

Brochet, A. and Guerrin, J. 2026. De- and re-infrastructure the Rhône Delta: Ecological restoration and industrial legacies in the Camargue. *Water Alternatives* 19(3): 644-680



De- and Re-infrastructure the Rhône Delta: Ecological Restoration and Industrial Legacies in the Camargue

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ABSTRACT: This article examines the transformation of inherited hydraulic infrastructures through the case of the former saltworks of the Camargue, in France's Rhône Delta. There, an ecological restoration project – subsequently framed as a Nature-based Solution – has restored hydrological connectivity while discontinuing the maintenance of former industrial seafront dykes. Drawing on qualitative fieldwork conducted between 2021 and 2023, combining semi-structured interviews, observation and document analysis, the article examines the social and political consequences of this transformation. The project is conceptualised by the authors as a process of de- and re-infrastructure that reconfigures hydrosocial territories and their historically sedimented hydrosocial heritages. The analysis shows how infrastructural transformation reshapes social practices, ecological relations, power relations and perceptions of risk, and how it can generate conflicts over historically constituted relationships between water, infrastructures and territorial practices. The article argues that such transformations can produce forms of hydrosocial misrecognition when historically constituted socio-ecological relations, situated knowledge and territorial practices are insufficiently recognised. More broadly, it shows that Nature-based Solutions, often presented as consensual and depoliticised, can themselves become sites of conflict over how territories should be inhabited, protected and transformed.

KEYWORDS: Hydrosocial territory, de- and re-infrastructure, Nature-based Solutions, hydrosocial misrecognition, Rhône Delta

INTRODUCTION

Over the last three decades, flood management policies in France have undergone major transformations that have been marked by a shift from hard engineering measures towards softer approaches, often encapsulated in slogans such as "make space for water" or "room for the river". These changes reflect a growing emphasis on sustainability strategies. Following several catastrophic floods (Nîmes in 1988; Vaison-la-Romaine in 1992; Xynthia in 2010), dykes were increasingly redefined by the state as problematic infrastructures, both because of safety concerns when they failed and their ecological impacts (Guerrin and Bouleau, 2014). At the same time, climate change and sea-level rise have raised doubts about the long-term effectiveness of continually reinforcing dykes, particularly in coastal areas (Bergsma, 2018).

From the 1990s onwards, a new public action paradigm called sustainable flood management (Guerrin, 2014) has emerged as a critique of the traditional flood defence model centred on structural protection. This paradigm promotes adaptation to environmental dynamics rather than control (Brochet et al., 2026; Guerrin, 2026), and calls for the restoration of floodplains, the reopening of river meanders, and the creation of coastal buffer zones. Floods are no longer framed solely as threats; they are also seen

as ecological processes that contribute to groundwater recharge, sediment transport, and soil fertility. Policy instruments thus increasingly emphasise prevention, risk culture and participatory governance, and call for the redistribution of responsibilities among the state, local authorities, private actors and NGOs (Butler and Pidgeon, 2011).

From the late 2000s, Nature-based Solutions (NbS) have gained prominence in international conservation and climate policies. They are presented as simultaneously addressing climate adaptation, biodiversity conservation and societal challenges (Cohen-Shacham et al., 2016; Drapier et al., 2024a). In the water sector, they seek to address risks such as floods, erosion and drought, while at the same time restoring ecosystems (Serra-Llobet et al., 2022; Guerrin et al., 2023). NbS for flood risk management can take diverse forms, from wetland or river restoration to rain gardens and green roofs, as long as they seek to prevent floods and benefit biodiversity. Flood-risk management, however, remains strongly shaped by a historically entrenched reliance on hard infrastructures, particularly dykes (Brochet and Guerrin, 2022; Brochet et al., 2025). NbS may therefore seek to reduce reliance on conventional infrastructures without necessarily erasing either inherited infrastructures or the socio-ecological relations formed around them. Petersson's (2021) concepts of de- and re-infrastructuring provide a way of analysing this tension between rupture and continuity.

These transformations can generate intense local contestation, including in projects presented as exemplary by environmental institutions. In the former saltworks of the Camargue (hereafter CFS), an ecological restoration project that was subsequently framed as an NbS generated public protests, contentious meetings and anti-environmentalist graffiti. This contrast was particularly visible in 2021, when a regional delegate of the Conservatoire du littoral¹ presented the project as an exemplary NbS at the World Conservation Congress of the International Union for Conservation of Nature (IUCN), while acknowledging the conflict it had generated.

This tension provides the starting point for this article. How can an NbS that is intended to reconnect hydrological processes, restore wetlands and contribute to coastal adaptation generate such tensions when the restoration site itself is uninhabited? Answering this question requires looking beyond both the site's formal boundaries and the opposition that arose between environmental protection and resistance to change. We examine how the selective abandonment, transformation and reassignment of hydraulic infrastructures through ecological restoration reshaped the broader hydrosocial territory that had historically been structured around them.

The article is organised as follows. The first section develops the theoretical framework through which ecological restoration is approached as a process of de- and re-infrastructuring hydrosocial territories. It then situates the case study within the historical and hydrosocial configuration of the Rhône Delta and presents the research methods. The next section traces the emergence of the controversy, showing how the restoration project became contested and how its governance and participatory arrangements shaped the conditions under which the conflict developed. We then examine what was at stake in this controversy by analysing how de- and re-infrastructuring reconfigured the hydrosocial territory. This section addresses the ways in which the former saltworks were reframed; it also describes how water flows, ecological processes and protective infrastructures were transformed, and how access, territorial practices and hydrosocial heritage were reworked. Drawing these findings together, we examine how the misreading, or 'misrecognition' of historically constituted hydrosocial relations was expressed territorially, epistemically and procedurally, and we look at how these dimensions intersected with the distributive consequences of infrastructural transformation. The conclusion returns to the article's conceptual contribution and considers its broader implications for NbS, ecological restoration, and climate adaptation in deltas and coastal wetlands.

¹ The Conservatoire du littoral is a French state-funded public body that was created in 1975; it acquires coastal land for permanent protection and entrusts its management to local organisations. Land that is bought by the Conservatoire becomes part of national heritage and cannot be sold (Legrain, 2000).

De- and re-infrastructure hydrosocial territories

To analyse ecological restoration in the Rhône Delta, we bring together three complementary concepts: de- and re-infrastructure, hydrosocial territories, and hydrosocial heritages. Drawing on infrastructure studies and political ecology, we approach infrastructural transformation as a process that reconfigures water flows, ecological relations, social practices and power relations, while environmental justice provides a lens for examining its uneven consequences.

Science and Technology Studies (STS) and infrastructure studies have shown that infrastructures are not fixed, neutral, technical objects, but rather are relational and evolving arrangements that are embedded in social practices and power relations (Star, 1999; Graham and Thrift, 2007). What counts as a functioning infrastructure is therefore not simply determined by technical performance; it involves context-dependent judgements that vary across temporal, spatial and political settings (Bijker, 2007). Building on this relational understanding, Petersson's (2021) paired concepts of de-infrastructure and re-infrastructure capture the processes through which infrastructural arrangements are materially and institutionally transformed while losing or acquiring functions and legitimacy. De-infrastructure refers not only to material deterioration, abandonment or removal, but also to the process through which existing infrastructures are framed as inadequate or undesirable. Re-infrastructure may therefore involve not only the construction or repurposing of material infrastructures, but also the institutional and knowledge arrangements through which new infrastructural configurations are made possible and legitimate; these can include planning instruments, expertise, monitoring practices and management rules. The two processes of de- and re-infrastructure are therefore closely intertwined, and de-infrastructure can create the material and political conditions for a new infrastructural order. In flood-risk management, for instance, conventional dykes may be problematised as rigid, ecologically damaging or maladaptive to climate change, while NbS are simultaneously promoted as new and soft infrastructures that provide flood protection, ecological benefits and climate adaptation.

Political ecology complements this perspective by approaching water and territory as historically produced through intertwined social, ecological and political processes. The concept of hydrosocial territory captures this relational production of space through interactions between water flows, hydraulic infrastructures, institutions, knowledge, and power relations (Boelens et al., 2016). This historical perspective is particularly relevant in the Rhône Delta. Using a historical political-ecology approach, Mathevet et al. (2015) show how contemporary ecological dynamics and conservation conflicts in the Camargue are embedded in longer histories of water control, property relations and access to natural resources. Hydrosocial territories are therefore not simply transformed by new interventions; instead, they carry forward material and social relations that have been produced through previous regimes of water management.

Hydrosocial territories are thus historically sedimented. Hydrosocial heritage refers to the assemblage of people, practices, representations and material environments that are inherited from past, and sometimes overlapping, hydrosocial territories (Drapier et al., 2024b). Hydraulic infrastructures contribute to these heritages by shaping water flows, landscapes, practices, access, ecological conditions and attachments to place. Such relations may persist after infrastructures lose their original functions and become politically salient when challenged by re-infrastructure. De- and re-infrastructure therefore involve not only replacing one material configuration with another but also confronting inherited socio-ecological relations and the legitimacy attributed to them.

This question of legitimacy connects hydrosocial heritage to environmental justice, as understood through the interdependent dimensions of distribution, participation and recognition (Fraser, 1997; Schlosberg, 2007; Walker, 2012). In ecological restoration, more specifically, these three dimensions concern the distribution of benefits, burdens and risks, as well as participation in decision-making and the recognition of the practices, knowledge, relationships to place, and values through which groups inhabit a territory. Hydrosocial heritage complements this perspective by foregrounding how historically

constituted socio-ecological relations shape questions of distribution, participation and recognition. Recognition also has a scalar dimension: what becomes visible or relevant depends partly on the scale at which environmental problems and interventions are framed. Broader policy framings such as NbS or climate adaptation may foreground benefits and objectives at wider spatial scales while making place-based practices, attachments and knowledge less visible in decision-making.

Together, these concepts allow us to examine NbS as processes of de- and re-infrastructuring that transform historically constituted hydrosocial territories, while also asking how their benefits, burdens and decision-making capacities are distributed and which inherited socio-ecological relations are recognised as legitimate. This framework therefore sheds light not only on what replaces an infrastructure, but also on how social and ecological worlds are maintained, destabilised or produced through its transformation.

