cvetkovich, 2000). Trust can be understood in this sense as a psychological state comprising  
194 “the intention to accept vulnerability based upon positive expectations of the intentions or  
195 behaviours of another” (Rousseau, Sitkin, Burt & Camarero, 1998, p. 395). Thus, community  
196 recognition of risk exposure and trust in responsible institutions to manage risks on their  
197 behalf is another – relational – characteristic typical of what Beck (1992) has called “risk  
198 societies”.

199 This relational definition of trust supposes individuals (1) are *aware* a risk exists and (2)  
200 *how* do people trust institutions in charge of managing these risks (Siegrist, 2021). In  
201 situations for example where the perception of risk exposure is minimal, communities express  
202 less the need to trust in institutions in relation to other situations where risk exposure is  
203 perceived as high (Bertoldo et al., 2020).

204 In relation to the second point, trust in the risk management capacities of institutions  
205 and public bodies often makes the implicit or explicit distinction between performance  
206 aspects (i.e., confidence) and values (i.e., social trust) (Siegrist, 2021). In other words, we can  
207 trust institutions in different ways and for different things. In regard particularly to risk  
208 management, trust can imply different things if we mean it in a ‘calculative’ or ‘relational’  
209 sense (Earle, 2010; Rousseau et al., 1998). Calculative trust involves the recognition that the  
210 trusted institution is sufficiently *knowledgeable* about the risk it is supposed to manage and is  
211 *able* to manage it (Engdahl & Lidskog, 2014). In this perspective the trustee would mainly be

212 judged on his or her competence (Fiske et al., 2002) or resources to manage a risk. Given the  
 213 rational basis of calculative trust, it has been shown to be more influenced by detailed  
 214 information and past events (Luhmann, 1979) than by emotion-based heuristics.

215 Such heuristics for their part are the basis of trust grown from the quality of previous  
 216 experiences with the institution: relational trust (Engdahl & Lidskog, 2014). Trust is here  
 217 regarded as “a modality of action that is relational, emotional, asymmetrical, and anticipatory”  
 218 (p. 713). Here the individual extends these emotion-based heuristic judgements to other  
 219 institutions perceived to be more or less socially close and to their respective reputation.  
 220 Considering the empirical nature of relational trust in comparison to calculative trust,  
 221 relational trust can be considered as being “broadly based, primarily concerned with  
 222 intentions, and *resilient*; calculative trust, based on specific behaviours, is *fragile*” (Engdahl &  
 223 Lidskog, 2014, p. 542, emphasis added).

224

225 *The present study*

226 Coastal areas are attractive spaces for broadly divergent types of activities – touristic or  
 227 industrial. Present tensions can be exacerbated by past industrial activities which have left  
 228 significant “chemical memories” in an environment that today harbours people who have no  
 229 other choice but to deal with their exposition to heavy metals. This questionnaire study  
 230 interrogates people-place relations in the context of a risky depollution project in Marseille:  
 231 the use of red mud waste to treat or neutralize lead-contaminated areas (Merdy et al., 2017).

232 More specifically we inquire how place attachment (Bonaiuto et al., 2016) and trust in  
 233 institutions (Engdahl & Lidskog, 2014) explain the acceptance or rejection of a red mud  
 234 recycling and lead-depollution project. Taking the perception of exposure as a condition for  
 235 the expression of trust (Bertoldo et al., 2020; Siegrist, 2021), we start by asking participants  
 236 about (1) their knowledge of the red mud residue disposal in the Mediterranean sea, near

237 Marseille. Participants who were not aware of the issue were informed about the history of the  
238 red mud disposal in the disposal site and in the Sea. After that, a summary of the red mud  
239 recycling and lead depollution project was presented, which was not known by the public at  
240 the time of the study. Then, we asked participants to (2) position themselves in relation to the  
241 depollution project and (3) evaluate the risks and benefits associated with the project  
242 described. Finally, participants were also questioned about their (4) attachment to the city of  
243 Marseille and (5) how much they trusted different institutions.

244 Based on the literature reviewed above, we make three main hypotheses:

- 245 1. the more greatly attached participants will perceive the local Marseille environment as  
246 *less polluted* in relation to other places in France or Europe (cf. Luís et al., 2016;  
247 Uzzell, 2000).
- 248 2. Moreover, more greatly attached participants will more strongly oppose the red mud  
249 recycling. This expectation is based on the timeframe with which public opinion reacts  
250 to new technologies or projects: rejected by the local population at the moment of the  
251 initial announcements and concertation efforts, these projects and technologies  
252 become progressively familiarized to be finally met with lower concerns locally in  
253 relation to communities situated farther away (Lima, 2004; Lima et al., 2005).
- 254 3. Based on how institutional trust was found to assure individuals of the competence of  
255 societal institutions to manage hazards on citizen's behalf (Siegrist & Cvetkovich,  
256 2000), we expect participants displaying *higher* levels of institutional trust to perceive  
257 *less* risk in the mud recycling and lead depollution project.

258 Further details about each of these variables and the study procedure are presented  
259 below.

## 260 **Method**

261 *Procedure and participants*

262 One-hundred-and-ninety-one Marseille inhabitants responded to a questionnaire in a  
263 public setting (train station and public transportation to or from Marseille). Before responding  
264 to the questionnaire, participants were asked if they were inhabitants or not. All participants  
265 informed their zip code. People living near the lead contaminated areas were especially  
266 targeted by the research team, who were present in these neighbourhoods to find participants  
267 to whom the lead contamination is more concerning. Considering these areas to be  
268 significantly less densely populated in relation to the city centre, and despite the effort to  
269 include these participants, only 9 participants (4.71%) of the sample live in lead contaminated  
270 areas. Still, we can extend the concerns about lead contamination to the whole sample because  
271 the areas surrounding the lead contaminated sites are part of the urban tissue, and highly  
272 visited during the summer season.

