Socialecological affective arrangements: mapping with a small sea of many seas

Violeta Cabello[a], Xabier E. Barandiaran[b,f], Blanca González-Mon[c], Juan Manuel Zaragoza[d], Jesús M. Siqueiros[e] , Marcela Brugnach [a,f]

[a] Basque Centre for Climate Change (BC3), EDIFICIO SEDE 1, 1º PLANTA 1 | PARQUE CIENTIFICO UPV/EHU B/SARRIENA s/n, 48940, Leioa, Spain
https://orcid.org/0000-0003-4393-2433

[b] IAS-Research Centre for Life, Mind, and Society, Department of Philosophy, Faculty of Education, Philosophy and, Anthropology, University of the Basque Country (UPV/EHU), Tolosa Hiribidea 70, 20018, Donostia - San Sebastián, Gipuzkoa, Spain. ORCID: https://orcid.org/0000-0002-4763-6845

[c] Stockholm Resilience Centre, Stockholm University, Albanovägen 28, 106 91 Stockholm, Sweden. https://orcid.org/0000-0001-8322-1586

[d] Universidad de Murcia, Spain. ORCID: https://orcid.org/0000-0001-8377-6688

[e] UAEY, Instituto de Investigaciones en Matemáticas Aplicadas y en Sistemas, UNAM, Tablaje Catastral N°6998, Carretera Mérida-Tetiz Km. 4.5, Municipio de Ucú, Yucatán, México, C. P. 97357. ORCID: https://orcid.org/0000-0001-8008-6198

[f] IKERBASQUE, Basque Foundation for Science, Bilbao, Spain. ORCID: https://orcid.org/0000-0001-8522-8650

ABSTRACT:

Environmental degradation engenders deep affective experiences that shape how people explain its causes and respond to it, yet socialecological research lacks tools to analyse these affective relations alongside factual accounts. This article proposes the concept of socialecological affective arrangement (SEAA), a historically and geographically situated formation of entities and practices that affect, and are affected by, one another, together with a method to map it: the mapparatus. The mapparatus codes interview narratives into networks whose nodes are narrators, entities (from nitrogen and algae to laws) and practices, and whose links are affects and emotions. It distinguishes egoaffective relations, through which narrators are themselves affected, from alteraffective relations, through which they explain what affects others, and combines network analysis with close qualitative reading. The method is explored through eight interviews with farmers, biologists, a fisher and a researcher concerned with the eutrophication of the Mar Menor, a Spanish coastal lagoon and the first ecosystem in Europe granted legal personhood. Participants are divided yet connected. Farmers cohere around how new regulations and public blame affect them; non-farmers cohere in signalling agriculture as a direct cause of eutrophication. Shared attachments to the lagoon, such as bathing and sailing with family, a common frustration with its governance and a participant experiencing inner affective contradictions about the lagoon connect both groups. Mapping SEAAs foregrounds affective experience as a crucial source of socialecological information and helps explain why people know-feel different worlds in contested environmental problems, offering a tool for affective knowing in sustainability research.

Keywords

affective arrangements; emotions; affective knowing; socialecological systems; mixed-methods; eutrophication; Mar Menor

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1 Introduction

Affects and emotions mediate our interactions and bonding with places and ecosystems, playing a crucial role in how we are constituted as sentient beings in relation to our environments (Cunsolo Willox et al. 2013; Zaragoza Bernal 2021a; Nightingale et al. 2022; Siqueiros-García et al. 2022). As such, environmental change and ecosystem degradation engender deep, often ambivalent affective experiences and a wide range of societal responses ranging from trauma and paralysis to conflict and collaboration, from denialism to stewardship (Norgaard 2006; González-Hidalgo and Zografos 2020; Neckel and Hasenfratz 2021; Strzelecka et al. 2025). These responses, in turn, shape political agendas and the advancement or blockage of sustainability transformations (Durnová and Karell 2023; Bogner et al. 2024; Olsson et al. 2026).

Environmental knowledge is still too often reduced to scientific facts produced and validated by scientists in papers and reports that remain opaque to the majority of the population. At the same time, it is increasingly evident that facts are continuously weaponised in manipulative, denialist, or polarising dynamics that push back against the recommendations of those reports (Durnová 2019; Powell 2024; Liste et al. 2026). Facts are entangled with fear, livelihoods, pain or desires, that is, with affective relations that keep being overlooked in environmental assessment procedures. There is an increasing call for a better alignment between knowledge production and emotional and affective ways of knowing, conceptualised as a need for 'affective knowing' (Nightingale et al. 2022; Hertz and Bousquet 2025). Moreover, affects and emotions provide crucial information for understanding how scientific facts and narratives get dynamically intertwined with people's values, needs and actions (Durnová and Karell 2023; Sorman and Galende-Sánchez 2025; Slaby et al. 2025). Yet, how to analyse the roles affects and emotions play in complex environmental dynamics and how to integrate them in socialecological models remain underexplored questions in sustainability science.

Despite epistemic divisions between cognitive and sociocultural approaches to affect and emotions, different authors concur in seeing affects and emotions as both subjective and intersubjective, both drivers and results of individual and collective actions, pertaining to all living beings (Fuchs and Koch 2014; Roelvink and Zolkos 2015; Colombetti 2017; Durnová 2019; Slaby and Von Scheve 2019). Within the environmental humanities, a growing body of theory focuses on the materiality of affects and subjectivity, examining how they both emerge from and sculpt more-than-human relational entanglements (Neimanis 2017; Adams-Hutcheson 2019; Verlie 2019). In the words of Slaby et al. 2025 (p.2), affect and emotion are "where meaning and mattering are fought out and lived at the same time." This understanding of affects and emotions as materially-semiotically relational offers a

conceptual bridge with socialecological process-relational approaches (Brugnach 2017; West et al. 2020; Mancilla Garcia et al. 2020; Hertz and Mancilla Garcia 2021) that, in our view, enables novel explorations of more-than-human relationality in environmental problems.

The aim of this paper is to propose a theoretically and empirically grounded methodological apparatus (Barad 2007) to map more-than-human affective relations in environmental problems. This *mapparatus* is a methodological process (and its result) that combines qualitative and network analysis techniques by structuring narrated affective experiences into network datasets where affects and emotions are considered relations (i.e. connections or edges between nodes). Theoretically, we draw on and expand the notion of affective arrangements introduced by (Slaby et al. 2019a; Slaby 2019), making it analytically operational for *SocialEcological Affective Arrangements* (SEAAs). In doing so, we explore the intersection between affective relationality and socialecological research.

We navigate this concept with the Mar Menor ("small sea"), a saltwater coastal lagoon in southeastern Spain experiencing a process of eutrophication, an enrichment of anthropogenic nutrient concentration in the water which has transformed its ecological qualities and triggered a significant sociopolitical and emotionally charged conflict (Boix-Fayos et al. 2023; Zaragoza et al. 2025). In 2022, the Mar Menor became the first ecosystem in Europe to be granted legal personhood (Vicente-Giménez and Salazar-Ortuño 2024), a milestone in global environmental governance unfolding in a challenging context. In previous research, we have explored the controversies surrounding the 'facts' about the causes and solutions to the lagoon's eutrophication and the wider process of polarisation dividing land and sea communities in this territory (Cabello and Brugnach 2023; Cabello 2024). Zaragoza (2025b) shows how emotions such as grief, anger, and hope are central to how socialecological degradation is perceived and acted upon, particularly in a context where ecological damage is not immediately visible and must be mediated through scientific knowledge and memory. He demonstrates that affective responses to the lagoon's ecological crises play a key role in transforming scientific information into shared values, motivations, and collective action.

These findings underpinned the organisation of a knowledge co-production experience co-led by the first author (Cabello 2024), in which co-author J.M. Zaragoza took part as a participant. The point of departure for the co-production process was interviewing participants individually in order to understand their affective experiences in relation to the lagoon and its deterioration. This led us to conceive the Mar Menor as *a sea of many seas*[1], as there were different ways of enacting what a degraded lagoon is. In this paper, we return to the interviews three years after the co-production process ended, and ask: what is the

[1] We are inspired by (de la Cadena and Blaser 2018)' emphasis on ontological multiplicity in 'a world of many worlds', while acknowledging our distance from the situations and contexts out of which they proposed this idea.

affective relationality of the Mar Menor eutrophication? How do narrated facts of the eutrophication problem relate with affective attachments to the lagoon?

The SEAA concept and the mapparatus, we argue, provide a meso-scale articulation for how affects and emotions modulate socialecological dynamics, and help get "to the heart of the matter" (Slaby et al. 2025, p. 3) of why people know-feel (Fals-Borda 2012) and narrate different worlds in contested environmental problems. As a sea of SEAAs, the Mar Menor can be seen as a dynamically patterned assemblage in which water bodies, nutrient particles, laws, microalgae and dying fish relate together with memories, fishing, agricultural or bathing practices through deep affective bonds, caring efforts, sadness, rage and blaming dynamics. Different affective entanglements co-produce different SEAAs with the Mar Menor that nonetheless interfere with each other in societal dynamics of conflict and cooperation (Venot and Jensen 2022).