The Camargue, an engineered and industrial hydrosocial assemblage

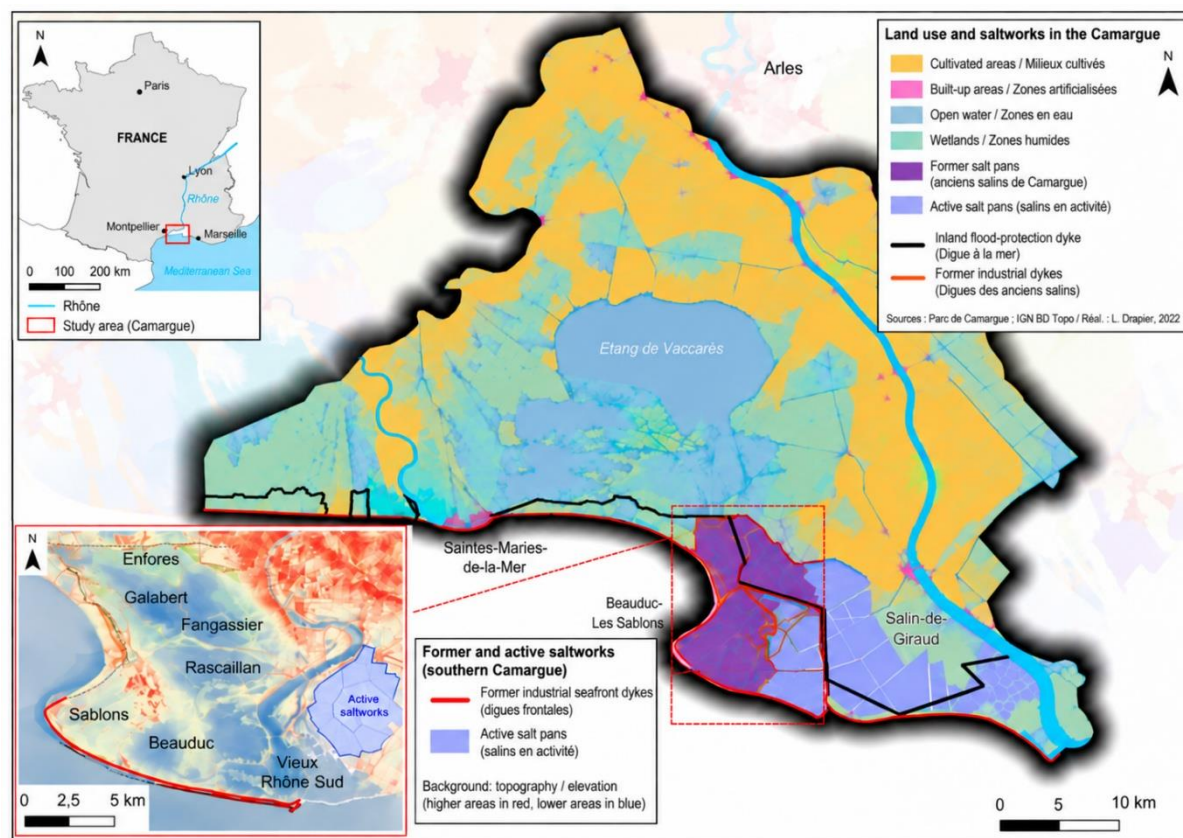
At the downstream end of the Rhône lies the Camargue, located between its two arms, the Grand Rhône and the Petit Rhône. The Rhône Delta is characterised by a highly dynamic coastal morphology, with alternating erosional and accretional sectors shaped by sediment supply, wave-driven longshore transport, and a long history of coastal engineering (Sabatier et al., 2009). The Camargue is often portrayed as one of the most climate-vulnerable regions in France due to its low elevation and its resulting exposure to sea-level rise, coastal erosion (Sabatier et al., 2006), and salinisation (Hetherington, 2025). It is nevertheless a deeply engineered hydrosocial territory. Historically characterised by high deltaic mobility (Sabatier and Anthony, 2015), it has been progressively transformed and partially stabilised through embankments, drainage and irrigation networks, pumping infrastructures, agricultural conversion and large-scale salt extraction (Guerrin et al., 2025). While these structures have stabilised the shoreline locally, coastal geomorphological studies have also documented associated effects such as profile steepening and downdrift erosion (Sabatier et al., 2009).

This long history of hydraulic engineering is particularly visible in the southern part of the delta, where extensive dyke systems, canals, pumping stations and managed ponds have supported changing combinations of flood protection, agriculture and industrial salt production over time.

As Picon (2020) shows, this landscape results from long-term interactions – and tensions – between state engineers, rice growers, the salt industry and managers of natural areas, thereby reflecting contrasting cultures of nature and different approaches to productive control, adaptation and conservation. Climate change is now intensifying these long-standing conflicts over the management and meaning of nature (Mathevet et al., 2025).

This article focuses on the CFS, a 6500-hectare site located in the southern part of the Rhône Delta (Figure 1). Formerly used for salt production, the site is now owned by the Conservatoire du littoral. It extends across the municipalities of Arles and Les Saintes-Maries-de-la-Mer and is adjacent to two settlements that are closely connected to its history and uses. The village of Salin-de-Giraud, to the east, was established in the late 19th century in connection with the development of industrial salt production (Guyonnet, 2024), and Beauduc-Les Sablons, to the southwest, is a settlement of shacks that developed mainly during the second half of the 20th century (Nicolas, 2008). Within the CFS, hydraulic infrastructures formed a highly engineered water management system through which water circulation, levels and salinity were actively controlled. The resulting landscape therefore bears the material imprint of successive forms of hydraulic intervention, whose functions and management have evolved over time.

Figure 1. The Camargue: Land use and former saltworks areas



Source: Authors' adaptation of Drapier, L. 2022. *The old saltworks of Camargue*. Map produced for the "Nature-based Solutions from Theory to Practice: Comparing France and the US" project.

The industrial transformation of the Camargue saltworks developed progressively and was closely intertwined with the broader hydraulic transformation of the Rhône Delta. Although salt production had a much longer history in the area, large-scale industrial salt production at Salin-de-Giraud dates from 1856 when Henri Merle established an industrial saltworks near the Grand Rhône (Guyonnet, 2024). This development occurred at approximately the same time as the major embankment works that transformed the Rhône River and its delta. In the aftermath of the catastrophic Rhône flood of 1856, the French state, by order of Napoleon, I.I.I.; undertook major hydraulic works in the delta, including the progressive embankment of the Rhône and, from 1857, the construction of the more than 40-km-long digue à la mer. Completed in 1859, this coastal dyke was designed to prevent seawater from entering the delta while allowing freshwater to drain towards the sea, thereby contributing to a broader transformation aimed at controlling the delta's hydrology and supporting agricultural development (Pailhès, 2000).

These works profoundly altered water circulation between the river, the central lagoons and the sea. Industrial development then began to accelerate through the activities of the company that became Alais, Froges et Camargue (later associated with Péchiney) and the Belgian chemical company Solvay. These activities contributed to Salin-de-Giraud's development as an industrial settlement through the construction of workers' housing (Figure 13) and other facilities; salt production thus became embedded within the social as well as hydraulic organisation of the territory. In 1970-1971, the salt production

activities associated with Péchiney were transferred to the Compagnie des Salins du Midi, which subsequently became the principal salt producer on the site.

For approximately a century after industrial salt production began in 1856, salt production remained concentrated mainly in the eastern part of the complex, close to Salin-de-Giraud. The westward expansion that produced the landscape examined in this article occurred primarily during the second half of the 20th century. From 1953 onwards, the saltworks expanded over much of what is now the CFS, progressively transforming the lagoons, dunes and *sansouires*² of Beauduc, Rascaillan and Fangassier into interconnected evaporation ponds (Figure 2). By the late 1960s, the industrial saltworks had reached the Pointe de Beauduc. This expansion also intersected with the rapid development of the Beauduc-Les Sablons settlement after World War II. Local working-class practices and settlements particularly flourished between the 1950s and the 1970s, when many fishing shacks were built and extended mainly by salt workers and by working-class families from the Arles area. Initially used mainly as places for fishing, leisure and weekend stays, over time some of these shacks became more permanent residences. Their development illustrates how the influence of the salt industry extended beyond production and employment, contributing to the formation of a wider social territory around Salin-de-Giraud. Coastal protection infrastructures were themselves progressively added to this expanding industrial system. From the early 1970s, in particular, seafront defences were constructed along the western saltworks to limit marine incursions that disrupted salt production. Pumping stations, canals and sluices controlled water levels and salinity according to the requirements of salt production, imposing seasonal cycles that partly reversed earlier hydrological rhythms.

The restoration project was therefore not just a single phase of infrastructural development; rather, it inherited a hydraulic landscape that was the product of successive layers of delta embankment, industrial expansion, coastal defence and associated social practices.

Figure 2. Hydraulic compartmentalisation of the saltworks landscape



Source: Author's photograph (2021).

² A *sansouire* is a very salty marsh that forms in delta zones; it supports only vegetation that thrives in highly salty environments.

The profitability of salt production declined in the 1990s. Because of this, and in the broader context of growing public involvement in coastal conservation and ecological restoration, over the next decade salt production was discontinued in this sector. The western part of the saltworks was then progressively acquired by the Conservatoire du littoral between 2008 and 2012. In the eastern part of the complex, however, salt continues to be produced by Salins du Midi.

Even though the area acquired for ecological restoration was itself uninhabited, it formed part of the historically constituted territory of Beauduc which included areas with numerous uses. The Beauduc-Les Sablons settlement, in particular, remained under the ownership of Salins du Midi; it was outside the area acquired for ecological restoration but formed part of the broader territory that was historically associated with the former saltworks (Figures 3 and 4).

Figure 3. The Beauduc-Les Sablons settlement within the lagoon landscape adjacent to the former saltworks



Source: Author's photograph (2023).

Figure 4. Shacks in the Beauduc-Les Sablons settlement



Source: Author's photograph (2023).

Since 2011, the management of the site acquired by the Conservatoire du littoral has been entrusted to three local organisations: the Parc naturel régional de Camargue (PNRC)³, the Tour du Valat (TdV),⁴ and the Société nationale de protection de la nature (SNPN).⁵

The progressive withdrawal of industrial salt production and hydraulic management initiated a major transformation of the site's hydrological functioning. From 2009 onwards, breaches multiplied in the seafront dykes, particularly following the storms that occurred during the winter of 2009-2010. In parallel, the industrial hydraulic system was progressively withdrawn. In 2010, following land transfers to the Conservatoire du littoral and the dismantling of a pumping station, several thousand hectares were removed from salt production water management, and in 2011 this process was extended to additional ponds. These changes altered flooding regimes, water levels, salinity and sediment dynamics, and were subsequently incorporated into an ecological restoration strategy.