273 The sample was made up of 61.3% of women and 32.5% of men. Participants were  
274 29.4 years old on average (16 – 83,  $SD = 13.9$ ). Most participants said they had attained either  
275 secondary school level studies (43.6%) or a university degree (29.4%).

276 *Variables*

277 Place attachment. This variable was measured through a combination of two place  
278 attachment scales (Bonaiuto et al., 1996; Hidalgo & Hernandez, 2002). Example: “do you feel  
279 proud of living in this town?” (5-point scale from 1 – *not at all* to 5 – *very much*). The eight  
280 items were averaged to a single place attachment indicator ( $a = .84$ ).

281 Pollution perception. This variable was inspired in the work of Bonaiuto et al. (1996)  
282 and Uzzell (2000) which demonstrated that individuals tend to downplay environmental  
283 issues of places they are close or attached to. We therefore asked through two single items  
284 “On average, would you consider natural and public spaces as polluted in Marseille in relation

285 to other cities?” and “On average, would you consider natural and public spaces as polluted in  
 286 France in relation to other countries?” (5-point scale from 1 – *not at all* to 5 – *very much*).

287 Environmental identity. This variable was measured using two items (Bertoldo &  
 288 Castro, 2016). Participants were asked to rate the extent to which they agreed that: “I think of  
 289 myself as someone with ecological concerns” and “I think of myself as someone committed to  
 290 environmental causes”. The two items (Sperman-Brown coefficient = .827).

291 Trust. Items addressing trust in either scientific (Achterberg, de Koster, & Van der  
 292 Waal, 2015) or a diverse set of other involved institutions including e.g. the media (Ren et  
 293 al., 2016) were proposed (see Table 1). Participants were asked for example how much they  
 294 trusted “scientists involved in this project” or “private organisations involved in the project”  
 295 (5-point scale from 1 – *no trust at all* to 5 – *trust completely*). These data were then submitted  
 296 to an exploratory factor analysis. Varimax rotation revealed two factors corresponding to (1)  
 297 trust in science ( $\alpha = .80$ ) and (2) trust in the societal institutions ( $\alpha = .70$ ). These two factors  
 298 together accounted for 68.5% of the total variance (KMO = .63; Bartlett’s test of sphericity:  
 299  $\chi(15) = 315$ ,  $p < .001$ ). The two factors were averaged in two trust items – ‘trust in science’  
 300 and ‘trust in societal institutions’ which are not correlated, further demonstrating their  
 301 independence ( $r = .13$ ,  $p = .08$ ).

302 Table 1. *Factor loadings of items addressing trust in science and social institutions.*

I trust:	Factor loadings	
	Trust in science	Trust in societal institutions
Science	<b>,670</b>	-,514
Scientists involved in this project	<b>,718</b>	-,493
Scientific information about this project	<b>,813</b>	-,255
Private organisations involved in this project	,476	<b>,700</b>
Institutions involved in this project	,604	<b>,639</b>
Media information about this project	,336	<b>,554</b>

303

304 Knowledge of the ‘red mud issue’ and knowledge of the red mud recycling project.  
305 These questions aimed at controlling if participants knew about (1) the historical red mud  
306 issue and (2) the red mud recycling and lead decontamination project. In any case, at this  
307 moment the researcher briefly explained through a standardized message the historical red  
308 mud issue and the possibility of using this residue to decontaminate the Escalette site. Both  
309 questions were answered with (1) *yes* and (2) *no*.

310 Position in relation to the project. Participants expressed their support or opposition  
311 to the red mud recycling project through the following question “How would you position  
312 yourself in relation to this red mud recycling project in Marseille?” (5-point scale from 1 –  
313 *strongly against* to 5 – *strongly favourable*).

314 Risk perception. Risks associated with the depollution project were measured  
315 through 3 items: risk to participants’ own health, risk to the health of other city dwellers and  
316 risk to the local environment (5-point scale from 1 – *not risky* to 5 – *very risky*).

317 Risk vs. benefit. Using one of the simplest ways to measure risk perception (e.g.  
318 Bertoldo et al., 2016), participants were asked to compare the risks and benefits they perceive  
319 to be associated with the presented project. This 5-point Likert scale opposed the statement  
320 (1) “the *risks* associated with this project largely outweigh the *benefits*” to (5) “the *benefits*  
321 associated with this project largely outweigh the *risks*”. The middle value (3) corresponded to  
322 the statement “the *risks* and *advantages* associated with this project are equivalent”. Lower  
323 values convey greater risk perception while higher values indicate greater benefit perception.

#### 324 *Data analysis*

325 All the questionnaire data was entered in an SPSS database. Here all the descriptive  
326 and inferential statistics were performed. We used chi square analysis in our two questions

327 which a had binary (yes-no) response modality – ‘knowledge of the red mud issue’ and  
328 ‘knowledge of the project’.