2 Socialecological Affective Arrangements

2.1 Affective arrangements

Affective arrangements is a theoretical concept proposed by (Slaby et al. 2019a; Slaby 2019) to situate the analysis of affective relations in the concrete sociomaterial constellations in which they unfold. Slaby (2019, p. 109, italics original) defines it as "an array of persons, things, artifacts, spaces, discourses, behaviors, expressions or other materials that coalesce into a coordinated formation of mutual *affecting-and-being-affected*". Among others, the concept is inspired by that of *assemblage* (Deleuze and Guattari 1987) to emphasise the *heterogeneity* of the elements assembled and invoke "a notion of distributed agency" (Slaby 2019, p.110). Despite their heterogeneity, elements in an arrangement present a "characteristic mode of composition and dynamic relatedness" (Slaby et al. 2019a, p. 2), a certain patterned regularity and intensity thresholds that make it possible to distinguish it from a less enmeshed background.

Taken like this, affective arrangements share many similarities and conceptual roots with recent adoptions of process-relational ontologies within sustainability theory (Brugnach 2017; Mancilla García et al. 2020; West et al. 2024), and in particular with applications of the notion of *assemblage* (Hertz and Bousquet 2025). It invites a kind of 'arrangement thinking' (Slaby et al. 2019b) that pays attention to the patterns in which practices, devices, living beings, things, spaces and temporalities continuously entangle in socialecological processes. What affective arrangements bring is a focus on *affects* as the core relational dynamics constitutive of social and material life. So, what are affects?

In its most common definition, an affect is an interaction that produces a difference in a body, that is, a conscious or unconscious bodily response (Massumi 2002; Brennan 2004).

Drawing on Deleuze's reading of Spinoza, Slaby and Mühlhoff (2019, p. 27) foreground a relational conception of affects as "material and ideational relations that, *in the short term, increase or diminish their agentive and existential capacities* in relation to their surroundings and all other actors and entities present in a situation". Adopting this perspective, we here adhere to the view that affects are intrinsically linked to dynamic notions of power; they involve bodily encounters that transform agencies (their *potentia)* and contribute to processes of becoming (Slaby and Mühlhoff 2019; Mühlhoff 2020). Crucially, affects are not exclusive to humans. They connect human and more-than-human bodies in recursive dynamics of affect-being-affected which, over time, modulate (create, drive, transform) individual and collective capacities and subjectivities (Roelvink and Zolkos 2015; Slaby and Von Scheve 2019). In this broader sense, any 'body' (whether human, animal, or non-living) participates in these affective dynamics. Affects also traverse human bodies, in what we often thematise as emotion.

The notion of affect has often been opposed to that of emotions to emphasise the pre-reflective character of most bodily engagements (Massumi 2002; Mühlhoff 2020). Our senses and our skin continuously feel and react to a world full of intensities without us even noticing. *Emotions,* on the other hand, respond to bodily experiences that we can explicitly narrate in ways such as "I fear floods". A key proposal of the affective arrangement framework is to conceive emotions as episodic realisations of affects that can be identified and categorised by a human body (Von Scheve & Slaby 2019). As Cunsolo Willox et al., (2013, p. 16) put it, emotions are "the spilling over of the effects of affect on a given body"; they are the ways we make sense of the *feelings* and sensations experienced in our bodies.

Emotions imply a double 'move while being moved' (Fuchs and Koch 2014). On the one hand, they reflect our evaluative orientations of concrete situations. Thereby, they demarcate our field of concerns helping us recognise what we care about[2]. On the other hand, e*motions* move us. They prompt us into engaging with the situations and actors that matter to us and shape how we tend to act in situations of fear, shame, anger or excitement, affecting and moving in turn those who witness our bodily expressions (Von Scheve & Slaby 2019). The analyses of affects and emotions, therefore, are not opposed but complementary in affective arrangements. Where affects enable approaching wide relational dynamics between living and non-living entities, emotions, as a specific type of affect, help illuminate the historically

[2] As extensively documented by sociology and history of emotions, individual and collective concerns and values are culturally and historically constructed, so are the linguistic categories we learn to read our bodily sensations and narrate our emotions (Scheer 2012; Boddice 2018; Moscoso 2021). The idea of emotions being preceded by judgement of situations is however controversial within philosophy of emotions, and some authors of this manuscript disagree with it (see Zaragoza Bernal, 2021). However, this controversy does not fundamentally affect our conceptual proposal in this paper and, for the sake of space, we do not address it here.

acculturated ways in which subjects feel, make sense of, and further engage with concrete phenomena[3].

2.2 Socialecological affective arrangements

Socialecological research is undergoing a 'turn' towards process-relational (PR) thinking (Brugnach 2017; West et al. 2020; Hertz and Mancilla Garcia 2021), highly influenced by posthumanist perspectives and relational thinkers like Gilles Deleuze, Donna Haraway or Karen Barad. PR approaches have contributed to a diagnosed need for theoretical grounding of socialecological[4] analysis, proposing an ontology that withdraws divisions between 'the social' and 'the ecological' to emphasise their intertwinedness (Mancilla Garcia et al. 2020). They have also deepened reflexive practices among sustainability scholars, paying attention to how researchers' backgrounds and chosen methods, their passions and frustrations, co-constitute the research process together with the very socialecological systems under study, what is often termed an ethico-onto-epistemological perspective (Barad 2007; Mancilla García et al. 2024; Haider and Rieser 2025).

We aim to contribute to this PR shift by 'affectionalising' socialecological analysis. Affective arrangements and their wider conceptual umbrella are uniquely positioned for this, as they share theoretical roots and a general style of thought that comes with interdisciplinary endeavours to address complex societal challenges. Moreover, affective relationality comes with an ambiguity that holds several dualities within: affect/emotion, mind/matter, human/more-than-human, individual/collective (Anderson 2009). It is precisely this ambiguity that offers a nuanced landscape to think-with *socialecological affective arrangements*. The challenge lies in describing socialecological interactions as affective, having emotional relationality within but not reducible to it while inquiring how emotions entangle within other sociomaterial processes and practices.

We define a **socialecological affective arrangement** as a *historically and geographically situated, heterogeneous formation of socialecological entities and practices mutually and recursively affecting-and-being-affected; expressed and enacted, among others, through human bodies and their emotional affection*. The **formation** is a dynamically (historically) and spatially (geographically) patterned mesh of affective relations between processes. The **processes** are, in turn, structured patterns of change in heterogeneous *entities* (understood as processes of individuation in, for example, humans, plants, rivers, memories, laws, or technologies), and *practices* (like fishing, governing or breathing). **Affects** are valenced interactions between processes, constituted by the resulting enhancement or diminishment of the capacities of

[3] The demarcation between 'human' emotions and 'more-than-human' affects remains another contested conceptual terrain, especially in animal studies (Lorimer et al. 2019), as animals can effectively communicate their affective worlds in numerous ways unattainable to human sensorial capacities.

[4] Whereas standard nomenclature in sustainability science is social-ecological (Biggs et al. 2021), we deliberately remove the hyphen to support the relational withdrawal of the division between these categories, as terms such as naturecultures or biocultural have done.

the processes and/or the formation(s) they participate in. Therefore SEAAs are formations of affective relations between socialecological entities and practices that modulate affective capacities of heterogeneous processes and/or the very same formation.

What is the unique focus of a SEAA as compared to an affective arrangement? First, SEAAs have a geographical dimension (Pile 2010; Bondi 2016; Jankowski et al. 2025). SEAAs are not located in a site but in a place, not in a Christmas family reunion (Schuetze 2021) but in a larger territory in which biophysical processes, such as weather changes or water flows, influence family gatherings along the year. This also brings a different temporality, as socialecological processes are rarely momentarily observed. They involve historical processes and path-dependencies along which emotions evolve, sometimes sediment in affective states, habits and relatedness patterns (Siqueiros-García et al. 2022). Second, the entities are socialecologically relevant, meaning they can be any type of actor (as in assemblages or Actor-Network Theory) as long as their affective relatedness can be recognised as a typical socialecological phenomenon[5]: a fisheries collapse, a human-animal conflict, the management of a forest to which communities are spiritually connected, the eutrophication of water ecosystems caused by anthropogenic nutrients. SEAAs make explicit how affects and emotions connect sentient humans, sentient non-humans and non-sentient entities and practices in recursive socialecological patterns.