The management orientations were embedded in a broader multi-level institutional framework that included European biodiversity policies and funding instruments, notably Natura 2000 and LIFE+. At the site level, management protocols were progressively formalised through successive operational management instruments, from the initial *Notice de gestion des Étangs et marais des salins de Camargue 2013-2016* (hereafter, the 2013-2016 *Notice de gestion*) to the 2023-2032 Site Management Plan (SMP). These documents translated broader management orientations into objectives and planned actions, defining the operational pathway through which the NbS examined in this study was progressively implemented on the site.

In practice, these management objectives informed a strategy that sought to restore hydrological and ecological connectivity between the sea, the former salt ponds and the wider lagoon system. Its aims were primarily to facilitate fish movements, re-establish seasonal flooding and drying cycles favourable to saltmarsh vegetation in the *sansouires*, and, in selected ponds, to maintain suitable conditions for colonial waterbirds. Restoration therefore combined the recovery of less-controlled hydrological processes with continued or renewed management where it was required by specific ecological objectives.

From 2017 onwards, this restoration trajectory was increasingly framed as an NbS, primarily by the Tour du Valat and more occasionally by the Conservatoire du littoral (Figure 5). Restored wetlands and hydrological connectivity were presented as contributing to biodiversity conservation and coastal adaptation. Rather than maintaining continuous hard coastal defences, some former industrial seafront dykes were no longer maintained, allowing renewed marine exchanges. The former saltworks were consequently expected to act as a buffer zone between the sea and more landward areas, contributing to a reduced risk of coastal submersion while supporting wetland restoration.

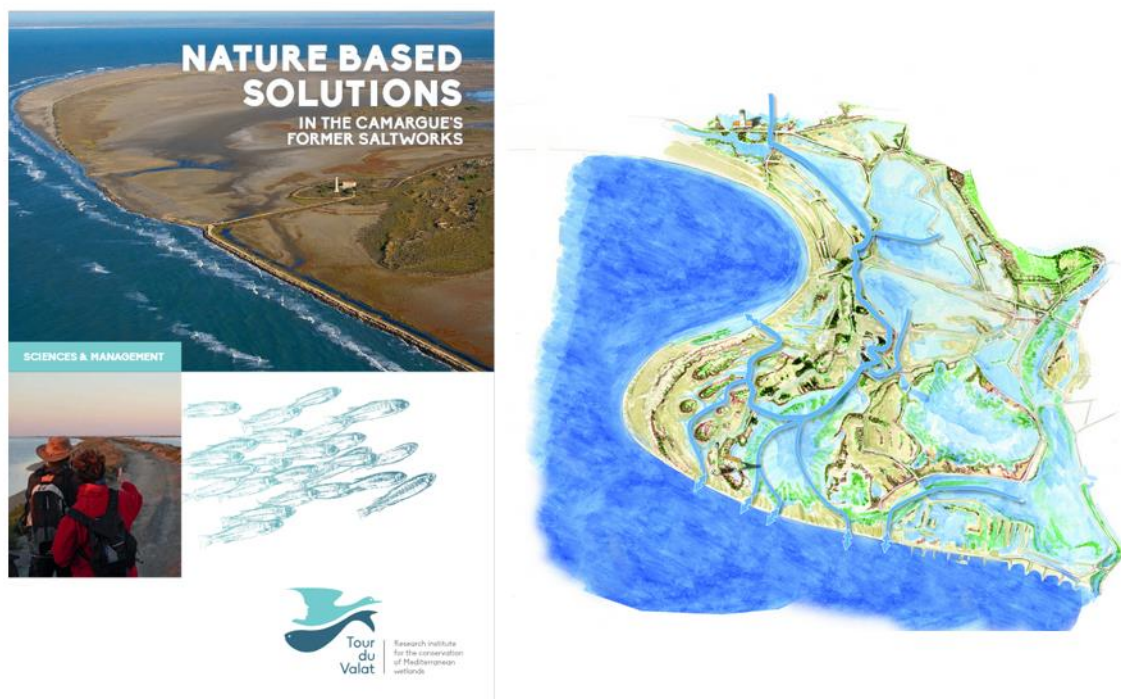
The transformation nevertheless did not involve a linear shift from industrial water management to ecological restoration. It combined the cessation of maintenance of most seafront dykes with hydraulic reconnection, adaptation of hydraulic structures, and selective reactivation of inherited infrastructures (Figure 6).

³ The Parc naturel régional de Camargue is a public territorial institution established in 1970; it coordinates environmental management and sustainable territorial development across the Camargue.

⁴ The Tour du Valat is a private, non-profit research institute founded in 1954 in the Camargue; it specialises in Mediterranean wetland conservation and combines scientific research with land management.

⁵ The Société nationale de protection de la nature (SNPN) was founded in 1854. It is France's oldest nature protection association and has managed the Réserve naturelle nationale de Camargue since 1927.

Figure 5. Brochure presenting ecological restoration actions at the CFS



Source: Segura et al. (2018).

Figure 6. New hydraulic control infrastructure installed to enhance hydrological connectivity between the former salt ponds and the sea, observed during a site visit



Source: Author's photograph (2020).

Research method

The analysis draws on qualitative fieldwork conducted between January 2021 and March 2023 which combined participant observation, document analysis, and 52 semi-structured interviews with public authorities, local elected officials, residents' and users' associations, environmental organisations, researchers and private sector actors (see Table A.2). Throughout the article, these interviews are cited without an asterisk.

This material was complemented by a CPIE Rhône-Pays d'Arles⁶ report drawing on approximately 30 anonymised interviews conducted during preparation of the 2023–2032 Site Management Plan (SMP). Quotations from these interviews, accessed through the report, are identified by a single asterisk (*). Separately, interviews conducted by Maïwenn Le Brazidec for her master's thesis (Le Brazidec, 2021) are identified by two asterisks (**). One author also observed the 2022 public consultation process for the SMP(**).

Grey literature on water management and ecological restoration was analysed to contextualise interview data. Interviews were used to analyse situated knowledge, causal interpretations and definitions of desirable ecological states; they were not treated as independent evidence of ecological causality. Interview material was triangulated with ecological and hydrological monitoring data and specialist studies documenting observed environmental changes.

GOVERNING THE TRANSFORMATION: THE EMERGENCE OF A CONTROVERSY

By 2019, the transformation of the former saltworks had become the focus of an increasingly visible local controversy. During a public meeting in Salin-de-Giraud, inhabitants openly challenged site managers over the restoration process. Opposition increasingly polarised around the category of the 'écolos', while hostility was also expressed through social media and graffiti. Local associations were created around concerns relating to water management, access and coastal flood protection. These manifestations did not mark the beginning of the tensions surrounding ecological restoration, but brought them together into a broader territorial controversy. This section traces how this controversy emerged through the transformation of former industrial infrastructures, limited local involvement in the initial restoration trajectory, and the events of 2019 that contributed to its crystallisation.

From ecological restoration to public controversy

The ecological restoration of the CFS progressively redefined the role and legitimacy of inherited hydraulic infrastructures. Following the land transfer, neither the Conservatoire du littoral nor Salins du Midi intended to maintain the former industrial seafront defence system, whose future thus became subject to technical and institutional assessment alongside the development of ecological restoration objectives.

A key assessment was commissioned by Salins du Midi in response to a State request concerning the future of the coastal infrastructures (BG Ingénieurs Conseils, 2013). It compared alternatives that were assessed through a multi-criteria analysis. These alternatives ranged from continued maintenance to progressive or complete dismantling and, ultimately, discontinuing maintenance ('passive renaturation') was favoured, mainly because of maintenance costs and the negative ecological effects of fixed infrastructures. The report nevertheless identified trade-offs regarding residual risk and robustness of protection. Importantly, all scenarios assumed the upgrading of the more landward digue à la mer (Figures 1 and 7), which was identified as the principal infrastructure protecting inhabited areas from marine intrusion.

⁶ The CPIE (Permanent Center for Environmental Initiatives) Rhône-Pays d'Arles is a local environmental association belonging to the French CPIE network. It works on sustainable development and facilitates participatory processes involving local actors.

Figure 7. The digue à la mer crossing the former saltworks of the Camargue



Source: Author's photograph (2022).

This assessment reflected a broader shift in coastal management, that is, from maintaining a fixed shoreline towards restoring sea-lagoon connections and accommodating coastal dynamics. This marked an overall shift from an infrastructural imaginary centred on fixity, separation and hydraulic control, towards one that valued movement, connectivity and the capacity of coastal environments to adjust to changing hydrological and sedimentary processes. Interviews with environmental organisations similarly emphasised the difficulty, and above all the cost, of maintaining rigid structures in an eroding coastal environment. As put in 2022* by an interviewee from an environmental NGO, "There were (...) two possibilities: either they kept the sea walls, which cost millions, and the older generation was happy (...) or they let the sea in".

The distinction between obsolete industrial infrastructure and flood-protection infrastructure, however, was not socially self-evident. Although the seafront dykes (Figure 8) had primarily served salt production, some local actors associated their long-standing presence with protection from marine submersion. Their deterioration was therefore understood in relation to the vulnerability of inhabited and productive areas. The controversy concerned not only whether particular dykes should be maintained, but what they protected, for whom, and what should replace them.

Figure 8. Former seafront dyke of the industrial saltworks along the Mediterranean coast



Source: Author's photograph (2022).

From limited local involvement to participatory governance

The initial restoration strategy, formalised in the 2013-2016 Notice de gestion, was developed primarily through technical studies and exchanges among public authorities, site managers and scientific actors.

Although municipalities and other local institutions participated through existing governance arrangements, there was no direct involvement of inhabitants, users or local associations in defining the initial trajectory towards hydrological reconnection and withdrawal from former industrial infrastructures. This lack of procedural involvement in defining the project and in the decision to discontinue maintenance of the former industrial dykes subsequently became an important source of controversy.

Several CFS managers subsequently acknowledged these limitations to participation. In an interview conducted by Le Brazidec (2021),** one representative from an environmental organisation commented that, "We were certainly inadequate, even bad, in previous years. We are trying to make up for lost time, or at least give ourselves another chance to forge new relationships with local actors".