329 All the other variables had scales as response modalities. For these variables we  
330 started with the correlations (Table 2) between all the scales. Then we opted for different  
331 analytical approaches for our different hypothesis: either variance analysis (Anova) or  
332 regression analysis. Variance analysis were used to compare how the state of the environment,  
333 and the risk presented by the project are seen by people who are more (or less) attached to the  
334 region. A variance approach for the analysis of these variables to facilitate the readability of  
335 our results in relation to the existence (or not) of an optimism bias as described in the place  
336 attachment literature. Finally, a regression analysis was performed on the perceived risk  
337 associated with the red mud recycling project. This analysis aimed at identifying from our  
338 model which are the variables that contribute (and how much) to the perceived risk vs. benefit  
339 attributed to the red mud recycling and lead depollution project.

340

## 341 **Results**

342 Overall knowledge of the red mud issue and knowledge of the red mud recycling project  
343 will be analysed first, followed by the psychosocial variables. Then we will present an  
344 analysis of how psychosocial variables influence risk perception.

345 47% of the local inhabitants in the sample had already heard of the red mud issue near  
346 Marseille. Among these participants, 17.4% affirmed they had heard of this specific red mud  
347 recycling project. Then all participants – irrespective of previous knowledge – received a  
348 standardized explanation about the red mud issue and of the depollution project and estimated  
349 their approval: 53.4% of participants were either strongly or moderately in favour of the



350 depollution project ( $M = 3.98$ ;  $SD = 1.08$ ). Project approval was not associated with place  
351 attachment (see Table 2).

352 Previous knowledge about the red mud issue in the region was especially high among  
353 people who identified as ‘environmentalists’. This analysis was done by splitting the sample  
354 between participants whose responses were one standard deviation above and below the mean  
355 environmental identity. The groups used in this analysis are labelled as having strong ( $M =$   
356  $4.36$ ,  $SD = .42$ ) or weak ( $M = 2.65$ ,  $SD = .76$ ) environmental identity. Results show that  
357 55.8% of the participants with a *strong* environmental identity had heard of the red mud issue  
358 in Marseille compared with 35.8% among those with a weak environmental identity ( $\chi^2(1) =$   
359  $7.3$ ,  $p = .007$ ; Cramer’s  $V = .19$ ,  $p < .007$ ). These results suggest that groups more concerned  
360 with the environment are also better informed about or more attentive to the historical red  
361 mud issue in the region.

362 Table 2 presents the proposed psychosocial variables and their correlations. These  
363 results show that a positive correlation is observed between (1) environmental identity and  
364 place attachment; and (2) environmental identity and trust in societal institutions. While the  
365 first correlation can easily be interpreted as a heightened sense of place, the second is less  
366 clear. This could possibly suggest that participants identify more with the environment also  
367 feel a greater need to trust the various institutions dealing with the red mud issue in the  
368 region.

369

370 Table 2. *Correlations between the place attachment, environmental identity, trust and*  
 371 *risk perception scales.*

	N of items	1	2	3	4	5	6	7	8	9	10	11
1. Place attachment	8	1.00										
2. Environmental identity	2	.19**	1.00									
3. Trust (science)	3	.07	-.01	1.00								
4. Trust (societal institutions)	3	.03	.21**	.13	1.00							
5. Pollution perception (Marseille vs. other cities in France)		-.14*	-.01	.04	.01	1.00						
6. Pollution perception (France vs. other countries)		.06	-.03	.13	.01	.23**	1.00					
7. Project perceived risk vs. benefit	1	.01	.08	-.04	.14	1.00	-.04	1.00				
8. Position in relation to the project		.04	-.06	.17	.07	.10	.29**	.09	1.00			
9. Perceived risk for oneself	1	-.00	.18*	-.12	-.01	-.02	.02	-.03	-	1.00		
									.29**			
10. Perceived risk for others	1	-.06	.14	-	-.01	.05	-.03	-.08	-	.88***	1.00	
				.17*					-	.28**		
11. Perceived risk for the environment	1	.12	-.06	.07	-.02	.08	.01	-	.14	.01	.07	1.00
								.27**				

372 \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

373

374 *Place attachment*

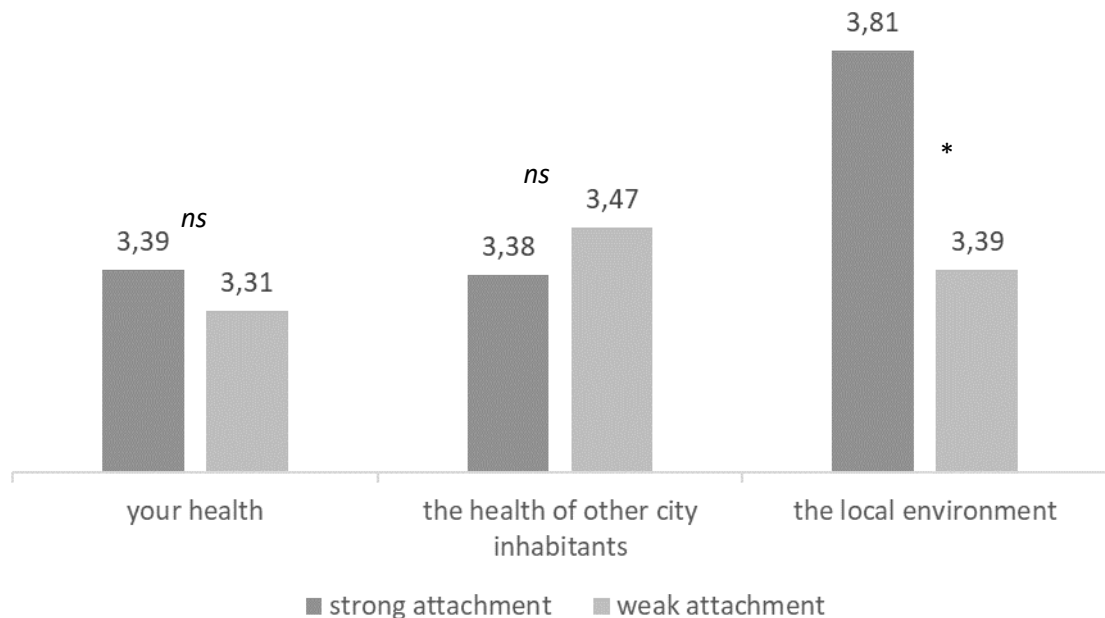
375 Given the strong emotional bonds experienced by people who are highly attached to  
 376 their environment, we compared how people who express a high (vs. low) attachment to  
 377 Marseille perceive the pollution problem in the region; and how risky they considered the  
 378 depollution proposal to be. This comparison was done by splitting the sample between  
 379 participants whose responses were one standard deviation above and below the mean place  
 380 attachment. Hence these groups are identified as high ( $M = 3.9, SD = .05$ ) and low attachment  
 381 ( $M = 2.5, SD = .05$ ).