Third, affective relations in a SEAA include socialecological material processes as affects (nitrogen triggering eutrophication process; increasingly intense storms flooding farms and affecting farmers' production). Considering ecological processes as affects represents a big leap from the common understanding of affect in cultural studies as preconscious forces invisibly connecting human bodies. It also bears risks of reification and reductionism. The core challenge, however, is not quantification per se, but avoiding content-free variables that strip context away. Striking a balance between manageability and complexity in an analytical framework is difficult; nonetheless, as Brugnach et al. (in rev.) argue, quantification can remain relationally situated when its unit of analysis is the relation rather than the isolated individual. At the same time, ecological affects help attune affectivity to the material agencies of environmental change as already proposed in environmental humanities and affective geographies (Neimanis 2017; Adams-Hutcheson 2019; Verlie 2019). They also provide an analytical pathway for the mixed-methods explorations that are common in both socialecological and affective relational research (Kahl 2020; Biggs et al. 2021).

2.3 A mapparatus for SEAAs

We call the methodological device developed in this paper a mapparatus. The term joins two senses. "Map" is used in its abstract relational rather than cartographic sense, like in situational analysis (Clarke 2009): a mapping is a correspondence that takes the elements of

[5] In PR socialecological theory, "phenomena refer to the ontological inseparability of objects, apparatuses as well as agencies of observation" (Hertz and Mancilla Garcia 2021) p. 3.

one set onto another. The mapparatus maps narrated affective situations onto a relational structure of relata (narrators, entities and practices) and the affective relations between them. "Apparatus" follows Barad (2007) following Foucault: apparatuses, devices, are not neutral instruments that register a pre-existing reality, but material-discursive practices that draw boundaries and take part in producing the phenomena they make observable.

A mapparatus is thus both a process and its result: the sequence through which a SEAA is elicited, coded and formed into a network, finally expressed in a relational map or diagram that integrates qualitative and quantitative information. It turns a SEAA into an operational device that can be explored, compared and shared. It does not represent the arrangement from outside: by illustrating a SEAA it becomes entangled with it, and shapes how the arrangement is understood and acted upon by those who encounter the mapparatus[6]. A mapparatus is not the only way of concretising a SEAA (e.g. a narrative account of the arrangement could also do) and mapparatuses could be built for arrangements other than SEAAs. Here we develop a mapparatus specifically with a threefold goal: 1) to make explicit concrete affective relations concerning the eutrophication of the Mar Menor (ontological), 2) to operationalise the notion of a SEAA (epistemological), and 3) to illustrate how to do PR research of socialecological affective dynamics (methodological).

3 Case study context

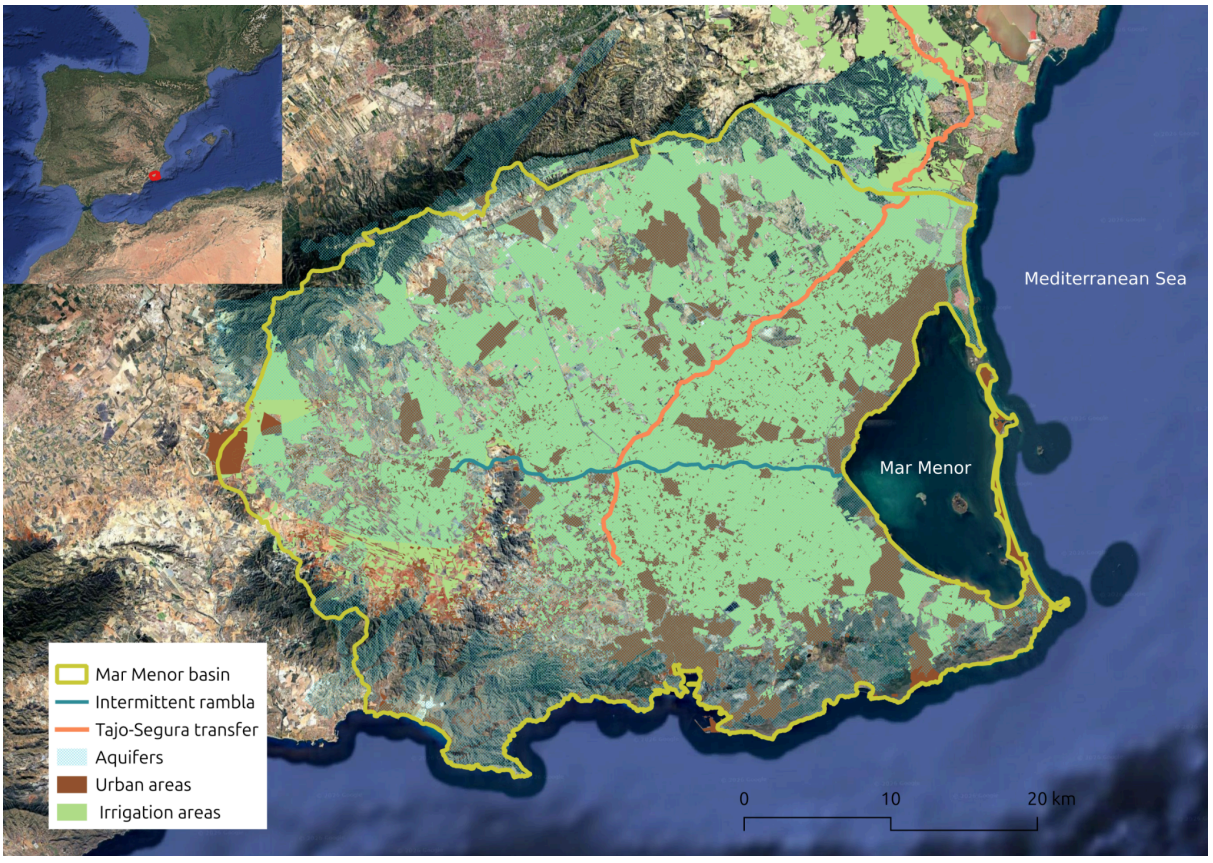
The Mar Menor is a shallow and hypersaline lagoon located in the southeastern Spanish region of Murcia, separated from the Mediterranean to the east by a heavily urbanised sandbar (Figure 1). The area has a semi-arid Mediterranean climate with high average temperatures (15–17°C) and scarce rainfall (~300 mm/year) that often triggers severe flash flooding during heavy storms. The lagoon's watershed spans the large Campo de Cartagena agricultural region, inland rural towns, tourist-driven coastal communities, and a small local fishery. The area is crisscrossed by numerous intermittent rivers, so-called ramblas, and five underground aquifers.

The Mar Menor made headlines in international media through the images of masses of dead fish accumulating on its shores in 2019 and 2021. These events were caused by episodes of aquatic hypoxia (rapid drop of oxygen levels in the water) within a long-term eutrophication process. They were preceded by an unexpected shift in the lagoon's waters by the end of 2015, with a microalgae bloom colouring it green for over a year. The causes of eutrophication are well-known: excessive nutrients, mostly nitrogen and phosphorus, released by human activities and material flows such as agricultural irrigation, industrial meat production and urban wastewater, accumulate in water bodies deteriorating ecological

[6] This is why we coined the term mapparatus, instead of more familiar terms such as 'diagram' or 'network representation', whose representationalist connotations conflict with our enactive and new materialist onto-epistemological commitments.

conditions once the concentration surpasses threshold levels. It is a worldwide 'wicked' socialecological problem, linked to expansive trends of urbanisation and agricultural productivity, often dividing inland agrarian and coastal communities (Levain et al. 2020; Cabello 2024).

Over the past 50 years, the Mar Menor territory has gone through a tremendous transformation brought about by the construction of the Tajo-Segura transfer (orange line in Figure 1), the largest infrastructure of its sort in Spain, carrying high-quality freshwater from the neighbouring river basin. Expanded processes of touristification and intensive vegetable production for exportation made the local economy bloom for decades[7] until the lagoon's waters turned green. The eutrophic crises had important socioeconomic and emotional impacts on the local population. New citizen platforms were created to organise a panoply of actions including massive demonstrations and creative caring collective activities such as "the Mar Menor hug"[8]. In October 2022, after a major social mobilisation to collect signatures for a citizen-led legal initiative, this ecosystem renewed its fame by becoming the first in Europe to be recognised as a legal person. For a deeper insight into the socialecological history of the Mar Menor, see (Zaragoza 2026).



[7] Irrigated land increased from 12% to 63% from 1980 to 2010, reaching a total area of 40-50,000 ha (Carreño 2015). Population density multiplied by 3.5, from 90 inhabitants/km² in 1970 to 340 inhabitants/km² in 2015 (Murcia Region Statistical Centre https://econet.carm.es/)

[8] https://abrazoalagua.blogspot.com/

Figure 1 Location and key geographical features of the Mar Menor watershed. It shows the path of the Tajo-Segura channelled water, the main Rambla del Albujón at the centre and the five aquifers below urban and irrigated areas.

Our preliminary research in this area focused on understanding the history of environmental degradation and the existing controversies about the causes of nutrient enrichment of the lagoon (Cabello and Brugnach 2023; Zaragoza et al. 2025). Controversies were multiple, but the most tangible one revolved around the weight of agricultural responsibility, with strong confrontation between environmental and farming narratives. This controversy was reflected in contested facts and knowledge claims about whether the main source of nutrients was agriculture or urban wastewater, and whether the main vehicle for agricultural runoff to the lagoon was surface or groundwater. Contested facts were continuously weaponised in public debates between opposing political camps represented at different levels of governance and relevant institutions[9], each defending different approaches to cutting nutrient leakage down.