The controversy eventually prompted a participatory turn. During preparation of the 2023-2032 SMP, the Conservatoire du littoral and the co-managers sought to strengthen local involvement. A process coordinated by the CPIE Rhône-Pays d'Arles in 2021-2022 combined interviews, field visits and workshops, as well as thematic groups involving inhabitants, users and associations; it thereby created new arenas for discussing water management, access, uses and the future of the site.

Participation nevertheless had two temporal limitations. It occurred *after* the establishment of the principal orientation towards ecological restoration and hydrological connectivity, so that discussion concerned primarily its subsequent management and did not reopen the question of the original choice. Participation also remained concentrated around preparation of the SMP, rather than the establishment of continuous local involvement in site governance. As commented in a 2022 interview by a representative from an environmental organisation:

The residents were hardly involved at all [in the governance of the site]. In fact, they were insufficiently involved. (...) Consultation mustn't stop once the document has been submitted! It must continue! It must be done on a somewhat continuous basis. And that's what's been missing, in fact.

From an environmental justice perspective, the procedural issue raised by the case is therefore not simply whether participation occurred, but when it occurred, what remained open to negotiation, and whether opportunities for involvement were sustained over time.

The 2019 trigger: From a dispute over hunting to a territorial controversy

The tensions surrounding the transformation of the former saltworks became openly visible in 2019. Several managers identified a dispute over the renewal of a waterfowl hunting agreement as an important trigger. As one interviewee from an environmental organisation stated in 2021,

It should be noted that in 2019 – we suspect this was the triggering event – we were in conflict with hunters from the Compagnie des Salins du Midi, over the renewal of the hunting agreement during the summer of 2019. We no longer wanted them to hunt migratory birds on certain dykes. And this could not be included in the agreement. It was the subject of a rather tough standoff (...).

The dispute concerned access and use arrangements that had been inherited from the industrial regime. Under Salins du Midi, hunting and fishing rights had been granted to salt workers and other authorised users, while industrial infrastructures also provided access to parts of the coast and Beauduc-Les Sablons. Some of these arrangements persisted after the land transfer but were renegotiated to align them with restoration objectives. The 2019 dispute concerned, in particular, the exclusion of hunting from certain former saltworks dykes.

The hunting dispute nevertheless concerned more than hunting alone. It revealed a broader transformation of historically constituted arrangements governing access and use. Former salt workers and other local users could experience the renegotiation of these arrangements as a loss of access to a territory with which they had long-standing relationships. In a 2020 interview, a representative from an environmental organisation stated that, "When you lived in Salin-de-Giraud and worked for Salins du Midi, you had hunting and fishing grounds extending over thousands of hectares, reserved for salt workers. In that respect too, they feel dispossessed".

These inherited arrangements had never provided equal or unrestricted access, as rights and practices were themselves selective and structured through company control. What changed was therefore not simply the disappearance of existing rights, but the institutional framework through which they were granted and renegotiated.

These tensions became explicit later in 2019 during a public meeting organised in Salin-de-Giraud. Intended to present a decade of management actions, it became an arena in which inhabitants challenged both the transformations underway and the way decisions had been made. In a 2021 interview, one member of a local community association stated that, "We realised that the environmental organisations were working for them, but that there was nothing for us!"

The meeting marked a shift from dispersed disagreements to a more visible territorial controversy. Criticism increasingly encompassed not only hunting but also water circulation, the transformation of inherited infrastructures, flood protection and the perceived consequences of ecological restoration for Salin-de-Giraud and surrounding areas.

As the controversy expanded, opposition increasingly polarised around the category of the '*écolos*', which grouped together environmental organisations and site managers despite their different institutional roles. In an interview conducted in 2021 by Le Brazidec,** a representative of an environmental organisation commented that, "'Ecolos' are a bit of a vague concept, but anyone who cares about the environment was included in that group. And without any real argument, it was just satisfying to bash someone, to find a scapegoat".

This polarisation was reinforced by a perception among some inhabitants that the restoration project was transforming the CFS into a territory that was intended primarily for biodiversity conservation, where human presence and long-established local uses were increasingly seen as undesirable or out of place.

Hostility was expressed through social media and graffiti (Figure 9). At the same time, opposition also became organised through local associations that raised concerns about water management, access and coastal flood protection; these included the Association des riverains du vaccarès and Protection salin Camargue.

The events of 2019 thus brought together previously dispersed tensions surrounding infrastructures, access, uses and the ecological transformation of the site, turning them into a broader territorial controversy. They also prompted managers to reconsider their relationships with local actors and contributed to the participatory turn described above. The following section examines more closely the hydrosocial transformations that had become objects of contestation.

RECONFIGURING THE HYDROSOCIAL TERRITORY: INFRASTRUCTURES, PRACTICES AND ECOLOGICAL RELATIONS

The controversy revealed competing understandings of what was being transformed by the ecological restoration. Historically, in the CFS, an intertwining had occurred among water flows, hydraulic infrastructures, industrial production, ecological conditions, access and everyday practices. Drawing on hydrosocial heritage, this section examines how de- and re-infrastructuring reconfigured these inherited relations through changes in representations of the territory, hydrological and ecological processes, flood protection, access and territorial practices.

Figure 9. Graffiti expressing opposition to environmental management in the former saltworks



Source: Author's photograph (2021).

Reframing the former saltworks through ecological restoration

The restoration project initially framed the CFS primarily through ecological and hydrological objectives. In the hydrosocial literature, this framing resonates with critiques of approaches that view water as separate from the social and historical relations through which it is produced (Linton, 2010; Swyngedouw, 1999); it also resonates with research showing that wetland restoration may privilege ecological and biophysical processes while giving more limited attention to social and political dimensions (Alp et al., 2024).

The five transitional objectives defined between 2009 and 2021 by the Conservatoire du littoral, the co-managers, and local municipalities prioritised: 1) restoring more 'natural' hydrological functioning, 2) rehabilitating coastal ecosystems, 3) supporting waterbirds, 4) adapting to sea-level rise, and 5) integrating socio-economic dimensions. The ordering and formulation of these objectives gave clear prominence to hydrological and ecological restoration, while existing uses and socio-economic activities were considered in relation to their compatibility with the site's new conservation objectives.

This ecological framing also shaped representations of the site's history. In institutional presentations of the restoration project, the CFS was described as a territory characterised by historically limited human presence and relatively late development;⁷ this contrasted with the industrial history and relationships between hydraulic infrastructures, salt production and neighbouring communities that are outlined above (Figure 10). Communication materials foregrounded wetland habitats and non-human life, while public heritage enhancement included older remains such as the 17th-century Château de Tourvieille. Although the industrial history was acknowledged in historical accounts, its material and social heritage

⁷ Among other examples, see "Dix ans de gestion et de mise en valeur du site des Etangs et marais des Salins de Camargue," https://www.etangs-marais-salins-camargue.fr/wp-content/uploads/2021/03/Bilan_gestion_10-ans_-3_octobre_2019.pdf; and "Restauration écologique et adaptation aux effets du changement climatique dans les anciens salins de Camargue" https://pole-lagunes.org/wp-content/uploads/sites/4/2022/01/5_CO_Thibault_REXsalinsCamargue_30nov21.pdf.

was largely absent from what is physically presented and enhanced within the restored landscape. Heritage-making in this way made some histories and socio-ecological relations more visible than others.

The 2023-2032 SMP increased attention to socio-economic issues and local involvement, but ecological objectives continued to structure the management framework, with 11 of the 18 long-term objectives concerning primarily ecological processes, habitats or species.⁸

Figure 10. Institutional representation of the former saltworks as a protected natural site undergoing ecological restoration



Source: Author's photograph (2021).

The progressive framing of the restoration project as an NbS articulated these objectives with a broader "hydrotopia" (Cortesi, 2022), that is, an imaginary of desirable relations between water, non-human life and society through which a different hydrosocial future is envisioned. Between 2018 and 2021, actors from Tour du Valat described NbS in terms of an "ecology of reconciliation" and of an "alliance with living things" through which adaptation to climate change can be promoted; this contrasts with an inherited imaginary of "taming nature". As put by a member of an environmental organisation in a 2021 interview,

How can these habitats be maintained and restored, while also being managed for the benefit of humans? We are not in a register of activism, denunciation, or locking nature away. We are trying to be in a form of openness and reconciliation between humans and nature.

⁸ Elaboration d'un nouveau plan de gestion pour le site des Étangs et marais des salins de Camargue - Comité de pilotage n°4 - 7 juillet 2022 : <https://www.etangs-marais-salins-camargue.fr/wp-content/uploads/2022/07/COPIL-EMSC-07-07-2022.pdf>

This vision of reconciliation was, however, contested by some local actors, who perceived ecological objectives as being prioritised over their own protection. In an interview**, one representative of a local community association, for instance, contrasted the restoration of eel circulation between the sea and the Vaccarès with what he perceived as insufficient protection of local inhabitants:

[The Tour du Valat] supports ecological restoration. What interests them is seeing that, thanks to this restoration, eels can move from the sea to the Vaccarès (...). But faced with this situation, I'm scared. I don't care about the eels. Frankly, I want to be protected..

This tension was also recognised by an environmental manager interviewed in 2021**, who described how the restoration project had been perceived locally:

We, for our part, are pleased to see nature reclaiming its place (...). But people saw it only as a defeatist approach: environmentalists happy to see a few fish coming back while putting the Camargue and its inhabitants at risk.

The use of the NbS label nevertheless evolved. It was initially prominent in Tour du Valat communications, and then came to be used more cautiously locally as controversy intensified. It nevertheless remained present in scientific and international arenas and later reappeared in a more hybrid framing that combined ecological processes with protective infrastructures. NbS was therefore not a stable designation; rather, it was a context-dependent framing of the changing relationship between ecological processes and conventional protection.

This reframing was also reflected in the ways the territory was named and represented. The official designation Étangs et Marais Salins de Camargue (Ponds and Salt Marshes of the Camargue) describes the site primarily through its wetlands. By contrast, local and vernacular geographies associated with Beauduc, Salin-de-Giraud and neighbouring spaces are embedded in a longer history of working practices, settlement, and uses of the territory (Nicolas, 2008; Guyonnet, 2024). These different ways of naming the territory are therefore associated with different histories, practices and forms of attachment, rather than constituting interchangeable geographical descriptions.

These contrasting representations matter because re-infrastructuring involves not only changes in water management and infrastructures, but also changes in which histories, practices and relationships to place are made most visible in descriptions of the site. From a hydrosocial heritage perspective, vernacular place names provide one indication of the social relations and attachments that may remain less visible within predominantly ecological representations of restoration.