382 A first comparison was performed to analyse how these two groups perceive the  
 383 pollution (1) in Marseille in relation to the rest of France; and (2) in France in relation to other  
 384 countries. Consistent with the environmental hyperopia phenomenon, participants who are  
 385 more attached to Marseille tend to perceive the city as *less* polluted ( $M = 3.8, SD = .09$ ) than  
 386 do participants who are less attached, a marginally significant result ( $M = 4.1, SD = .09$ ;  
 387  $t(183) = 1.9, p = .056, Cohen's d = 3.33$ ). No differences between the two attachment groups

388 were found in relation to how they evaluate pollution in France in relation to other countries  
 389 ( $t(184) = -.43, p = .635$ ).

390 Place attachment also influenced the degree to which participants perceived the project  
 391 as risky. As presented in Figure 1, respondents were asked about the threat posed by the  
 392 project in relation to their own health, to the health of the other city inhabitants and to the  
 393 local environment. More and less attached participants perceived similar levels of threat to  
 394 their own health and the health of the city inhabitants (Figure 1). The more attached  
 395 participants however perceived the project as significantly more dangerous to the local  
 396 environment as compared to less attached participants ( $t(179) = 2.75, p = .006$ , Cohen's  $d =$   
 397  $.4$ ).

398 *Figure 1: Perceived threat of the recycling red mud project to the respondents' own health, the*  
 399 *health of other city's inhabitants and to the local environment in function of place attachment*  
 400 *(strong vs. weak).*



401

402

403

404 *Explaining risk perception*

405 Finally, the perception of risks vs. benefits associated with the project was entered in a  
 406 regression analysis where it was modelled by the following variables: trust in science, trust in  
 407 societal institutions, place attachment and environmental identity. This regression model also  
 408 controlled for the variance of demographic variables (age, gender and education). The  
 409 regression analysis contained three blocks of predictors: the first including demographic  
 410 variables; the second assessing trust in science and trust in societal institutions; and finally,  
 411 the third with environmental variables (place attachment and environmental identity). Results  
 412 are presented in Table 3.

413 Table 3. *Regression analysis of the risk vs. benefit attributed to the red mud recycling project.*

Bloc	Predictors	Adj. R <sup>2</sup>	F	df	β	t	LL	UL
1	Age	.068	4.5**	3,144	-.196	-2.351*	-.034	-.003
	Education				-.105	-1.264	-.198	.044
	Gender (woman)				-.148	-1.830†	-.764	.030
2	Age	.085	3.67**	5,144	-.192	-2.329*	-.330	-.003
	Education				-.090	-1.053	-.192	.059
	Gender (woman)				-.161	-2.003*	-.794	-.005
	Trust in science				-.054	-.641	-.359	-.183
	Trust in private organisations				.172	2.123*	.017	.473
3	Age	.089	2.99**	7,144	-.198	-2.401*	-.035	-.004
	Education				-.094	-1.092	-.197	.062
	Gender (woman)				-.160	-1.990*	-.770	-.021
	Trust in science				-.036	-.418	-.354	.278
	Trust in societal institutions				.145	1.751 †	-.069	.443
	Place attachment				.012	.144	-.213	.238
	Ecological identity				.128	1.522	-.040	.320

414

415 The first block controlling for demographic variables shows that age ( $\beta = -.196$ ) and  
 416 gender ( $\beta = -.148$ ) explains the risk vs. benefits perceived in this red mud recycling project.  
 417 The negative association between age and risk-benefit perception indicates that the older

418 participants are, the more likely they are to associate risk rather than benefits with this project.  
419 The negative relation with gender (dummy variable for women) suggests that women tend to  
420 attribute more risks than benefits to this project.

421 Trust in science and trust in societal institutions were then added in the second block of  
422 predictive variables. Trust in science does not significantly contribute to explain the risk  
423 associated with the project ( $\beta = -.054$ ) but trust in societal institutions does ( $\beta = .172$ ). It is  
424 positively associated with risk-benefit perception, meaning that the more people trust societal  
425 institutions, the more they attribute benefits rather than risks to this red mud recycling project.  
426 The addition of the environmental variables (place attachment and environmental  
427 identification) in the third block does not contribute further to explain the perceived risks or  
428 benefits associated with this project.