4 Mapparatus

4.1 Context of the research and participant recruitment

Within the socialecological context described above, the first author co-led a knowledge co-production process aimed at unpacking controversies in a care-full environment[10] (Cabello 2024). The process had a sandwich design starting with an in-depth individual interview with participants in March 2022, following with four dialogue workshops, and ending with evaluation individual interviews in March 2023.

We aimed at forming a small group of 10–15 local actors, balancing maximum diversity with minimised power inequalities. We used purposive sampling, selecting individuals out of a wider sample of actors interviewed in previous phases of the research. We selected lay individuals, rather than organisational representatives or prominent public figures, who lived or worked locally, had diverse backgrounds and experiences with the lagoon's eutrophication crisis, and demonstrated dialogue-readiness. Out of 18 invited actors, 14 accepted to participate and were interviewed, albeit two of them withdrew before the

[9] The conservative Popular Party has ruled in the region since 1995, whereas the current national government has been led by a coalition of the Socialist Party and leftist Sumar since 2021. The national government has responsibility over water and environmental governance. The region is in charge of land planning and agricultural governance.

[10] The co-production process was co-led by Paula Zuluaga Guerra, supported by the New Water Culture Foundation (https://fnca.eu/). The research followed the guidelines of and was approved by the ethical committee of the first author institution. All participants were duly informed and asked for informed written consent before the interviews. Their names and personal data have been anonymised except for those of Researcher H, J.M. Zaragoza, the only participant who agreed to have his identity disclosed. Note that this paper does not focus on the entire knowledge co-production process, which has been analysed in Cabello (2024).

workshops due to health and personal reasons. Whereas a commitment to attending all workshops was asked from participants, only eight participated fully (four workshops), while four attended only two. Our analysis in this paper focuses on the preliminary interviews with those eight individuals. Among them is J.M. Zaragoza, an expert on philosophy and history of emotions co-authoring this paper. The following Table 1 provides further information about the interviewees.

Table 1 - Interviewees description

Interviewee ID	Description	Gender	Age range
Farmer J	Small-scale farmer producing seeds for a large production company	Male	50-55
Biologist E	Expert in aquatic biota and activist in an environmental NGO	Female	45-50
Biologist F	Expert in benthic biology	Female	40-45
Biologist B	Expert in the fishing sector and lagoon's ecology	Male	40-45
Fisher G	Traditional fisher, member of the Mar Menor fishers' union	Male	60-65
Farmer A	Medium-scale farmer, member of a cooperative	Male	50-55
Farmer P	Medium-scale farmer, member of a cooperative and of the Irrigation Community Campo de Cartagena	Male	60-65
Researcher H (J.M. Zaragoza)	Philosophy professor at the University of Murcia, expert in the history of emotions	Male	40-45

4.2 Relational interviews

We used a relational approach to interviewing (Ayata et al. 2019; Mancilla García et al. 2024) to explore how participants affectively encounter the lagoon and its eutrophication, together with their factual narratives or framings of the problem. Our previous research suggested that participants might be reluctant to share at a personal level in a highly polarised context. For this reason, interviews were designed as a progressively deepening conversation. The interview guide can be found in the Supplementary Material (SM Section 3). Interviewees were first asked about their daily activities and relations in work and leisure time. One interviewer asked the questions while the other drew the interconnections described on a large sheet of paper. A satellite image of the Mar Menor was then introduced on top of the drawing. With the lagoon materialised on the table, interviewees were asked about their relation to the Mar Menor; their opinion about its current situation and the causes behind it; the impacts eutrophication had on their relational life, including their work, their relationships and their emotions. As a prompt, we had prepared a list of emotions identified

in our previous research in the area. Lastly, they were asked about their views on the legal personhood citizen initiative (accepted to be processed by the Spanish Congress in January 2022) as a potential solution to the current situation and about their expectations for the co-production process. The first author kept a field diary annotating her perceptions of the interview situation and affective qualities such as place and weather, general emotional tone or moments or questions that elicited more emotional narratives.

4.3 Relational coding of interviews and network formation

This section describes the key methodological contribution of this paper, which bridges qualitative interpretive traditions and network analysis. Whereas methods exploring affective relationality are mostly qualitative and non-representational (Kahl 2020), socialecological research is more prone to mixed-methods approaches (Biggs et al. 2021). Socialecological network analysis in particular has been widely used in combination with narratives and other qualitative approaches (Eakin et al. 2019; Koch et al. 2023; González-Mon et al. 2025). It provides a way of visualising and exploring patterns across complex relational information, which can be further unpacked through thicker qualitative descriptions. The core of the *mapparatus* is precisely the link between these methods, a procedure for qualitative coding and structuring into datasets that preserve the semantic richness of interview segments while expanding them through relational network attributes.

The procedure goes as follows. The first author, responsible for data collection and analysis, revisited the interview recordings and captured in the transcript those affective qualities that could be perceived through listening, triangulating annotations with field diary notes. Second, she anonymised and coded the transcripts (using QualCoder 3.4) to extract data that can be codified as 'nodes' and 'edges' in a socialecological network. She identified text segments conveying affective meaning related to the Mar Menor. Segments were coded simultaneously for three categories, ensuring exact overlap: at least two *relata* (nodes in the network) and one *affective relation* (edges in the network) between relata, either attributable to the interviewee as a node and to another relatum (e.g. "I was deeply affected by the contamination of the lagoon") or from one relatum to other relata as related to the interviewee but not involving them directly (e.g. "farming activities pollute the lagoon"). Coded text segments were exported in .csv format for each interview.

The second step was structuring and categorising text segments in networked datasets. The first author interpreted the annotations within the wider affective context of the full interview, iteratively refining the identification of affective relations. Within text segments, she identified affective configurations consisting of two relata (a source and a target node), and one relation indicating how the source affects the target (in total 93 relata, 312 relations, see SM Section 5 for further statistical details). Each affective configuration was derived from one or more text segments conveying similar affective meaning. Each text segment delivered one or more affective configurations depending on how many relations it

described. Affective configurations (rows in the network dataset) were then classified according to several attributes following our conceptual framework. Relata were classified as Narrators (interviewees), Entities (people, organisations, institutions, algae, nitrates, ships, fishes, water flows…) and Practices (e.g. farming, fishing, governance). Affective relations were classified as emotions (e.g. sadness, hope, anger) and general affects (e.g. deteriorate, flourish, care, enable, confront). The classification of a relation as an emotion responded to direct mentions of emotional categories by interviewees and, in relevant cases, to our interpretation of their (verbal and non-verbal) affective expressivity. Each configuration was assigned a valence (+, -, 0) to indicate whether the affective relation enhances or diminishes bodily capacities of target entities[11].

Finally, to explore the interplay between 'facts' and 'emotions' in the eutrophication problem, affective relations were also classified by type of narrative as *egoaffective* and *alteraffective*[12]. Egoffective narratives are specified by narrators (interviewees) bringing to the surface processes and relations that affect their lives directly. Alteraffective narratives are those where narrators bring affects other than those directly involving themselves. In our data, egoaffective relations include all emotions (direct connections to interviewees) but also other affects such as bonding through recreation practices or confrontation with politicians or other people. Alteraffective relations include mostly material affects describing significant cause–effect relations in eutrophication, similarly to a causal loop diagram.

The process of interpretation and categorisation of affective relations was validated by co-author J.M. Zaragoza in his double role of interviewee and emotion researcher. Interpretive inference was handled through open reflection with the full group of co-authors. A section describing the interpretive dilemmas and decisions made is provided

[11] We acknowledge that the classification of valences, while useful for network analyses, is theoretically complex and requires further development. Valences reflect the concept of *potentia* in the account for affect. They are required to avoid collapsing affect with the wider notion of cause and effect. Not every (causal) difference in a body qualifies or turns into an affect, but only those that increase or decrease its potency, its capacity to act. An underlying metaphysical problem is that *potentia* thus understood is an abstraction, and does not exist in isolation as a determinant of affect; but only relationally, in relation to some horizon of action. Potentia is always *potentia for*; for some action, for somebody. That is, for a body capable of self-defining an activity. And not all bodies can do that (Barandiaran et al. 2009; Barandiaran 2017) (Barandiaran et al. 2009; Barandiaran 2017). We also consider cases in which valence is "0" or neutral. Such cases involve situations in which: a) the interviewee is ambiguous, b) the affects have multiple (positive and negative) consequences on a body's potential, or c) there is still no definite horizon of action that will disambiguate the positive or negative valence. However, for the sake of this paper, we shall bracket a more detailed and strict discussion of the concept of affect and the analysis of valences in SEAAs.

[12] We draw inspiration from the social network analysis terminology of ego-networks and alter-networks, depicting the network of relationships around a particular node.

in SM Section 6. A table with examples of affective relations from each interview dataset is provided in SM Section 4 (Table SM4.1). All network datasets are available in Zenodo[13].