Restoration therefore did not simply replace a 'human' territory with a 'natural' one; instead, it changed which inherited relations were made visible and legitimate. These representational changes accompanied material transformations of water, ecological conditions, and infrastructural functions.

De- and re-infrastructuring the waterscape, flood protection, and ecological processes

The reframing described above was accompanied by a material transformation of the waterscape (Figure 11).

The progressive discontinuation of industrial hydraulic management and the modification or deterioration of former hydraulic infrastructures altered connections between lagoons and the sea and reorganised water levels, flooding patterns and salinity gradients across the site. These changes were spatially differentiated. Increased connections with the sea produced more pronounced marine influence in the southern lagoons, accompanied by changes in sediment dynamics, aquatic vegetation and benthic communities (Tour du Valat, 2022). At Beauduc, for instance, stronger marine connectivity between 2018 and 2022 was associated with increased water circulation and sedimentation, a marked decline of *Ruppia cirrhosa* (spiral tasselweed) and the development of *Zostera noltei* (dwarf eelgrass), indicating increasing marine influence.

These differentiated trajectories show that de-infrastructuring did not restore a single prior ecological state. New conditions emerged through interactions between renewed marine dynamics, the topography inherited from salt production, and the remains of its hydraulic system. Greater hydrological autonomy was therefore itself materially produced through infrastructural transformation.

Figure 11. Typical wetland landscape in the CFS following the discontinuation of industrial salt production



Source: Author's photograph (2021).

The transformation also reconfigured flood protection, requiring a distinction between two types of infrastructure that are often grouped locally under the term 'dykes'. The first consists of the former saltworks seafront dykes, which primarily served industrial water management, although they could *de facto* limit marine incursions. The second is the more landward *digue à la mer*, which was explicitly intended to protect inhabited areas. Ecological restoration primarily involved discontinuing maintenance of the former industrial seafront system. However, inhabitants perceived this withdrawal from maintenance as a threat to their own security, particularly because they considered the *digue à la mer* to be inadequately maintained.

This did not imply abandoning infrastructural protection. The alternatives assessed in 2013 all assumed upgrading the *digue à la mer* as the principal protection against marine intrusion (BG Ingénieurs Conseils, 2013). During our research, however, the Symadrem, the public body responsible for flood protection across the Rhône Delta, was still developing its coastal flood-risk strategy, whose diagnostic phase was completed in 2022 (Symadrem, 2022). Ecological restoration and flood protection also remained institutionally separate; the Symadrem was not a CFS co-manager nor was it involved in designing the restoration project.

The formal redistribution of protective functions also did not necessarily correspond to how inherited infrastructures were understood locally, since engineering functions do not exhaust the meanings or effects acquired by infrastructures over time (Goeldner-Gianella et al., 2024). Some local actors associated the inherited seafront dykes with protection and interpreted their deterioration as increasing vulnerability, despite their different original function. These concerns cannot be reduced to perceptions alone as seafront dyke maintenance ceased before the more landward protection system had been fully upgraded, thus creating a period in which the coverage of protective functions remained incomplete.

Flood protection concerns became a focus of local mobilisation. In a 2021 interview, a representative from the local community association Protection Salin Camargue, constituted in the opposition to the NbS project, described the association's purpose primarily in terms of protection, saying that,

Our association, Protection Salin Camargue, grew out of a movement of salt workers (...) We would like to be protected. To this end, a sea dyke already exists. There are places where its structure is not able to withstand the onslaught of the sea and there are places where it is just a line on a map. (...) Our association will do everything it can to get them to take action [to protect us from floods]. We explain things technically, but then we need to be heard.

The quote illustrates how infrastructural transformation became connected to concerns about flood protection. It should not be read as a technical assessment of the flood-defence system, but rather as evidence of the protective functions and expectations that some local actors associated with inherited infrastructures.

De-infrastructuring within the CFS also redistributed exposure towards the adjacent active saltworks. As maintenance of the former saltworks' seafront dykes ceased, dykes bordering the still-active saltworks – which had previously been located behind this outer line of defence – became more directly exposed to marine dynamics (Symadrem, 2022). This increased reinforcement and repair requirements for Salins du Midi. De-infrastructuring in one part of the formerly interconnected salt production system therefore shifted exposure and the associated costs towards its still-active part. De-infrastructuring thus redistributed protective functions and vulnerabilities rather than simply removing protection, while the infrastructures intended to manage these redistributed risks may follow different institutional and temporal trajectories (Brochet et al., 2025).

The Fangassier pond provides a different illustration of the selective character of de- and re-infrastructuring. This pond shows how industrial hydraulic management had itself produced ecological conditions that subsequently acquired conservation value. During the salt production period, water levels and salinity were actively managed through pumping and water transfers, while an artificial nesting island constructed in the 1970s contributed to making Fangassier an important breeding site for greater flamingos (Mathevet and Béchet, 2020). Flamingo conservation at Fangassier was therefore already embedded in an anthropogenically managed landscape (Figure 12).

In a 2023 interview, a former saltworks manager described the relationship between hydraulic management and ecological conditions through the technical categories of salt production; as he put it,

We were doing water movements [for the flamingos], so there was always a certain level of salinity here and a certain water level (...) around 90 to 100 grams per litre, because *Artemia* shrimp [an important food source for flamingos] are present at these salinity levels.

Figure 12. Wetland habitat and flamingos in the former saltworks



Source: Author's photograph (2021).

Unlike the more directly connected southern lagoons, Fangassier has no natural outlet, and discontinuing pumping removed an important mechanism for managing water levels and salinity. By 2021, average salinity had reached approximately 220 g/L, with summer conditions reaching salt crystallisation (PNRC et al., 2021). During this period, flamingos ceased breeding regularly at Fangassier and subsequently established themselves in the active saltworks at Aigues-Mortes. This relocation, however, cannot be attributed to salinity alone: successful breeding depends on active management of nesting sites and water levels, and monitoring identified other factors, including repeated breeding failures and predation (Mathevet and Béchet, 2020; Tour du Valat, 2022). Locally, however, the disappearance of the colony became highly visible evidence through which some actors questioned the ecological legitimacy of the new management regime. As stated emphatically by a resident in a 2023 interview,

Symbolically, as soon as they took over [management of the site], the flamingos left! (...) In people's minds, it was an operation to destroy nature!

This account shows how a highly visible environmental change became embroiled in the controversy surrounding restoration. The departure of an iconic specie from a historically important breeding site provided a particularly powerful means through which some local actors compared the new ecological regime with the industrially managed landscape that preceded it; they questioned whether ecological restoration necessarily produced ecological improvement. The subsequent management of Fangassier further complicates any simple opposition between industrial hydraulic control and ecological restoration. From 2022 onwards, an agreement between the Conservatoire du littoral and Salins du Midi provided for renewed water transfers and the pumping of hypersaline water from Fangassier through the company's hydraulic system (Tour du Valat, 2022). Conservation management therefore again involved active hydraulic intervention and cooperation with the former industrial operator in order to manage water levels and salinity and maintain conditions favourable to colonial waterbirds.

Fangassier thus makes the relationship between de- and re-infrastructuring particularly visible. Ecological restoration did not replace industrial hydraulic control with autonomous ecological processes; rather, infrastructures were abandoned, retained or reactivated according to changing ecological and protective functions. De-infrastructuring was therefore partial and sometimes reversible, while greater

hydrological connectivity itself depended on material interventions into inherited infrastructures.⁹ The emerging waterscape is consequently neither post-infrastructure nor a restoration of a pre-industrial condition; it is a hybrid and evolving configuration in which an imaginary of renewed ecological autonomy and connectivity coexists with inherited infrastructures, local technical expertise, and continually evolving forms of hydraulic management, reconfiguring access, uses and industrial hydrosocial heritage.

Industrial hydrosocial heritage and changing territorial practices

The transformation of the CFS also affected relationships with the territory that had developed through the industrial organisation of salt production. The former saltworks were closely intertwined with the social and industrial history of Salin-de-Giraud and Beauduc-Les Sablons. The development of Salin-de-Giraud from the late 19th century was closely associated with industrial production (Figure 13), while the settlements and practices around Beauduc-Les Sablons were likewise connected to working-class and popular uses of the surrounding territory (Nicolas, 2008; Guyonnet, 2024).

Figure 13. Industrial housing associated with salt production in Salin-de-Giraud



Source: Author's photograph (2021).

The influence of the salt industry extended well beyond employment and water management. As noted above, the industrial companies that shaped the development of Salin-de-Giraud, notably Solvay and Péchiney, were involved in many dimensions of local life, including workers' housing, schools (Figure 14), medical services and other collective facilities. This paternalistic organisation also extended to relationships with the surrounding territory through company-regulated access to land and resources. As one member of a local community association recalled in a 2023 interview,

The salt workers (...) didn't earn much, but they came to fish and hunt [on the CFS site]. It supplemented their income. (...) That's why the first shacks we had [in Les Sablons] were for salt workers from Salin-de-Giraud, and professional fishermen from Les Saintes, who came by sailboat.

⁹ The restoration of hydrological connectivity itself involved substantial earthworks, including the use of heavy machinery to breach, lower or reshape inherited hydraulic structures. The restoration of more autonomous hydrological processes should therefore not be understood as the absence of material intervention.

These practices were therefore more than recreational uses of the site. They formed part of a broader set of relationships through which industrial labour, access to resources, and everyday territorial practices became interconnected. Hunting, fishing and access to particular spaces contributed both materially and socially to the incorporation of the former saltworks into everyday life in and around Salin-de-Giraud.

These relationships were materially supported by infrastructures and access arrangements associated with the industrial territory. Roads, tracks and dykes shaped possibilities for circulation, while company-regulated access organised hunting, fishing and other uses of the saltworks, including access to beaches and to Beauduc-Les Sablons. Infrastructures designed primarily for industrial purposes thus also supported everyday territorial practices and connections between Salin-de-Giraud, the saltworks and the coast.

These arrangements should not be idealised, as access remained selective and company-controlled, while material provision and usage rights were embedded in paternalistic relations of dependency and control (Guyonnet, 2024).

Figure 14. Inauguration of the Salin-de-Giraud school, financed by the P  chiney company, 22 October 1905



Source: Archives of the Salin-de-Giraud branch of the Municipality of Arles.