429

## 430 **Discussion**

431 The relative invisibility of industrial pollutants in e.g. soils means that the perception  
432 that one is exposed might depend on other variables describing people-place bonds, like place  
433 attachment or environmental identity. Thus, we explored how people-place bonds to the city  
434 of Marseille could predict local response to a potentially polemical depollution project. More  
435 precisely we have analysed two hypotheses: (1) participants more attached to Marseille would  
436 perceive lower levels of pollution (Uzzell, 2000; Bonaiuto et al., 1996, 2016) (2) would more  
437 strongly oppose the depollution project; and finally (3) participants displaying higher levels of  
438 trust would perceive lower risks in the depollution project (Siegrist & Cvetkovich, 2000).

439 Results show that despite the historicity and mediatization of the red mud issue since  
440 2014, less than half of the participants had heard about it. After being informed about the  
441 depollution project, 54% of participants evaluated it positively.

442 People-place variables played influenced how polluted the local environment is  
443 perceived to be, in the sense of the proposed hypotheses: participants who are more attached  
444 to the city of Marseille regard its surrounding environment as less polluted compared to  
445 people who are not attached. Moreover, attached participants regard the depollution project as  
446 riskier to the local environment than less attached participants. No differences were found  
447 between these populations for perceived risks to respondents' own health and the health of the  
448 community. This study provides additional evidence of the negative relations found between  
449 place attachment and risk perception (Bonaiuto et al., 1996, 2016) demonstrating how people-  
450 place bonds contribute to a person's sense of familiarity and security.

451 Finally, we modelled the perception of risks vs. benefits associated with the project.  
452 After controlling for demographic variables, only trust was seen to explain perceived risk-  
453 benefit and, more specifically, trust in societal institutions. This result means that the more  
454 participants trusted media, non-scientific institutions and private organisations involved in the  
455 red mud recycling project, the more they attributed benefits to this project. Trust in science  
456 was not related to the perceived risk-benefit of the project. On the other hand the positive  
457 effect of trust in societal institutions upon evaluation of the project as beneficial (vs. risky)  
458 makes sense in terms of risk perception heuristics. The absence of an effect of 'trust in  
459 science' suggests a low variance yielding an apparent ceiling effect ( $M = 3.85$ ,  $SD = .78$ ) of  
460 this variable in comparison to 'trust in societal institutions' ( $M = 2.57$ ,  $SD = .84$ ;  $t(187) =$   
461  $17.29$ ,  $p < .001$ ).

462 The Marseille region has seen significant social movements around how the red mud  
463 issue has been handled locally, as well as the local management of areas polluted by lead  
464 (Desrousseaux, 2017). Analyses describing the people-place dynamics in the Marseille region  
465 have been greatly supported by an interdisciplinary dispositive of applied environmental  
466 sciences (e.g. Observatoire Homme Milieux – Bassin Minier de Provence). Still, analyses of

467 how people-place dynamics affect the local handling of industrial risks have been infrequent  
468 (but see Claeys, et al., 2017). Our study offers an initial approach to grasping the psychosocial  
469 background to local tensions arising from conflicts over land use.

470         Among the limitations of this study, we acknowledge the sample could have included  
471 people more people living in the vicinity of the lead-contaminated areas. These places are  
472 already less densely populated what rendered data collection there especially difficult.  
473 Another limitation is the exclusive use of questionnaires: a more profound understanding of  
474 how place attachment and trust in institutions shape people-place bounds would be gained by  
475 analysing argumentation, through e.g. media analysis, focus group and individual interviews,  
476 and or *in situ* observations.

477         Our results demonstrated that variables such as trust in societal institutions and place  
478 attachment impact, as expected, the evaluation of how polluted the local environment is. We  
479 have also shown that just over half of our study participants (54%) would be favourable to the  
480 implementation of such a depollution project. This slight majority agreement must be taken  
481 with caution since this depollution project, recycling industrial residues to neutralize other  
482 legacy pollution, has not yet been scrutinized by the public. If in the future the depollution  
483 project is officially announced, with its attendant environmental impact consultations, our  
484 preliminary results may help to analyse the basis on which local people and organisations may  
485 evaluate the proposal. The identity of the institutions (scientific or other) that make the  
486 announcement and carry the project may shape whether highly attached, environmentally  
487 aware residents welcome the project or on the contrary echo the resistance identified in the  
488 60's when pipelines first starting to dump red mud in the Mediterranean Sea (Loison & Pezet,  
489 2006).