4.4 Mixed network and qualitative analyses

Network-structured datasets allow for multiple types of analyses, including visual explorations and quantitative analyses. To showcase the potential of the mapparatus, we combined them with qualitative analysis of the coded segments and of the interview situations. Visual analysis was developed in Gephi (Bastian et al. 2009) using the ForceAtlas2 layout (Jacomy et al. 2014). It was used to explore how relata broadly cluster within and across SEAAs, to locate the relata and narrators that hold different regions of a network together, and to select the relations and text segments to be read more closely.

Quantitative analysis explored patterns across the egoaffective and alteraffective networks through descriptive statistics and network metrics. On the one hand, we built a two-mode network of the egoaffective relations of all interviews, in which narrators and the other relata (entities and practices) form two levels. We calculated degree and betweenness centrality to identify the relata that play connecting and bridging roles across narrators, building on our previous work in the Mar Menor (González-Mon et al. 2025). We projected this network onto the narrators, weighting each link by the number of relata two narrators share, and applied Louvain modularity clustering (Blondel et al. 2008) and betweenness centrality to the projection using Python 3.13 with NetworkX 3.6.1, to explore which narrators become connected when sharing entities and practices, and who bridges between groups. On the other hand, we treated the alteraffective relations of each interviewee as a separate network over a common set of relata, and computed the Jaccard distance between every pair of networks on the causal links they contain, to discern which interviewees are closer in their causal descriptions. Further details on these methods can be found in SM Section 7.

Qualitative analysis focused on unpacking the meaning of the affective relations shown in the visuals and the patterns detected by the metrics: returning to the coded segments, to the full interviews and to field-diary notes on each interview to understand how a relation was narrated, with which emotional intensity, and what justifications, nuances or ambivalences accompanied it.

These methods were combined differently at three different scales. We first explore an individual SEAA, that of Farmer P, through a vignette of our conversation and his network. We chose Farmer P because he has the most distant causal explanation of the eutrophication problem, while playing a key bridging role in the egoaffective network. We then examine

[13] Zenodo link: 10.5281/zenodo.18600157. Following our ethical protocol, we do not include the semantic content of the edges to guarantee interviewees' anonymity. We acknowledge this hinders the full reproducibility of this research.

how two SEAAs meet, those of Farmer P and Biologist E, comparing their egoaffective and alteraffective networks relation by relation. Finally, we visualise the full SEAA of SEAAs and use network metrics to characterise how its eight SEAAs divide and connect.

4.5 Limitations of the present study

As a novel interdisciplinary proposal, our mapparatus still carries conceptual and methodological tensions and limitations. One important limitation of this study lies in the asymmetry between the more-than-human ambition of the SEAA concept and the exclusively human character of the data from which it was developed. Our corpus consists of interviews, and the non-human constituents of the arrangements mapped here (the lagoon's waters and sediments, nutrients and algae, fishes and jellyfishes, the irrigation and transfer infrastructures) enter the analysis only as they are narrated by human participants. This constrains what the mapparatus can render visible: it reaches the affective lives of non-human entities only obliquely, through the traces they leave in those who speak. The constraint does not, however, undermine the relational premise of our framework. Within a PR ontology the interviewee is not the sovereign originator of the affects we map but a node of articulation through which wider socialecological entanglements become expressible; what these networks register are relations traversing the narrator rather than emanating from them. The limitation is also historically specific: the interviews were designed within a knowledge co-production process rather than as instruments for mapping SEAAs, a concept that emerged from re-reading the material three years later. A design conceived for this purpose from the outset could mobilise resources unavailable to us here such as sustained observation and fieldnotes attentive to the lagoon's own rhythms and to multispecies encounters, or the ethological and sensory registers developed in multispecies ethnography and in work on animals' atmospheres (Lorimer et al. 2019).

A second limitation, conceptually entangled with the first, concerns the eight interviews on which the analysis rests. Judged by the conventions of social network analysis this sample cannot sustain inferential claims, and we report our network analysis results with that caveat stated. Yet the relational commitments that shape the first limitation also unsettle the notion of significance at work here. Statistical significance measures the improbability of a pattern under a null model of independent, interchangeable units, precisely the ontology of separable individuals that a PR account sets aside. What a SEAA map offers is not the generalisation of a pattern across a population but an articulation of how relations compose within a situated arrangement. We therefore treat the quantitative measures as devices for detecting patterns and directing interpretive attention rather than as tests, while recognising that what significance might mean in affective-relational research remains to be developed.

5 The Mar Menor as a small SEAA of SEAAs

5.1 A small SEAA

Farmer P suggests meeting at midday at a terraced café, a three-minute walk from the lagoon's shore. It is a bright spring Sunday; whenever the farm's rhythm allows, he keeps weekends for his family. He takes part in agricultural unions and in the annual meetings of the irrigation community, and he joins demonstrations both for the agricultural sector and for the Mar Menor. We do not need to ask about the lagoon: from the outset he tells us how much it worries him, *"all my childhood is this"*. Every morning he checks the lagoon and the wind, *"the sea tells you where it comes from and what wind it is"*. In the evening, back from the farm, he looks again, to see whether *"it is more green, less green [laughs]. Or how the algae are"*. When we ask about his emotions, he is blunt: eutrophication makes him *"sad, sad, sad… [shouts] Of course! sadness, because… for those who live in La Manga, or only come during summer… but for those of us here…"*. He used to sail with his family to the lagoon's small islands and to bathe every day. He still bathes in summer, even though his neighbours try to dissuade him and his kids no longer join him. He is also enraged. He confronts local politicians who, in his view, neither care nor act, *"after what happened to the Mar Menor, I do not believe in politics"*.

Figure 2 presents Farmer P's SEAA as rendered by our mapparatus: 33 relata and 61 relations, the largest number of relations in our sample. Three regions can be distinguished in his egoaffective network: i) the practices through which he inhabits the lagoon (bathing, sailing, diving, family bonding), held by joy, nostalgia and childhood emotional evocations, and now impeded by eutrophication; ii) the blaming dynamics towards the farming sector, reinforced by the politicisation of the eutrophication problem and by controversies that worry him; and iii) the consequences of the new regional regulation for his farming practices (inspections, shrub planting, fertiliser control).

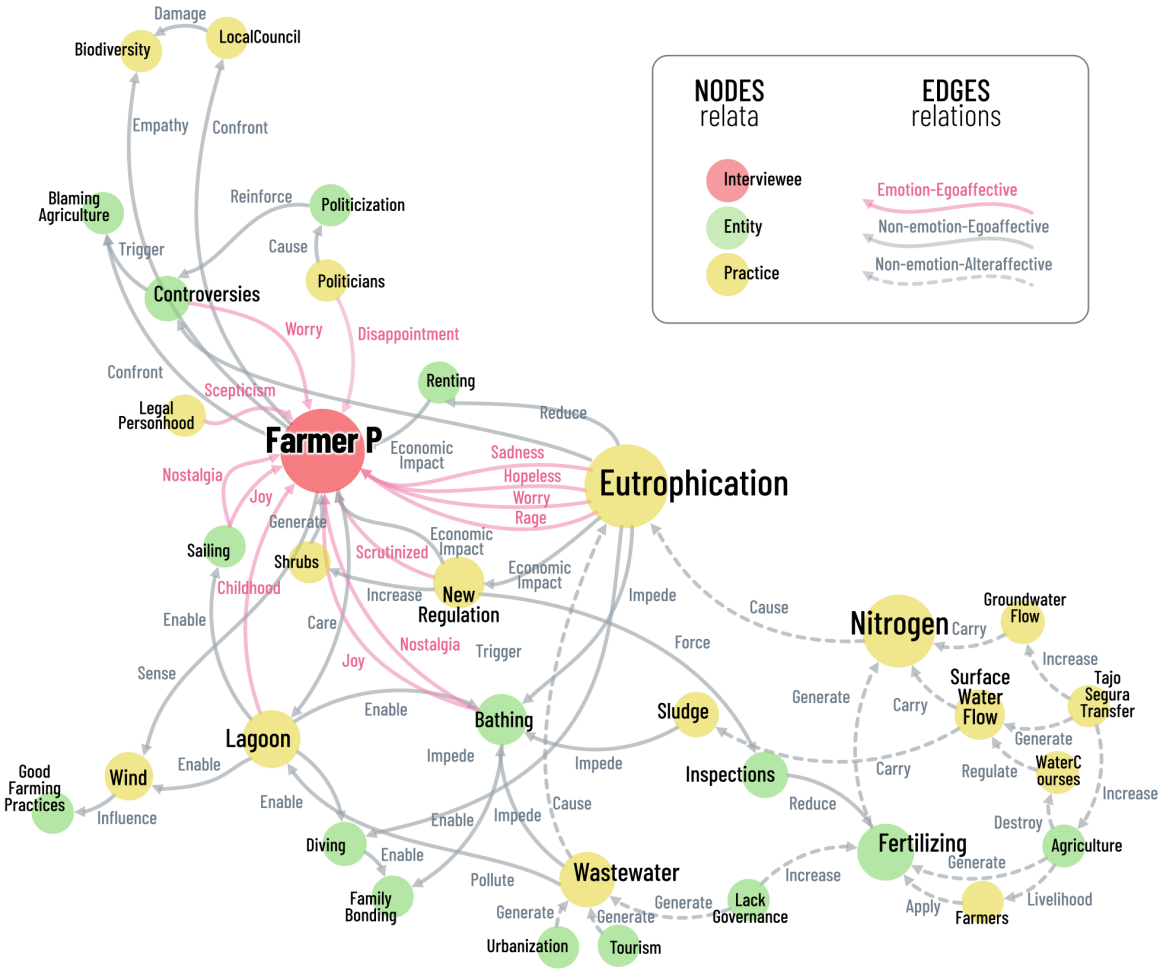


Figure 2 Farmer P's SEAA. Nodes represent the heterogeneous elements that compose the socialecological arrangement. Node size is proportional to the number of incoming relations (in-degree).