These relationships were not static throughout the industrial period. Paternalistic arrangements remained important until the late 1980s and then were progressively dismantled from the beginning of the 1990s onwards as changes in company ownership and economic restructuring transformed employment, services and access to resources. Conservation management therefore constituted a further redefinition of long-standing practices and usage rights, rather than the replacement of a fixed industrial social order.

One researcher, in a 2023 interview, described the resulting transformation of practices in particularly strong terms, saying that, "The social effects of this renaturation are enormous in terms of reframing practices. It's a straitjacket [*corsetage*], in fact, if I had to describe it in one word! It's a straitjacket for practice".

These changes were particularly visible in access to Beauduc-Les Sablons. As company-regulated arrangements were replaced by conservation management, the former salt production territory became formally more accessible to the wider public, while some historically established forms of local motorised access were restricted. Motor-vehicle access to Beauduc-Les Sablons became regulated through permits linked primarily to shack ownership. For local actors, these changes affected not simply mobility, but the terms on which the territory was open, to whom, and for which practices. They reconfigured a historically constituted relationship between Salin-de-Giraud, Beauduc-Les Sablons and the former salt production territory. As one representative from a local community association put it in a 2023 interview, "There used to be many more people coming to this place, from all walks of life, than there are today! Today, it's deserted! (...) Before, this site was much more open! And it welcomed many more people!"

The issue was therefore not only physical access but also a perceived shift in who could legitimately use and inhabit the site. Restrictions on motorised access and parking also had uneven practical consequences. For residents of Beauduc-Les Sablons, transporting water, gas bottles, food or materials to maintain the shacks often requires a vehicle, as does launching a boat (Nicolas, 2008). Regulation of motorised uses could therefore imposed particular constraints on inhabitants whose everyday practices depended on such access. One resident, in a 2023 interview, interpreted the reduction in human presence in explicitly normative terms, saying that, "This drastic reduction in human traffic seems to me almost like a moral condemnation of the existence of such a practice".

The transition from company-regulated to conservation-oriented access also had distributive effects. Some historically established uses associated with salt workers, shack residents and other local users became more restricted, while walking, cycling and other recreational uses were increasingly accommodated within the site's public and conservation functions. Wider formal accessibility could therefore coexist with reduced possibilities for groups whose practices depended on forms of access inherited from the industrial territory.

From the perspective of the Conservatoire du littoral and the co-managers, these changes represented an opening up of the former salt production territory to a wider public, which replaced the continuation of selective access inherited from company control. The tension therefore cannot be reduced to a simple opposition between access and exclusion; rather, it concerned competing principles of access, with broader public accessibility on the one hand and the constraining of historically constituted local practices and usage arrangements on the other.

Recognising these relations as hydrosocial heritage does not imply endorsing the social order that produced them. Contemporary practices and attachments were historically constituted through an industrial regime that combined territorial integration and material provision with labour exploitation and paternalistic control. Restoration therefore encountered not an empty post-industrial landscape, but a territory in which infrastructures, practices and social relations continued to carry the effects of this history.

Regulating everyday practices in the restored territory

Conservation management also changed the everyday regulation of territorial practices. Following the acquisition of the CFS, eco-guards employed by the PNRC and operating under the authority of the Conservatoire du littoral became increasingly visible actors of the new regime, monitoring access and permitted uses. Some inhabitants described encounters with them as expressions of reduced autonomy and limited recognition of established practices. According to one resident in a 2023 interview, "They tell you: no, you can't do that (...) They have a little badge and they think they're the bosses". One example concerns *levadons*, small earthen embankments used locally to modify water circulation around inhabited or used areas. Residents of Beauduc-Les Sablons described these small *levadons* around their shacks as means of managing local water flows and protecting against flooding or salinisation. One researcher interviewee situated these small earthen embankments within a longer history of local water

management. In a 2023 interview, she commented that "there is knowledge among the people, the inhabitants (...) techniques that existed before the nineteenth-century developers built the dykes. *Levadons* were gentle techniques, put in place by the people themselves to protect their homes or their land. And this continues to be practised today". And this continues to be practised today.

Disputes over their construction therefore brought different scales of hydraulic knowledge into contact: situated, small-scale interventions by inhabitants were evaluated against site-wide management objectives and the regulatory framework of a protected area.

Fishing and shellfish gathering constituted another arena of conflict. Several interviewees considered that eco-guards interpreted applicable rules more restrictively than the regulations required. One community association representative stated in a 2023 interview that, "We were told: 'Fishermen are not allowed to fish with nets'. But that's not true. The regulations simply prohibit anchoring. The guards want to ban us from fishing".

Shellfish gathering was described in similarly conflictual terms. One resident, in 2023, commented that, "They try to ban everything, for example clams. They see people gathering clams on the CFS site, and it annoys them. So they try to ban clam gathering so that no one comes anymore".

Such statements do not establish either managers' motivations or the correct legal interpretation of regulations; instead, they show how some users understood conservation-oriented regulation as restricting practices that they regarded as ordinary and historically legitimate. Practices considered ordinary or sustainable by some local users could in this way come into conflict with rules and management priorities established within the conservation framework.

These practices should not simply be characterised as environmentally insensitive. Nicolas (2023) shows that dwelling at Beauduc-Les Sablons involved employing situated forms of adaptation to an uncertain coastal environment, including construction practices that were adapted to flooding and changing environmental conditions. Local environmental knowledge therefore existed outside conservation institutions and did not always correspond to their management frameworks.

Some inhabitants of the settlement felt that the long-standing presence of eco-guards in the territory conflicted with the authority exercised by relatively recent management institutions. A local community association leader commented in a 2023 interview that, "It's hell (...) They've been here for four or five years, while we've been here for decades. They take photos, and you get a registered letter. They don't discuss things".

Importantly, criticism of regulatory practices did not necessarily imply opposition to conservation objectives themselves. One research interviewee (2023) explicitly distinguished between support for environmental protection and criticism of the way regulation was implemented: "I share the objective of protecting nature. But it must be shared with everyone! That's their job! We need to educate rather than annoy people".

Together, these examples show how conservation objectives were translated into everyday rules governing access and uses. Hydrosocial transformation was therefore experienced not only through infrastructures and water circulation, but also through interactions in which inherited practices, situated knowledge and legitimate ways of inhabiting the site were negotiated and contested. Hydrosocial heritage became politically salient when established relationships with water and territory encountered a different regime of ecological management. (For a summary of the main hydrological, ecological and hydrosocial transformations examined in this section, see Table A.3.)

DISCUSSION: HIGHLIGHTING HYDROSOCIAL MISRECOGNITION

The CFS case shows that ecological restoration does not simply replace conventional hydraulic infrastructures with nature-based forms of environmental management. Through processes of de- and re-infrastructure, it reconfigures a hydrosocial territory where there has been a long historical

interconnection of water circulation, ecological processes, flood-protection functions, productive activities, knowledge and everyday practices. These transformations are also political; they involve decisions about which territorial relations are made visible, which forms of knowledge are considered legitimate, and who should be able to participate in defining and governing territorial change. The discussion develops this argument through the concept of hydrosocial misrecognition, examining its territorial, epistemic and procedural dimensions.

A narrow ecological framing that obscured hydrosocial relations

The case illustrates a tension between the spatial and conceptual boundaries through which ecological restoration was organised and the broader hydrosocial relations through which the territory had historically been constituted. The ecological framing of restoration made hydrological connectivity, habitats and species particularly visible as objects of intervention, while some of the productive, flood-protection and social relationships historically embedded in the same infrastructures remained less visibly incorporated into the project's initial definition.

These relations also extended beyond the formal boundaries of the restoration site. Livestock breeders, for instance, use adjacent land and form part of the broader hydrosocial territory within which the project takes place. As one livestock breeder argued in a 2023 interview, "They [the CFS managers] have environmental expertise, but they're missing half the picture. We need farmers, livestock breeders, people involved in tourism to be considered equally important actors in the region".

This highlights how the territorial boundaries through which ecological restoration is governed intersect only partially with the broader hydrosocial relations it reconfigures. As research on the territorialisation of water governance shows, functional and institutional territories are produced through different logics and do not necessarily coincide (Ghiotti, 2007). While the SMP is organised around the restoration site, water circulation, flood protection functions, productive activities and everyday practices extend beyond its boundaries. Ecological restoration can therefore generate consequences at spatial scales that do not coincide with those through which intervention is defined.

This compartmentalisation was also visible in the relationship between ecological restoration and flood-risk governance. Flood protection was not initially a structuring objective of the restoration project and the Symadrem was not included in site governance. The Symadrem also operates at a different spatial and institutional scale from that of the restoration site, with a mandate organised around the wider flood protection system of the Rhône Delta rather than the ecological management of the CFS itself; however, the progressive transformation of former coastal infrastructures and the subsequent framing of the project as an NbS brought these distinct territories of intervention into relation, raising questions concerning the wider organisation of flood protection. As a coastal engineer from Symadrem acknowledged retrospectively in a 2023 interview, "Afterwards, it's true that it might have been good to anticipate the issue of risk, and perhaps also for Symadrem to have been included in the governance of the site. That's for sure".

The issue was therefore not simply the absence of a particular institution from the project, but the coexistence of partly distinct territories of intervention, each organised around different mandates, spatial boundaries and objects of management. This echoes analyses of French flood governance that show that attempts to integrate the management of aquatic environments and flood prevention encounter pre-existing institutional territories, responsibilities and management trajectories (Brochet et al., 2026; Barone and Ghiotti, 2023; Guerrin et al., 2014). Within a hydrosocial territory, however, these domains remain materially interconnected. The subsequent framing of the restoration project as an NbS brought ecological restoration and coastal adaptation into the same narrative, but did not in itself overcome this institutional fragmentation. The case consequently illustrates how sector-based territories of intervention can render some hydrosocial relations more visible and governable and erase others.

These institutional divisions matter because hydraulic infrastructures themselves participate in producing territorial relations rather than merely regulating water flows (Hommes et al., 2022). In the CFS, their selective abandonment, transformation or reactivation affected relations involving flood protection, ecological conditions, production, access and everyday practices. De- and re-infrastructuring was consequently also a process of territorial reconfiguration.

This also resonates with critiques of 'modern water' as an abstraction that separates water from the social relations through which it is produced (Linton, 2010). Although restoration sought to reconnect hydrological and ecological processes, its initial framing could still render less visible some of the historically constituted social relations with water.