490

491 **References**

- 492 Achterberg, P., de Koster, W., & van der Waal, J. (2015). A science confidence gap:  
 493 Education, trust in scientific methods, and trust in scientific institutions in the United  
 494 States, 2014. *Public Understanding of Science*, 26(6), 704-720.  
 495 <https://doi.org/10.1177/0963662515617367>
- 496 Ariccio, S., Petruccelli, I., Ganucci Cancellieri, U., Quintana, C., Villagra, P., & Bonaiuto, M.  
 497 (2020). Loving, leaving, living: Evacuation site place attachment predicts natural  
 498 hazard coping behavior. *Journal of Environmental Psychology*, 70, 101431.  
 499 <https://doi.org/10.1016/j.jenvp.2020.101431>
- 500 Barraqué, B. (2017). Les boues rouges de l'usine Péchiney- Alteo de Gardanne : de l'inertie à  
 501 la toxicité, du rejet... et du dossier. *Revue juridique de l'environnement*, 42, 2, 273-  
 502 292, [www.cairn.info/revue-revue-juridique-de-l-environnement-2017-2-page-](http://www.cairn.info/revue-revue-juridique-de-l-environnement-2017-2-page-273.htm)  
 503 [273.htm](http://www.cairn.info/revue-revue-juridique-de-l-environnement-2017-2-page-273.htm).
- 504 Barthélémy, C. (2016). La prise en charge publique contemporaine des sites pollués dans les  
 505 Calanques. In : Daumalin, X., Laffont-Schwob, I., & Kmieckowiak, J. (2016). *Les*  
 506 *Calanques industrielles de Marseille et leurs pollutions - une histoire au présent*.  
 507 REF2C.
- 508 Beck, U. (1992). *Risk Society: Towards a New Modernity*. London: SAGE Publications.
- 509 Bernardo, F. (2013). Impact of place attachment on risk perception: Exploring the  
 510 multidimensionality of risk and its magnitude. *Estudios de Psicología*, 34(3), 323-329.  
 511 <https://doi.org/10.1174/021093913808349253>
- 512 Bertoldo, R., Tanga, R., Dias, P., Guignard, S., & Schleyer-Lindenmann, A. (2020).  
 513 Calculative and relational trust in the management of coastal floods and earthquakes: a  
 514 comparative study. *PsyEcology*, 11(2), 193-213.  
 515 <https://doi.org/10.1080/21711976.2020.1734398>
- 516 Bertoldo, R., & Castro, P. (2016). The outer influence inside us: Exploring the relation  
 517 between social and personal norms. *Resources, Conservation and Recycling*, 112,  
 518 45-53. <https://doi.org/10.1016/j.resconrec.2016.03.020>
- 519 Bertoldo, R., Mays, C., Poumadère, M., Schneider, N., & Svendsen, C. (2016). Great deeds or  
 520 great risks? Scientists' social representations of nanotechnology. *Journal of Risk*  
 521 *Research*, 19(6), 760-779. <https://doi.org/10.1080/13669877.2015.1042503>
- 522 Billig, M. (2006). Is My Home My Castle ? Place Attachment, Risk Perception, and Religious  
 523 Faith. *Environment and Behavior*, 38(2), 248-265.  
 524 <https://doi.org/10.1177/0013916505277608>
- 525 Bonaiuto, M., Alves, S., De Dominicis, S., & Petruccelli, I. (2016). Place attachment and  
 526 natural hazard risk : Research review and agenda. *Journal of Environmental*  
 527 *Psychology*, 48, 33-53. <https://doi.org/10.1016/j.jenvp.2016.07.007>



- 528 Bonaiuto, M., Breakwell, G. M., & Can, I. (1996). Identity Processes and Environmental  
 529 Threat: the Effects of Nationalism and Local Identity upon Perception of Beach  
 530 Pollution. *Journal of Community & Applied Social Psychology*, 6(3), 157-175.  
 531 <https://doi.org/10.1080/13669870110062730>
- 532 Claeys, C., Hérat, A., Barthélémy, C., & Deldrève, V. (2017). The Calanques National Park,  
 533 between environmental effort and urban effort. *Journal of Urban Research*, 16.  
 534 <https://doi.org/10.4000/articulo.3252>
- 535 Daumalin, X., Raveux, O. (2016). Les Calanques espace de relégation des industries les plus  
 536 polluantes. In : Daumalin, X., Laffont-Schwob, I., & Kmieckowiak, J. (2016). *Les*  
 537 *Calanques industrielles de Marseille et leurs pollutions - une histoire au présent.*  
 538 REF2C.
- 539 Daviet, S. (2000). Les écoles d'ingénieurs dans le nouveau paysage industriel provençal.  
 540 *Rives méditerranéennes*, 4, 67-81. <https://doi.org/10.4000/rives.76>
- 541 Desrousseaux, M. (2017). L'analyse juridique de la pollution diffuse du massif de  
 542 Marseilleveyre : terrain d'application et d'évolution du droit de la restauration  
 543 écologique. *Revue juridique de l'environnement*, volume 42(3), 495-511.  
 544 [https://www.cairn.info/revue-revue-juridique-de-l-environnement-2017-3-page-](https://www.cairn.info/revue-revue-juridique-de-l-environnement-2017-3-page-495.html)  
 545 [495.html](https://www.cairn.info/revue-revue-juridique-de-l-environnement-2017-3-page-495.html)
- 546 Devine-Wright, P. (2009). Rethinking NIMBYism: The role of place attachment and place  
 547 identity in explaining place-protective action. *Journal of Community & Applied Social*  
 548 *Psychology*, 19(6), 426-441. <https://doi.org/10.1002/casp.1004>
- 549 Earle, T. C. (2010). Trust in risk management: A model-based review of empirical  
 550 research. *Risk Analysis: An International Journal*, 30(4), 541-574. [http://doi:](http://doi:10.1111/j.1539-6924.2010.01398.x)  
 551 [10.1111/j.1539-6924.2010.01398.x](http://doi:10.1111/j.1539-6924.2010.01398.x). PMID: 20522197.
- 552 Earle, T. C., & Cvetkovich, G. (1995). *Social trust: Toward a cosmopolitan society.*  
 553 Greenwood Publishing Group.
- 554 Engdahl, E., & Lidskog, R. (2012). Risk, communication and trust : Towards an emotional  
 555 understanding of trust. *Public Understanding of Science*, 23(6), 703-717.  
 556 <https://doi.org/10.1177/0963662512460953>
- 557 Fiske, S. T., Cuddy, A. J., Glick, P., & Xu, J. (2002). A model of (often mixed) stereotype  
 558 content: competence and warmth respectively follow from perceived status and  
 559 competition. *Journal of personality and social psychology*, 82(6), 878-902.  
 560 <https://psycnet.apa.org/doi/10.1037/0022-3514.82.6.878>
- 561 Gastaut, Y. (2009). Histoire de l'immigration en PACA aux XIXe et XXe siècles. *Hommes &*  
 562 *migrations*, 1278, 48-61. <https://doi.org/10.4000/hommesmigrations.226>
- 563 Hidalgo, M. C., & Hernández, B. (2001). PLACE ATTACHMENT : CONCEPTUAL AND  
 564 EMPIRICAL QUESTIONS. *Journal of Environmental Psychology*, 21(3), 273-281.  
 565 <https://doi.org/10.1006/jevp.2001.0221>