Most of his alteraffective relations run across the third region, routing agriculture's role through fertilising, ensuing nitrogen generation and the destruction of most of the ramblas. He does not deny agriculture's role: *"we have been cultivating for 40 years, using the Tajo water. That is on the aquifer, it goes to the Mar Menor through the ramblas, and the aquifer is rising"*[14]. At the same time, he feels scrutinised by new regulations that impose inspections and the planting of shrubs on farms, and he defends fertilising as part of what farming is: *"if you're a farmer, you have to fertilize"*.

Farmer P's SEAA thus holds within one person both worlds that, as we will see, divide the sea of SEAAs: the lagoon of family life and the regulated farm. For him, this division is mediated by epistemic and political controversy: *"These aren't scientific positions; they're political ones. It's more like some scientists align with one party, while others align with another, something like that.*

[14] Here Farmer P is referring to the fact that the Rambla del Albujón (Figure 1) has turned into a permanent river due to the elevation of aquifer levels with water from the Tajo-Segura transfer.

Everything is highly politicized. In one place, one party is in power; in another, a different party is in power". We return to his bridging role in Section 5.3.

5.2 When two SEAAs meet

We meet Biologist E on an evening after a major storm. As we drive to the coffee shop through the soaked Campo de Cartagena, we get a sense of the fear of flash flooding in this land. She describes her relation to the lagoon as one of becoming, *"well, I've been living in San Pedro for 23 years, so there's been a connection for 23 years"*. Over this period, she has worked as an environmental consultant, a researcher and a teacher, always in relation to the lagoon. She sails all year round, but only in summer with a lateen sail on the Mar Menor. She enjoys sharing this activity with close friends and family. The lagoon's crises fostered her environmental activism and enabled new connections and projects: *"Yes, the Mar Menor, of course, has given me all those opportunities [...], from the start to the present. From collecting my research samples to giving me the chance to work on a marine project. I mean, just think about it, a project that... (Makes a clicking sound.) It's true, I made a living from it, [...] It also allowed me to develop a volunteer program that I... Well, we've already published the first article!"*.

Farmer P and Biologist E are the two interviewees differing the most in their causal accounts of the lagoon's eutrophication (Jaccard distance 0.96 between their alteraffective networks). Bringing their SEAAs together (Figure 3) we can explore what divides and what connects them. Their alteraffective networks share five relata: agriculture, urbanisation, surface water flows (the ramblas), the Tajo-Segura transfer and the lack of governance. However, the same relata are wired into different causal stories. For Biologist E, each cause directly affects eutrophication, whose effects she follows into the lagoon's life, the damaged seagrass meadows of the benthos and the blooming algae. For Farmer P, the crux of the problem lies in the unplanned urbanisation of the area, which magnified floods and wastewater leaks to the lagoon: *"for 25 years, untreated sewage was directly dumped to the lagoon. Then they opened the treatment plant, but it wasn't dimensioned for that urban growth"*; and agriculture affects the lagoon only through a chain of fertilising, nitrogen release and the groundwater and surface flows that carry it.

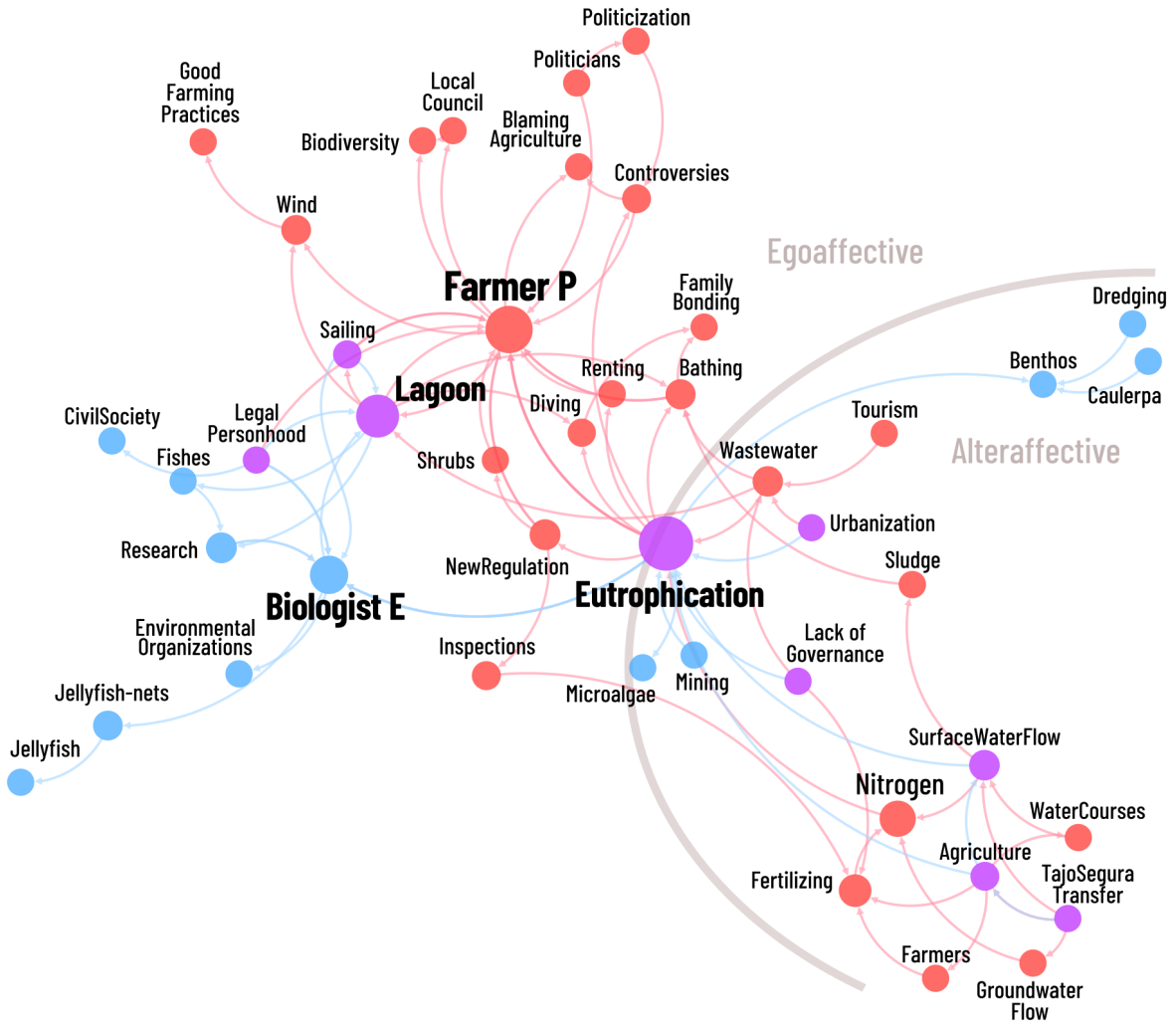


Figure 3 When two SEAAs meet: Farmer P (red) and Biologist E (blue). Nodes shared by both are coloured purple. Edge colour indicates the narrator. Node size is proportional to betweenness centrality, that is, to how often a node lies on the shortest paths connecting other nodes in the network. Betweenness picks out the nodes that join the two SEAAs, the elements through which affects pass from one narrative to the other. Egoaffective and alteraffective layers are separated by a grey line.

In their egoaffective networks, they narrate connections to the lagoon through different practices while sharing only one node: sailing. Sailing brings him joy and nostalgia in the past tense, and her pleasure in the present. Eutrophication leaves both of them with hopelessness, accompanied by worry, sadness and rage for him, and by grief and loss for her. They are emotionally divided on the legal personhood initiative: it raises scepticism in Farmer P, while Biologist E is *"absolutely thrilled"*, and finds in it happiness and hope. In sum, Farmer P and Biologist E are divided on their causal narrations but not on their core elements. They are divided on the legal personhood as potential remedy and connected through the lagoon they care for, sail on and grieve.