Hydrosocial heritage (Drapier et al., 2024b) helps explain why these relations remained politically salient after salt production ended. Infrastructures and water management arrangements had shaped production, access, ecological conditions, practices, and relationships to place, all of whose significance persisted beyond their original functions. Contestation therefore cannot be reduced to resistance to environmental change or inadequate understanding of risk. Building on research that links Camargue risk perceptions to territorial attachments and contrasting representations of the delta's future (Mathevet et al., 2025), our findings show how such attachments are constituted through historically sedimented relationships with infrastructures, water management, and territorial practices.

We use the term 'hydrosocial misrecognition' to describe this partial recognition of the historically constituted relations through which water, infrastructures, ecological processes and territorial practices have become interconnected.

Specifying the 'partialness' of hydrosocial misrecognition implies that these relations were not entirely ignored and that not all inherited practices should have been preserved. It draws attention to the selective and fragmented ways in which a hydrosocial territory becomes legible through particular management objectives, institutional mandates and forms of expertise. Some relations are recognised and incorporated into intervention, while others remain peripheral, are addressed through separate institutional frameworks, or become visible only when their transformation generates conflict.

Hydrosocial misrecognition may also operate across scales. Benefits associated with wetland restoration, biodiversity conservation or longer-term coastal adaptation may be defined at broader spatial and temporal scales, while industrial hydrosocial heritage and locally experienced transformations remain less visible. The conflict therefore concerned not only the benefits and burdens of restoration, but also the scales at which they became visible. Hydrosocial misrecognition thus connects the scalar organisation of ecological restoration with the recognitional dimension of environmental justice.

Hydrosocial knowledge and the politics of expertise

Hydrosocial misrecognition also has an epistemic dimension. Ecological, hydrological and technical expertise occupied a central position in defining restoration objectives, while experiential knowledge derived from long-term relationships with water, infrastructures and territorial practices was less readily incorporated into formal management categories. This does not imply two homogeneous or opposing knowledge systems; rather, it suggests that different forms of knowledge had unequal capacities to define the problems, objectives and desirable futures through which restoration was organised.

Residents and users had developed situated knowledge of water flows, species, environmental change and infrastructures through long-term territorial practices. In an interview that was conducted in 2021 by the CPIE Rhône-Pays d'Arles,* an interviewee emphasised the potential relevance to scientific and environmental management of such situated knowledge. As she puts it,

The knowledge of the people, the *telliniers* [fishers specialising in wedge-clam harvesting], the fishermen, they have an intimate knowledge of the currents and the games that scientists might be interested in. It's a shame not to use lay knowledge, that social contempt is there too.

Local associations did not necessarily claim that such experiential knowledge was equivalent to scientific or engineering expertise; rather, they emphasised the value of knowledge acquired through long-term involvement with the territory. In another interview* a member of a local community association commented that, "The first thing is to be able to listen and accept that we locals, modest as we are, do not have the skills of an engineer in hygrometry or water management. But what is certain is that we have experience".

The issue was therefore not an opposition between scientific and local knowledge, nor was it a rejection of ecological expertise; rather, it was the unequal legitimacy attributed to different ways of knowing and experiencing the territory. From an environmental justice perspective, this raises a question of recognition; that is, whose knowledge, practices and relationships with place are considered relevant to defining environmental problems and desirable futures (Fraser, 1997; Schlosberg, 2007). Hydrosocial heritage adds a historical dimension by drawing attention to knowledge developed in the course of experience with previous hydrosocial territories.

Recognition was also shaped by the institutional formats through which knowledge about the site was organised. The Site Management Plan translated the territory into standardised management categories, objectives and ecological indicators that did not necessarily correspond to how all actors articulated territorial issues. Importantly, these categories were also contested from within the site managers. As put by a representative of an environmental organisation in a 2022 interview,

A management plan is a highly standardised protocol. (...) You can't deviate from the instructions! (...) It's the standard imposed by the Conservatoire du littoral. (...) For the definition of the issues, there are 10 pages (...) that's not how we see things! (...) An issue concerning wading birds, an issue concerning (...) no! That's completely stupid!

This complicates any interpretation of the controversy as a straightforward opposition between environmental managers and local knowledge, as criticism of the categories through which the site was rendered governable also emerged from within environmental organisations. The epistemic issue therefore concerns the institutional capacity of particular categories and forms of expertise to define what counts as a legitimate management problem.

Hydrosocial knowledge need not be explicitly rejected to become marginalised; such marginalisation may occur through formulation of the categories and standards that make environmental problems institutionally legible. This resonates with critiques of using claims to "sound science" to gain political authority in water governance (Trottier, 2008). According to this critique, scientific expertise does not merely provide information for decision-making; it can also contribute to defining which questions and forms of knowledge are recognised as relevant. The issue in the CFS was not whether ecological expertise was scientifically valid; rather, it was about how particular forms of expertise interacted with institutional arrangements that privileged some ways of describing water, ecological processes and territorial futures over others.

Hydrosocial heritage helps make visible what such categories may leave in the background, that is, knowledge of water circulation, of hydraulic intervention and of ecological change that has developed through historically constituted relationships with the territory. Recognising such knowledge does not require treating it as inherently more accurate than scientific expertise or accepting local interpretations of ecological causality without scrutiny; rather, it means recognising it as one dimension of the hydrosocial relations that are transformed through ecological restoration. The politics of expertise therefore forms part of hydrosocial misrecognition, and when infrastructures and water relations are transformed, the knowledge produced through those relationships may also lose, acquire or renegotiate legitimacy.

The limits of participatory governance

Recognition and participation were closely related, but analytically distinct, dimensions of the conflict. The participatory process expanded opportunities for inhabitants, users and associations to express concerns and contribute knowledge, but it occurred *after* the principal orientation towards ecological restoration and renewed hydrological connectivity had been established. Participation therefore broadened involvement in site management without necessarily reopening the question of the original choices through which the restored territory had initially been defined.

The procedural issue was consequently not simply whether participation occurred, but when it occurred and what did and did not remain open to negotiation. This temporal dimension is particularly important in processes of de- and re-infrastructure because decisions concerning infrastructures and water circulation can establish material trajectories that subsequently constrain possible territorial futures. Research on coastal adaptation similarly shows that the acceptance of NbS and managed realignment depends not only on technical or ecological performance, but also on trust, place-based values, and local involvement in decision-making (Areia et al., 2023; Apine and Stojanovic, 2026; de la Vega-Leinert et al., 2026). The CFS case adds a temporal dimension, in that the introduction of participatory processes after major infrastructural and ecological orientations have been established does not provide the same capacity to shape territorial futures as participation during their initial definition.

The later consultation nevertheless created opportunities for local actors to influence site management, and some called for more sustained participation beyond consultation. In a 2022 interview, a representative of an environmental NGO commented that,

One of the ways out of this situation is for them [the inhabitants of Beauduc-Les Sablons and Salin-de-Giraud] to be involved in the management of the site. (...) As far as possible, the residents and stakeholders should work alongside the managers to at least observe what is happening, but ideally they should be involved in the management.

This demand is particularly significant because hydrosocial transformation remains ongoing. De- and re-infrastructure does not constitute a single transition from one stable configuration to another; instead, water circulation, ecological conditions, flood protection arrangements and management practices continue to evolve and sometimes require renewed technical intervention. Participation therefore concerns not only consultation over a management plan, but the continuing processes through which water, infrastructures, practices and risks are monitored and governed.

From an environmental justice perspective, this raises a question of procedural justice (Fraser, 1997; Schlosberg, 2007; Walker, 2012). Procedure cannot, however, be separated from recognition and distribution. Who participates, when participation occurs, and what remains negotiable influence which hydrosocial relations and forms of knowledge become visible; meanwhile, decisions concerning infrastructures, access and water management redistribute benefits, burdens and exposure to risk.

Approaching NbS as processes of de- and re-infrastructure therefore shifts attention from the acceptance of environmental interventions towards the governance of the hydrosocial transformations they entail. In the CFS, controversy emerged not simply because ecological restoration generated opposition, but because transforming infrastructures also transformed historically constituted hydrosocial relationships. Participation is therefore particularly consequential when de- and re-infrastructure redefine not only material environments, but also the relations through which territorial futures are imagined, negotiated and governed.

CONCLUSION

This article examined how ecological restoration and Nature-based Solutions can transform a territory that has been historically organised through hydraulic infrastructures. The CFS case shows that this transformation cannot be understood simply as the replacement of conventional infrastructure by restored ecological processes; rather, it involved the selective abandonment, transformation and, in some cases, reactivation of inherited hydraulic arrangements. De- and re-infrastructuring should therefore be understood as intertwined processes through which infrastructures, water flows, ecological conditions, flood protection functions and territorial practices are reconfigured.

Hydrosocial heritage helps explain why such transformations can become politically contentious. Infrastructures inherited from salt production had become embedded in social and territorial relations that extended beyond their original industrial functions. Recognising these relations as hydrosocial heritage does not imply idealising the industrial regime through which they developed, which was itself characterised by asymmetrical relations of authority, dependency and control. It instead draws attention to the historically constituted sociomaterial relations that may persist when the original functions and ownership of infrastructures change.

Building on this perspective and on the recognitional dimension of environmental justice, we propose the notion of hydrosocial misrecognition. The concept refers not simply to the insufficient recognition of particular groups, identities or practices, but rather to the partial and fragmented recognition of the historically constituted relations that make up a hydrosocial territory. The CFS case shows how such misrecognition can emerge when these relations are divided between different territories of intervention, institutional mandates and forms of expertise, or when ecological benefits and locally experienced transformations become visible at different spatial and temporal scales. Hydrosocial misrecognition therefore connects the recognitional, distributive and procedural dimensions of environmental transformation; what is recognised as relevant shapes which effects become visible, whose knowledge informs intervention, and what remains open to negotiation.

This perspective also highlights the importance of participation in infrastructural transformation. Participation matters not only for the acceptance of restoration, but for identifying and negotiating the hydrosocial relations affected by de- and re-infrastructuring. The CFS case nevertheless shows the limited benefits of participatory processes that are introduced after major orientations have been established or when interconnected issues such as ecological restoration and flood protection remain governed through distinct institutional frameworks. Beyond the Camargue, these findings have implications for ecological restoration and climate adaptation programmes in other deltas and coastal wetlands. Such environments are rarely blank spaces in which NbS simply replace conventional infrastructures; rather, they are historically layered hydrosocial territories that have been shaped by successive regimes of water management, flood protection, production and ecological intervention. Approaching NbS through de- and re-infrastructuring and hydrosocial misrecognition therefore draws attention not only to what ecological restoration seeks to produce, but also to the historically constituted relations it redistributes, destabilises and requires societies to renegotiate.