- 566 Jadach-Sepiolo, A., Muszyńska-Jeleszyńska, D., & Spadło, K. (2016). *Analysis of the current*  
 567 *situation of post-industrial sites in urban areas of three functional zones: Capital City*  
 568 *of Warsaw, the City of Plock and the City of Radom together with the city of Pionki*  
 569 [Report]. Vienna: Interreg Central Europe. [https://www.interreg-](https://www.interreg-central.eu/Content.Node/ReSites/WPT1--GreenerSites-Brownfield-analysis-of-Radom-and-Plock-FU.pdf)  
 570 [central.eu/Content.Node/ReSites/WPT1--GreenerSites-Brownfield-analysis-of-Radom-](https://www.interreg-central.eu/Content.Node/ReSites/WPT1--GreenerSites-Brownfield-analysis-of-Radom-and-Plock-FU.pdf)  
 571 [and-Plock-FU.pdf](https://www.interreg-central.eu/Content.Node/ReSites/WPT1--GreenerSites-Brownfield-analysis-of-Radom-and-Plock-FU.pdf)
- 572 Le Délézir, R. (2008). Le développement littoral en question. *Pour*, 199(4), 109-115.  
 573 <https://doi.org/10.3917/pour.199.0109>
- 574 Luhmann, N. (1979). *Trust and Power: Two Works by Niklas Luhmann* John Wiley: New  
 575 York.
- 576 Lewicka, M. (2011). Place attachment: How far have we come in the last 40 years? *Journal of*  
 577 *Environmental Psychology*, 31(3), 207-230.  
 578 <https://doi.org/10.1016/j.jenvp.2010.10.001>
- 579 Lima, M. L. (2003). Terramotos, amor e outras coisas perigosas: uma abordagem  
 580 psicossociológica da percepção de riscos. In M. L. Lima, Castro, P. E Garrido, M.  
 581 (Org.), *Temas e Debates em Psicologia Social* (pp. 225-246). Lisboa: Livros Horizonte
- 582 Loison, M. C., & Pezet, A. (2006). L'entreprise verte et les boues rouges. *Entreprises et*  
 583 *histoire*, 45(4), 97. <https://doi.org/10.3917/eh.045.0097>
- 584 Merdy, P., Lucas, Y., Bertoldo, R., Prudent, P., Laffont-Schwob, I., Hennebert, P. (2017).  
 585 Mécanismes et solutions réalistes de stabilisation de déchets industriels et de sols  
 586 contaminés en milieu méditerranéen par l'utilisation de résidus de bauxite (boues  
 587 rouges). *Séminaire Annuel de Restitution de l'OHM Bassin Minier de Provence*.
- 588 Michel-Guillou, E., & Meur-Ferec, C. (2016). Representations of coastal risk (erosion and  
 589 marine flooding) among inhabitants of at-risk municipalities. *Journal of Risk*  
 590 *Research*, 20(6), 776-799. <https://doi.org/10.1080/13669877.2015.1119181>
- 591 Mioche, P. (2011). Alumine et risques industriels : le cas des boues rouges et des résidus.  
 592 Aix-en-Provence, CNRS – OHM Bassin minier de Provence, TOHM, 1, 25 p.
- 593 Miossec, A. (2001). L'évolution de la géographie des océans et des littoraux face aux  
 594 perspectives du développement durable au XXIe siècle. Quelles hypothèses  
 595 envisager?//The geography of coasts and seas facing sustainable development : what  
 596 could be the future ? *Annales de Géographie*, 110(621), 509-526.  
 597 <https://doi.org/10.3406/geo.2001.1718>
- 598 Nigbur, D., Lyons, E., & Uzzell, D. (2010). Attitudes, norms, identity and environmental  
 599 behaviour : Using an expanded theory of planned behaviour to predict participation in  
 600 a kerbside recycling programme. *British Journal of Social Psychology*, 49(2),  
 601 259-284. <https://doi.org/10.1348/014466609x449395>