5.3 A SEAA of SEAAs

When aggregating the eight SEAAs in a single network (Figure 4), some of the patterns detected in the previous sections are upscaled whereas others are nuanced. The algorithm applied to the raw data spontaneously distributed nodes on a polarisation axis from top-left (farmers' pole) to bottom-right (non-farmers' pole). Nevertheless, these poles are bridged through a number of connections (purple nodes and relations). To start with, eutrophication occupies a central position in the arrangement, intertwining emotionally loaded narratives about the lagoon's changing conditions with causal narratives of what is happening on both sides. In this section, we examine this divided-yet-connected pattern through qualitative and quantitative analysis of the aggregated SEAA datasets.

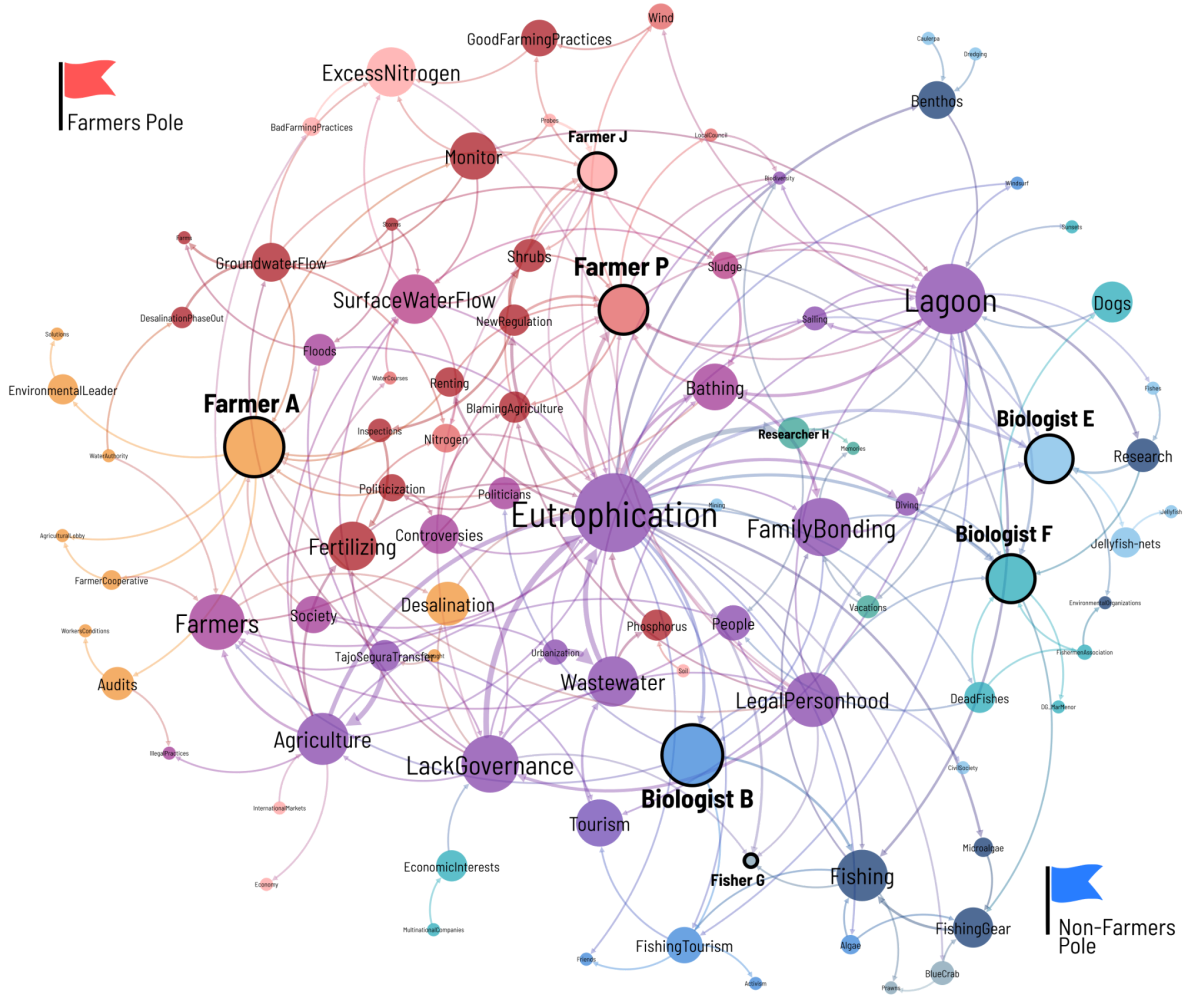


Figure 4 The Mar Menor SEAA of SEAAs. This map visualises the combined arrangement of the eight interviews' network datasets. Each interviewee is indicated by a bold black circle. Each interviewee, and the nodes and affects they name, are coloured in a shade of their pole's colour. When a node and its affects are mentioned by interviewees of different poles, its colour blends blue and red in proportion (shades of purple). Node size is proportional to betweenness centrality. The edges are aggregated to indicate the weight of those connections across the network.

When analysing the similarity of the alteraffective networks of all interviewees, we found two clusters dividing farmers and the rest (Figure SM7.1). This means that causal narratives between these two groups differ. Yet, farmers are more dissimilar in their causal narratives between themselves than the members of the other group, who, like Biologist E, mostly narrate direct connections between different drivers and eutrophication (Figure SM7.2). Farmers provide richer explanatory pictures for different water and nutrient flows in the watershed and for the diversity of *"good", "bad"* or *"illegal"* farming practices within the agricultural world, tying their sense of responsibility to their perception of other unaccounted drivers. Farmer J states this bluntly: *"Do you know how I see all this? I'm not saying this, or actually, I am saying it, out of resentment or… The way I see it, a decision has been made here that agriculture is the entire problem with the Mar Menor. But the truth is, that's not the case. Agriculture does bear responsibility for nitrogen pollution. That's it".*

The analysis of egoaffective relations depicts the same division between farmers and the rest of interviewees (Figure SM7.3). However, here the picture reverses. Farmers cohere in their perception of being publicly appointed as polluters of the lagoon while bearing the sanctions and costs of changing their practices. They all mention the new regional regulations imposing inspections, the planting of shrubs on their farms and other measures causing them an economic impact: *"I have a section of hedge that I planted but that dried up; I haven't replaced it because water always drains down to that spot, though I do need to plant it. That's something I still have to take care of. When they come to inspect, well, I certainly hope they don't penalize me (Farmer A)".* On the other hand, non-farmers narrate a wider range of consequences of eutrophication in their lives, both in terms of the new projects and connections they have developed but also in terms of the distinct sets of practices (vacations, bathing, diving, sailing, spending time at the beach, fishing) they perceive as impeded by the algae and the *"nasty"* sludge. Biologist F explains: "*I can't do that (diving) with my 8-year-old nephew because… well, it's just a shame, you can't see a thing*".

Farmers and non-farmers are therefore divided both in the factual accounts and in the affective narrations of eutrophication. But they are also connected. First and foremost, all interviewees signal lack of governance as a central driver. It is also named by five of eight interviewees in their egoaffective relations. They narrate personal consequences of the poorly planned territorial transformations of the previous decades and, for some, hope that the legal personhood will catalyse a governance shift. Several other relata cross the egoaffective divide: family bonding (five of eight interviewees), bathing (four), diving and sailing (three each) or biodiversity (one farmer and two non-farmers) (Figure SM7.4). Emotions of loss and nostalgia for losing the practices that structured family life in the past connect narrators on both sides, so do the emotions of indignation or rage for the lack of public intervention. For instance, Biologist B reflects: *"I obviously feel it as a loss. Losing the Mar Menor. I was raised here, with my family. I learn to swim, to dive, here. It's been seven fisher generations here…well, my father was the last one…(his voice slightly cracks)".* Finally, Farmer P concentrates a significant share of these crossings: he is the interviewee who shares the most relata with the

five non-farmers (8 of his 19 egoaffective relata; Figures SM7.3 and SM7.4). Farmer P's bridging is thus not a matter of agreeing on causes as Section 5.2 showed, but of the contradictory way he inhabits the lagoon as shown in Section 5.1.

The SEAA of SEAAs shows how knowing-feeling narratives align in two different small seas. However, it also reveals multiplicity within those groups and affective bridges across them.

6 Discussion and outlook

With the SEAA concept and the mapparatus we make a double contribution. On the one hand, we expand and specify the concept of affective arrangements (Slaby et al. 2019a; Slaby 2019) making it analytically operational for environmental research. On the other hand, we expand the relational turn in sustainability science (Brugnach 2017; West et al. 2020; Hertz and Mancilla Garcia 2021; Mancilla García et al. 2024) bringing a new conceptual and methodological tool for 'affectionalising' socialecological research. In this section, we position the mapparatus within a constellation of related methods that can expand it in future research and answer our empirical questions for the Mar Menor.