ACKNOWLEDGEMENTS

The authors would like to thank the public representatives and NGOs in the Camargue for interviews and access to consultation workshops. This research benefited from support of the Post AgreenSkills Fund (PAF_11), through the project *Nature-based Solutions from Theory to Practice: Comparing France and the US*, and from the ANR funded FluidGov project *Towards a 'fluid' governance: hydrosocial analysis of flood paradigms and management practices in Rhone and Ganges basins* (ANR-18-EQUI-0001). This research was also carried out as part of the *OHM Vallée du Rhône* and received government funding managed by

the French National Research Agency (ANR) under the LabEx DRIIHM programme, part of the Investissements d'avenir initiative (ANR-11-LABX-0010).

The authors are grateful to the editors and anonymous reviewers of Water Alternatives for their careful reading and constructive comments, which helped to improve the manuscript. Special thanks are extended to Sushilla Rajamanie, Editorial Assistant at Water Alternatives, for her assistance and support throughout the editorial process.

AI USE DECLARATION

Generative AI was used during the revision of the manuscript solely for English-language editing. All arguments, interpretations, analyses, and conclusions remain those of the authors.

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APPENDIX A

Table A.1. Main stages in the de- and re-infrastructure of the former saltworks of the Camargue

Period	Infrastructural and hydrological transformation	Governance and management
1856 to late 19th century	Establishment of industrial salt production at Salin-de-Giraud near the Grand Rhône; construction of the digue à la mer, completed in 1859, alongside the progressive embankment of the Rhône, profoundly transforms water circulation across the delta	Industrial development of salt production, initially associated with Henri Merle and subsequently with Alais, Frogès et Camargue; development of Salin-de-Giraud as an industrial and workers' settlement, alongside the activities of Solvay
Early to mid-20th century	Salt production remains concentrated primarily in the eastern part of the complex; hydraulic infrastructures and industrial facilities are progressively developed around Salin-de-Giraud	Consolidation of industrial salt production and of the associated social and territorial organisation around Salin-de-Giraud
1953 to late 1960s	Westward expansion of the saltworks over much of what is now the CFS; lagoons, dunes and sansouires are progressively converted into interconnected evaporation ponds; by the late 1960s, the saltworks extend to the Pointe de Beauduc	Expansion and intensification of industrial salt production; development of settlements and practices associated with the saltworking territory, including the growth of Les Sablons
1970 to 1982	Construction and extension of the seafront industrial dyke system to protect salt production from marine incursions; intensification of hydraulic control of salt production ponds	Industrial water management and salt production by Salins du Midi
2008 to 2010	Salt production progressively ceases in the western sector as the first former salt production areas are transferred to the Conservatoire du littoral	Progressive acquisition by the Conservatoire du littoral, beginning with Bélugue and Fangassier in 2008; management of the first acquired areas is entrusted to the PNRC
2009 to 2010	Storm-induced breaches multiply in the seafront dykes, altering marine exchanges, water levels and salinity	Progressive withdrawal from maintenance of former coastal infrastructures
2010 to 2011	Former salt production ponds are progressively withdrawn from industrial hydraulic management; the Beauduc pumping station is dismantled and hydrological connections are progressively reconfigured	Transition from industrial salt production management towards ecological management
2011	–	Co-management between the PNRC, SNPN and Tour du Valat is established at the initiative of the Conservatoire du littoral, with the PNRC remaining the coordinating manager, a provisional management plan is introduced to guide management pending completion of land acquisitions

2013	Discontinuation of maintenance of former seafront infrastructures is incorporated into the site management strategy	Formalisation of the initial management and ecological restoration strategy through the 2013-2016 Notice de gestion
2014 onwards	Successive hydraulic works progressively reconfigure water circulation and connectivity between water bodies and with the sea	Ecological restoration is progressively implemented through adaptive management
From 2017	–	Restoration begins to be explicitly framed as a Nature-based Solution, primarily by Tour du Valat and, more occasionally, by the Conservatoire du littoral
2019	Hydraulic works modify water circulation in several former salt production ponds, including Galabert and Rascaillan	A public meeting in Salin-de-Giraud marks the emergence of open public controversy over the restoration project
2020 to 2022	–	Preparation of the 2023-2032 Site Management Plan (SMP), with the stated objective of strengthening the involvement of local users and inhabitants
2021 to 2022	–	Participatory process coordinated by the CPIE Rhône-Pays d'Arles, including individual interviews, field visits, workshops and thematic working groups
December 2022	–	Validation of the 2023-2032 SMP by the steering committee
2022/2023	Rehabilitation, replacement and construction of hydraulic infrastructures and restoration of irrigation networks	Hydraulic works are implemented under the national France Relance programme
2022 onwards	Selective reactivation of active hydraulic management at Fangassier, a former salt production pond within the CFS, through water transfers, pumping, and management of water levels and salinity	Renewed operational involvement of Salins du Midi in hydraulic management for ecological objectives

Table A.2. List of interviewees by organisation, type, scale and role (anonymised individuals)

Organisation	Type of organisation	Scale	Respondent (anonymised)	Number of respondents
ACCM (Communauté d'agglomération – General administration)	Public authorities	Intercommunal	R31, R32	2
ASCO Corrége Camargue Major	Independent economic actors (agriculture)	Local	R15	1
Association Au fil du Rhône	Local community associations	Local	R13	1
Association de chasse maritime de Camargue	Local community associations	Local	R30	1
Association des Amis des Marais du Vigueirat	Environmental organisations	Local	R27	1
Association des cabanoniers de Port-Saint-Louis-du-Rhône	Local community associations	Local	R7	1
Association des cabanoniers de Port-Saint-Louis-du-Rhône	Local community associations	Local	R29	1
Association des Riverains du Vaccarès	Local community associations	Local	R21	1
Association Les Flamants Roses du Trébon	Local community associations	Local	R18, R19, R20	3
Association Protection Salin Camargue	Local community associations	Local	R38	2
Association Quartiers Plage Nord et Carteau Nord	Local community associations	Local	R9, R10	2
Association Trébon Campagne	Local community associations	Local	R40, R41	2
CCI Pays d'Arles (Programme Inond'Action)	Public authorities	Intercommunal	R12	1
Collectif des Naufragés du Rhône	Local community associations	Local	R3	1
Comité d'Intérêt de Quartier de Pont-de-Crau	Local community associations	Local	R37	1
Compagnie des Salins du Midi	Private sector actors	National	R46	1
Conservatoire du littoral	Environmental organisations	National	R11, R35	2
CPIE Rhône-Pays d'Arles	Environmental NGOs	Local	R43	1
DDTM Bouches-du-Rhône	Public authorities	Departmental	R23, R24	2
DREAL PACA	Public authorities	Regional	R26	1
DREAL Rhône – Méditerranée – Corse	Public authorities	Basin / National	R14	1
Fédération départementale des chasseurs des Bouches-du-Rhône	Local community associations	Departmental	R42	1
Association des plaisanciers de Beauduc	Local community associations	Local	R45	1
Independent	Residents	Local	R52	1

Independent researcher	Researchers / experts	National	R48	1
Arles Municipality	Public authorities	Local	R2, R16, R25, R36	4
Arles Municipality (village of Mas-Thibert)	Public authorities	Local	R33	1
Arles Municipality (village of Salin-de-Giraud)	Public authorities	Local	R8	1
Fourques Municipality	Public authorities	Local	R17	1
Port-Saint-Louis-du-Rhône Municipality	Public authorities	Local	R4, R5, R6	3
Mairie des Saintes-Maries-de-la-Mer	Public authorities	Local	R1	1
Vallabrègues Municipality	Public authorities	Local	R50	1
Independent	Independent economic actors (agriculture)	Local	R47	1
Parc naturel régional de Camargue	Environmental organisation	Regional	R34	1
Réserve naturelle nationale de Camargue	Environmental organisations	National	R39, R44	2
Symadrem	Public authorities	Intercommunal	R28, 54	2
Tour du Valat	Environmental organisation	Local/International	R22, R49, R51	3

Table A.3. Main hydrological, ecological and hydrosocial transformations associated with the restoration of the former saltworks

Area/component	Hydrological or infrastructural transformation	Documented environmental changes	Hydrosocial transformation	Main actors/groups affected
Southern lagoons (Beauduc, Sablons)	Increased connectivity with the sea; greater influence of gravity-driven exchanges	Changes in salinity, sedimentation and submerged vegetation; increasing marine influence at Beauduc	Reduced dependence on industrial water control; renewed exposure to marine dynamics	Site managers; local residents
Former seafront dyke system	Progressive discontinuation of maintenance; breaches and renewed marine exchanges	Increased exposure to coastal processes and redistribution of water flows	Former industrial infrastructures lose some functions; protective functions are redistributed within the wider flood-defence system	Site managers; local residents; Salins du Midi
Adjacent active saltworks	Some formerly internal dykes become directly exposed to marine dynamics	Increased exposure of salt production infrastructure to flooding	De-infrastructuring within the CFS redistributes infrastructural vulnerability beyond the restoration site	Salins du Midi
Fangassier	End of the former industrial hydraulic regime following the cessation of pumping; no natural outlet; very high salinity; renewed pumping from 2022	Average salinity c. 220 g/L in 2021; changing attractiveness as a flamingo breeding site involving multiple ecological factors	Selective reactivation of inherited infrastructure and renewed cooperation with the former industrial operator	Site managers; Salins du Midi; local residents
Access and territorial practices	Replacement of former company-regulated access arrangements by conservation-oriented rules; restrictions on some forms of motorised access and use	Expected benefits for wetland and waterbird populations associated with restored hydrological and ecological processes	Redistribution of possibilities for accessing and using the territory among different practices and groups	Shack residents; hunters; fishers; local users; wider public
Local water management practices	Restrictions reported by interviewees on small-scale interventions such as levadons (earthen embankments)	Changes in exposure to environmental risks, water-flow distribution, and the presence of aquatic species	Situated water management practices encounter a different regime of institutional regulation and legitimacy	Residents; local users

Everyday conservation regulation	Enforcement of rules concerning access, fishing, shellfish gathering, and other permitted uses	Expected benefits for marine and wetland fauna and flora through reduced disturbance and pressure on habitats and species	Conservation objectives are translated into everyday rules; inherited practices and situated knowledge become objects of negotiation and contestation	Eco-guards; residents; fishers; local associations
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