- 602 Patterson, M. E., & Williams, D. R. (2005). Maintaining research traditions on place :  
 603 Diversity of thought and scientific progress. *Journal of Environmental Psychology*,  
 604 25(4), 361-380. <https://doi.org/10.1016/j.jenvp.2005.10.001>
- 605 Peijnenburg, W. J. G. M., & Jager, T. (2003). Monitoring approaches to assess  
 606 bioaccessibility and bioavailability of metals: Matrix issues. *Ecotoxicology and*  
 607 *Environmental Safety*, 56(1), 63-77. [https://doi.org/10.1016/s0147-6513\(03\)00051-4](https://doi.org/10.1016/s0147-6513(03)00051-4)
- 608 Reig, P, Belbachir, S., & Massenot, G. (2016). *Un millier de manifestants à Marseille contre*  
 609 *les rejets de l'usine Altéo*. France Bleu – Bouches-du-Rhône, January 30, 2016.  
 610 [https://www.francebleu.fr/infos/climat-environnement/manifestation-contre-les-rejets-](https://www.francebleu.fr/infos/climat-environnement/manifestation-contre-les-rejets-de-boues-rouges-samedi-devant-le-prefecture-marseille-1454090523)  
 611 [de-boues-rouges-samedi-devant-le-prefecture-marseille-1454090523](https://www.francebleu.fr/infos/climat-environnement/manifestation-contre-les-rejets-de-boues-rouges-samedi-devant-le-prefecture-marseille-1454090523)
- 612 Ren, X., Che, Y., Yang, K., & Tao, Y. (2016). Risk perception and public acceptance toward  
 613 a highly protested Waste-to-Energy facility. *Waste Management*, 48, 528-539.  
 614 <https://doi.org/10.1016/j.wasman.2015.10.036>
- 615 Robert, S., & Melin, H. (2016). *Habiter le littoral: enjeux contemporains*. Presses  
 616 universitaires de Provence.
- 617 Rousseau, D. M., Sitkin, S. B., Burt, R. S., & Camerer, C. (1998). Not so different after all: A  
 618 cross-discipline view of trust. *Academy of management review*, 23(3), 393-404.  
 619 <https://doi.org/10.5465/amr.1998.926617>
- 620 Siegrist, M., & Cvetkovich, G. (2000). Perception of hazards: The role of social trust and  
 621 knowledge. *Risk analysis*, 20(5), 713-720. <https://doi.org/10.1111/0272-4332.205064>
- 622 Smolders, E., Oorts, K., Van Sprang, P., Schoeters, I., Janssen, C. R., McGrath, S. P., &  
 623 McLaughlin, M. J. (2009). Toxicity of trace metals in soil as affected by soil type and  
 624 aging after contamination: using calibrated bioavailability models to set ecological soil  
 625 standards. *Environmental Toxicology and Chemistry: An International Journal*, 28(8),  
 626 1633-1642. <https://doi.org/10.1897/08-592.1>
- 627 Tajfel, H., & Turner, J. C. (1986). The social identity theory of intergroup behavior. In S.  
 628 Worchel, & W. G. Austin (Eds.), *Psychology of intergroup relations*, 7–24. Chicago:  
 629 Nelson-Hall.
- 630 Terry, D. J., Hogg, M. A., & White, K. M. (1999). The theory of planned behaviour: self-  
 631 identity, social identity and group norms. *British Journal of Social Psychology*, 38(3),  
 632 225–244. <https://doi.org/10.1348/014466699164149>
- 633 Testiati, E. (2012). *Contamination de sols par des éléments traces métalliques en zone*  
 634 *méditerranéenne côtière : études de leur mobilité et du transfert à la phytocénose*.  
 635 [Thèse de doctorat, Aix-Marseille Université]. Sudoc.  
 636 <http://www.theses.fr/2012AIXM4804>
- 637 Uzzell, D. (2000). The psycho-spatial dimension of global environmental problems. *Journal*  
 638 *of Environmental Psychology*, 20, 307–318. <https://doi.org/10.1006/jev.2000.0175>

- 639 Van der Werff, E., Steg, L., & Keizer, K. (2014). I am what I am, by looking past the present:  
 640 The influence of biospheric values and past behavior on environmental self-identity.  
 641 *Environment and Behavior*, 46(5), 626-657.  
 642 <https://doi.org/10.1177%2F0013916512475209>
- 643 Wachinger, G., Renn, O., Begg, C., & Kuhlicke, C. (2013). The risk perception paradox—  
 644 implications for governance and communication of natural hazards. *Risk analysis*,  
 645 33(6), 1049-1065. <https://doi.org/10.1111/j.1539-6924.2012.01942.x>
- 646 Wakefield, S. E., Elliott, S. J., Cole, D. C., & Eyles, J. D. (2001). Environmental risk and (re)  
 647 action: air quality, health, and civic involvement in an urban industrial neighbourhood.  
 648 *Health & place*, 7(3), 163-177. [https://doi.org/10.1016/S1353-8292\(01\)00006-5](https://doi.org/10.1016/S1353-8292(01)00006-5)
- 649 White, M. P., Alcock, I., Wheeler, B. W., & Depledge, M. H. (2013). Coastal proximity,  
 650 health and well-being: results from a longitudinal panel survey. *Health & place*, 23, 97-  
 651 103. <https://doi.org/10.1016/j.healthplace.2013.05.006>
- 652 Whitmarsh, L., & O'Neill, S. (2010). Green identity, green living? The role of pro-  
 653 environmental self-identity in determining consistency across diverse pro-  
 654 environmental behaviours. *Journal of Environmental Psychology*, 30(3), 305–314.  
 655 <https://doi.org/10.1016/j.jenvp.2010.01.003>
- 656 Wynne, B. (1992). Misunderstood misunderstanding: social identities and public uptake of  
 657 science. *Public Understanding of Science*, 1(3), 281–304.  
 658 <https://doi.org/10.1088%2F0963-6625%2F1%2F3%2F004>