6.1 Methodological contributions of the mapparatus

Following an ethico-onto-epistemological position (Barad 2007), our SEAA analysis is necessarily situated in the experiences we had in the Mar Menor and in the type of methodological apparatus we crafted. Drawing on our previous mixed-methods explorations (Charli-Joseph et al. 2018; González-Mon et al. 2025), we have integrated relational approaches to interviewing and coding with a structured procedure for deriving socialecological affective networks. Our mapparatus opens an interdisciplinary pathway for qualitative and network scholars to collectively explore affective relationality in environmental problems. As a bridging methodology, the mapparatus is connected to and can be further developed by numerous other approaches. Below we discuss three of them.

First, the interviews analysed in this paper were developed in the context of a knowledge co-production process (Cabello 2024). Our relational interviewing and network analyses are inspired by the combination of ego-network and Fuzzy Cognitive Mapping developed in the context of Transformation Labs by (Charli-Joseph et al. 2018). Conventional ego-network analysis typically uses a sociometric approach to map social capital and collaborative ties strictly among human actors (the ego and human alters). Fuzzy Cognitive Mapping is commonly applied to explore the socialecological mental models, or causal framings, participants of knowledge co-production hold. Whereas our affective networks share methodological and epistemological roots with these approaches, they represent a distinct proposal grounded in the concept of SEAAs. For example, the nodes in our mappings represent a variety of elements, including human narrators, more-than-human entities and practices. The links capture affective relations, rather than strictly social or organisational

ties. By distinguishing between egoaffective and alteraffective links, we graphically represent and intertwine emotional experiences and the broader socialecological dynamics that are relationally co-constituted within a single network.

The visual richness of these networks, together with their qualitative descriptions, can be used both as a diagnostic and a deliberation tool in knowledge co-production processes. As a diagnostic tool, it can provide a deep understanding of differences and connections in the affective worlds of participants, supporting the design of co-production spaces that embrace rather than erase difference (Brugnach 2017; Özkaynak et al. 2023). As a deliberative tool, affective mapping can be used in workshops to visualise the diversity of experiences within the group and for interrogating affective patterns, helping raise awareness of the complexity of environmental problems and of participants' relations (Wilmer et al. 2025). Furthermore, the mapparatus can be applied longitudinally along co-production processes in order to trace concrete relational changes and learning (Charli-Joseph et al. 2022; Cabello 2024; Seiferth et al. 2025).

The mapparatus is also related to situational analysis (Clarke 2009; Clarke et al. 2018), which shares several theoretical lineages (Foucault, Actor-Network Theory, Haraway) and maps human and non-human elements relationally, treating mapping as an analytical practice. It differs from situational analysis in at least three respects. First, it codes relations rather than elements: each segment in the interview is formalised as an affective relation between relata, so that emotions are relations rather than items on the map. Second, while positional maps deliberately detach positions from persons, the mapparatus presented in this paper keeps narrators as relata, since SEAAs are expressed through bodies; this is what allows SEAAs to be compared and bridging positions to be identified. Third, it encodes maps as network datasets that can be aggregated and explored through quantitative metrics. The mapparatus could benefit from situational analysis's close attention to discourse and silence, for instance illuminating which affective worlds are not represented (like those of migrants sustaining the workforce in agriculture and fisheries) or which positions are not taken (like farmers not drawing a direct link between agriculture and eutrophication). Moreover, situational analysis's focus on social worlds/arena maps could place interviewees within the organised collectives the individual SEAAs only mention: unions, the irrigation community, environmental platforms.

Lastly, the mapparatus connects with multispecies ethnographies and more-than-human approaches (van Dooren et al. 2016; Dowling et al. 2017). To address the human-centric limitations of our data discussed in Section 4.5, future data collection can draw on Anna Tsing's 'arts of noticing' and multispecies methodology (Tsing 2021; Tsing et al. 2024). Specifically, fieldnotes can be operationalised not merely as records of human discourse or affect, but as "hybrid notebooks combining ethnography and natural history" (Mathews 2017). By systematically logging non-human practices and material traces, such as the seasonal proliferation of algal blooms, shifts in water opacity and oxygenation, the spatial

distribution of feral organisms (e.g., jellyfish or benthic vegetation), and the physical boundaries of agricultural run-off infrastructures, fieldnotes may serve to record the polyphonic assemblage of the lagoon (Tsing 2021). In this framework, human emotional landscapes (such as solastalgia (Albrecht et al. 2007)) are not treated as isolated human phenomena, but as affective responses embedded in and co-constituted by specific, non-human material encounters and ecological disruptions. Additionally, interdisciplinary studies of affective relationality have developed a full repertoire of qualitative methods beyond interviews to capture affects and emotions in more-than-human arrangements (Kahl, 2020), offering a rich landscape for future work.

6.2 Affective relationalities in the Mar Menor

The SEAA concept foregrounds affective experience as a crucial source of information for understanding complex environmental problems, showing how affects and emotions co-constitute the worlds we live in and narrate (Nightingale et al. 2022; Slaby and Von Scheve 2019; Slaby et al. 2025). Our analysis reveals how human subjects grow embedded in changing environments, affecting-while-being-affected by them (Cunsolo Willox et al. 2013; Jankowski et al. 2025; Strzelecka et al. 2025). This is shown in how Farmer P describes his everyday contacts with the lagoon since childhood, and in how Biologist E has grown as a person and a professional in relation to the lagoon. It is also shown in how they are affected by a multiplicity of socialecological relations in the watershed on a daily basis. For instance, farmers' irrigation practices shape groundwater levels while changes in groundwater levels might induce a change in the mood of Farmer P. Thereby, the mapparatus visualises distributed forms of agency, contributing to non-anthropocentric conceptions of more-than-human subjectivities (Roelvink and Zolkos 2015; Neimanis 2017; Braidotti 2019).

Furthermore, Farmer P's SEAA visualises the contradictory ways in which we inhabit our environments, caring for them while having a role in their deterioration (Nightingale 2013). His story is illustrative of the ambivalent roles of emotions in ecological crises beyond their too often assumed capacity to mobilise action (Neckel and Hasenfratz 2021; Schütze et al. 2022). One can grieve the lagoon's eutrophication while feeling anger against the policies in place to prevent nutrient leakage, evading one's share of responsibility as a means to cope with inner emotional conflicts or preserve collective identities (Norgaard 2006).

When assembling SEAAs, different affective worlds become entangled. Each person and community in this territory has a different experience and relational composition with the Mar Menor (tourists, environmentalists, farmers, fishers…). However, those arrangements are not isolated narratives of what the Mar Menor is. They are affectively and spatially connected, and their encounters reveal the part of the world that interviewees share, even when their experiences of that world may differ significantly. Our analysis of the SEAAs of Biologist E and Farmer P sheds light on how different causal framings relate with sharply dissimilar consequences of eutrophication in their working and social lives. However, their

SEAAs overlap when sailing in and grieving for the same sea, or highlighting the consequences of the Tajo-Segura transfer.

The eutrophic crises of the Mar Menor have not only become polarising forces but also melting pots with transformative effects over the different Mar Menor(s). This ambivalent becoming is revealed in the clusterings of the eight SEAAs rendering farmers and other participants as divided-yet-connected groups. Our exploratory analysis shows a distinct pattern of affecting-and-being-affected around the eutrophication of the lagoon. The land coheres around how it is being affected by the lagoon's eutrophication, the sea around how it explains what affects the lagoon. Shared practices that enable family bonding, a common frustration with its governance and Farmer P's paradoxical attachment to the lagoon bridge the two groups. Affective mapping thus complicates the common division between 'the land' and 'the sea' in eutrophication cases in intensive agricultural areas (Levain et al. 2020). The cleavage between farmers and environmentalists can be interpreted in terms of the different ways in which they, individually, collectively and dynamically experience this socialecological issue.

Altogether, these results speak to the emerging literatures on polarisation in environmental issues (Karakas and Mitra 2020; Chen et al. 2021; Judge et al. 2023) and on the roles of emotions and affects in contentious environmental politics (Durnová and Karell 2023; Powell 2024), offering insights that can be used in spaces aimed at bridging across divides (González-Mon et al. 2025). In the co-production process that the interviews analysed here initiated (Cabello 2024), understanding participants' affective knowledge helped demystify false facts circulating in disinformation campaigns and reframe polarising patterns.

7 Conclusion

We would like to conclude by revisiting the problem statement of environmental knowledge being reduced to purportedly objective facts disregarding the affective dimensions of socialecological crises. We have argued that one side of this problem is the lack of interdisciplinary tools capable of connecting socialecological models with qualitative information on human and more-than-human affective worlds, a gap that our mapparatus addresses. By analysing emotions enmeshed within wider socialecological affective networks in the Mar Menor, we have explored how causal framings of the eutrophication problem relate with the diverse attachments to the lagoon and its deterioration. Thereby, SEAAs and the mapparatus contribute to an affective knowing agenda in sustainability research (Nightingale et al. 2022), assuming all facts emerge from affective relations.

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