How to measure the social acceptability of alternative environmental management solutions in wetlands and other ecosystems

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RESEARCH QUESTIONS

THEORETICAL RESEARCH QUESTIONS	OPERATIONAL RESEARCH QUESTION
• What is social acceptability in the context of wetland restoration projects? • By which factors is it influenced?	• What is already known about the social acceptability assessment of wetland restoration based on previous European and international projects? • Is it possible to create an integrative assessment that merges social and natural sciences?"

Literature review

WOS + Scopus	Cordis
Selection of the international literature (English language only) under the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) Statement (Sarkis-Onofre et al., 2021). WOS query string: TITLE-ABS-KEY ((public AND acceptability) OR (social AND acceptability)) AND TITLE-ABS-KEY ((restor*) OR (restore) OR (abandon*) OR (convers*)) AND TITLE-ABS-KEY ((land AND cover*) OR (land AND use*) OR (land*) OR (landscape) OR (territor*) OR (community)) Scopus query string: (TS=((public acceptability) OR (social acceptability))) AND (TS=((restor*) OR (restore) OR (abandon*) OR (convers*))) AND (TS=((land cover*) OR (land use*) OR (land*) OR (landscape) OR (territor*) OR (community)))	Identification on the Cordis research platform (https://cordis.europa.eu/search/en) of the projects that have already experienced the assessment of social preferences on LULUCF in wetlands. Cordis query string: "wetlands" AND "social" AND "acceptability"
## Wetlands + Wetlands Ecology and Management	
Selection of relevant articles published in specialised Journals investigating the issue of wetland management. Once we identified "Wetlands" and "Wetlands Ecology and Management" as the most recognized journals (i.e., those with the highest scores according to https://www.scimagojr.com/) We used their homepage search tool to select the articles to consider	

Results of the literature review and relevance assignment

Table 1. Sources, criteria and number of references (records) resulting from the selection of the literature

Database	WOS [1]	Scopus [2]	WoS+Scopus	Specialised Journals	Cordis [3]
Total records from the query [1] [2]	170	156	326	14	76
Removed duplicate record	110		110	-	-
Selected records	170	46	216	14	57
Pertinent[4] records according to abstract and keywords	33		33	9	10
Very relevant records according to content	16		16	3	3

Social acceptability in the context of land use change

- Initially SA referred to the analysis of forest management preferences (Shindler et al., 2002; Brunson & Shindler, 2004)

- Gradual extension of the scope of application to various environments as grassland, coastal management and in general the LULUCF field. (SA) as judgement of shareability (Arnberger et al., 2022; Sutton et al., 2022; Dixon et al., 2008; Morton et al., 2010)

- In this context, SA stands for the prioritization of preferences regarding specific land use management

- Recently, SA studies included wetlands too (marshes, bogs, sloughs, and swamps) and the focus here is upon the pressing challenges threatening them

- Specific attention to the role of ecosystem services (ES) provided by preserved, altered, or restored wetlands (Gamborg, Morsing, Raulund-Rasmussen, 2019; Guo et al., 2019; Moshofsky, Gilani, Kozak, 2019; Morton et al., 2010)

- Stakeholders are often asked to express their opinions in a "relative" way. (judjements comparatively assessed).

- In this comparative process, contextual, institutional and cultural factors influence the individual's evaluation process via the formation of cognitive beliefs (Shindler, 2000)(Social influences vs. individual experiences)

- Involvement of local communities

- Legitimacy and support

- Long-term effects

- Health and well-being effects

- Factors classified as relevant is really large, ranging from individual perceptions, preferences and values, to contextual and institutional elements:

- Gupta and colleagues (2011) literature's review (300 studies analyzed)

- Numerous variables appear to influence social acceptability (trust, risk, knowledge, perceived benefits, individual differences, attitudes etc.)

- Factors are interconnected and influence each other over time

- Some factors depend highly on the specific context of the site
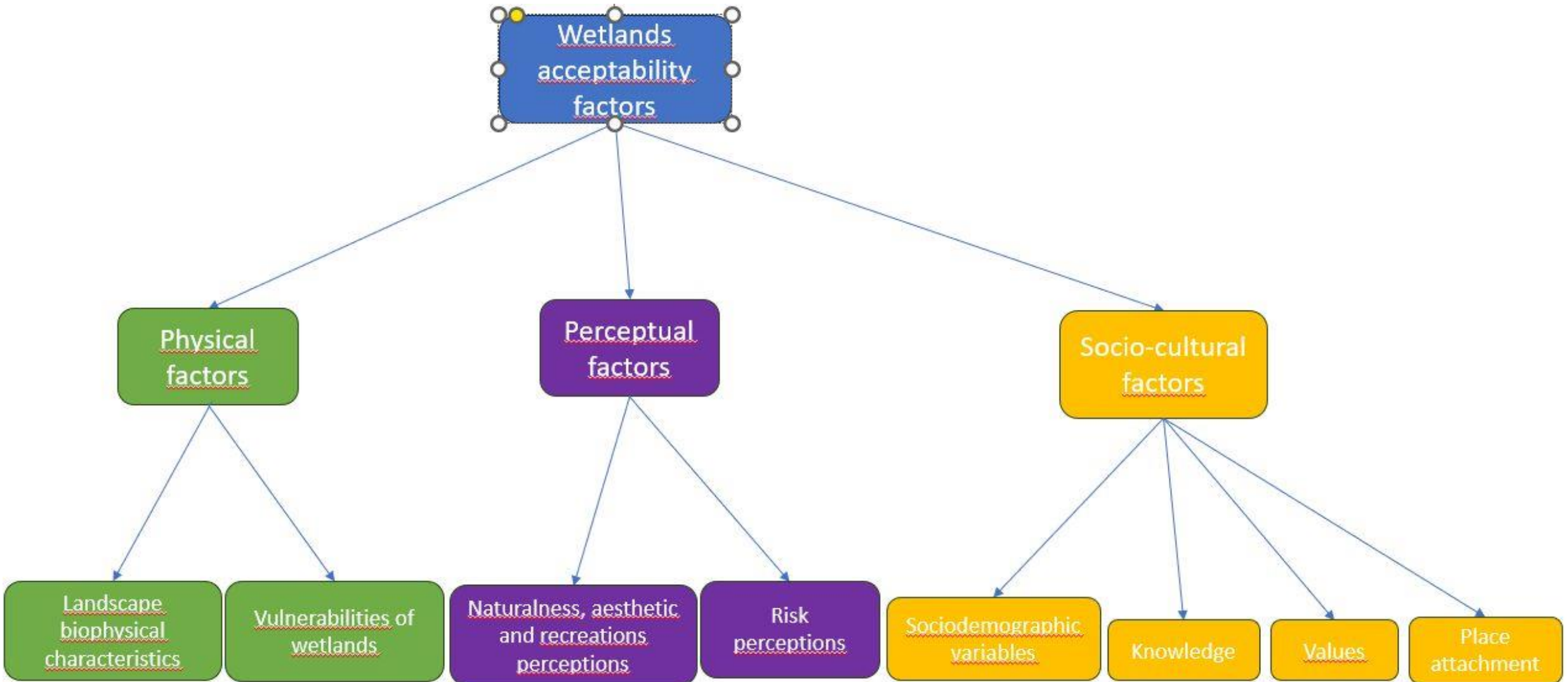
Adapted from Garcia et al. (2020)

- Factors related to the individual's social and cultural background that shape individuals' preferences

- It's not just about describing preferences but rather relating them to specific value orientations

- Why certain orientations are more common among specific stakeholder groups? correlations between individuals' preferences for particular values and their attitudes toward environmental issues. Why participation and freedom of opinion are more common among environmentalists?

Values and beliefs

- The values that most strongly influence environmental management preferences are those related to people's view of the human-nature relationship (Balance of needs)

- Ecocentrism/Anthropocentrism (Nature for Nature and Nature for People)

- Intrinsic values

- Instrumental values

- EEP scale: Environmentalists generally favour restorations measures but don't support all of them

- Nature as Culture (Lengieza et al. 2023)

- Relational values

- The alignment of value orientations within stakeholders' groups is relevant: farmers preferences, agricultural land use vs. wilderness

Socio-demographic characteristics

- Most studies focus on **sex, age, income, education, work, house-hold configuration and geographical context**

- Income, education, age (Garcia et al. 2020)

- Work, household size, sex and aesthetic values. Male-headed households and young people have a greater willingness to pay for aesthetic, social relationship and cultural heritage services (Ly et al. 2022)

- Alaira and colleagues (2022) analysed demographic associations with individuals' environmental orientation measured by the EEP scale. Women, young people, more educated individuals, higher-income persons significantly tend to be more environmentally oriented

- Income can be ambivalent: low income people often supports restoration actions if they expect to enhance well-being and income (Espaldon et al., 2016; Muzari et al., 2012)

- Urban and peri-urban residents are generally more environmentally oriented (Alaira et al., 2022). Brunson and Shindler (2004) confirm the existence of region-specific preferences in natural resource decision-making

- Acceptability judgments incorporate cognitive information and are expressed in relation to socially shared norms

- Providing information about a management problem helps establish a context for more reasoned judgments. (Wildlands fuels management practices and the role of fire) Cleavage between cognitive judgments and beliefs of an environmental issue

- The effectiveness of informational interventions on acceptability judgments proves some inconsistency in several studies (Hill and Daniel, 2007; Arnberger et al., 2022)

- … but familiarity and experience with environmental management can lead to higher acceptability ratings without necessarily altering the aesthetic preferences of the landscape.

Place attachment

- It largely depends on social integration and that greater attachment to places leads to opposition to development projects.

- Length of residence and the distance with respect to the site of restoration can have a role that is mostly context-specific but generally:

- Newcomers value differently their place attachment from longtime residents

- The distance of residence can have twofold effects

- Perceptual and psychological factors influencing stakeholders' environmental management preferences

- Naturalness, aesthetics, risk and safety

- Aesthetic preferences are influenced by evolutionary factors and may not be significantly altered by ecological information and education (Evolutionary theories) (Hill and Daniel, 2007)

- Cognitive psychology and decision sciences indicate that landscape preferences are driven by basic emotional and affective processes

- The Cultural Landscape (CL) concept (Busse et al. 2019):

- If there is a threat to conserving the current state of the CL, stakeholders will oppose it

- Restored Wetlands as aesthetically unpleasing landscape. Es: bogs, swamps, wet meadows etc. (Gobster et al., 2007; Nassauer, 2004)

- Misalignment between scientific ecological measures and stakeholders' perceptions (risk of misperception: degraded ecosystem as ecological environment)

Risk and safety perceptions

- Public perception of risk and safety significantly influences acceptability of river and wetland management actions

- Perception of risk associated with a phenomenon can be also ambivalent, depending on the point of observation (habitat vs. flood risk)(Garcia et al. 2020)

- Important concerns expressed by stakeholders: water quality, mosquito problems and general health safety

- Perceptions of flood risk and prior flood experience affect the acceptance

- Relationship between value orientation and risk perception introducing the concept of cultural risk cognition (CRC), i.e. the tendency to perceive risks and related facts in relation to personal values. (Moshofsky et al. 2019) e.i. Individualists

- Factors that consider the relationship between the elemental, structural (design) and functional characteristics of wetland landscapes and people's preferences.

- These can be categorised as landscape biophysical and functional features, like ecosystem services and disservices.

- Wetlands have a positive attraction effect on humans, but the specific configuration of biophysical elements influences stakeholders' preferences.

- Water clarity, trophic status and biodiversity, particularly the richness of bird and wildlife species contribute to the increased acceptability of wetlands.

- These considerations are strictly related to the provision of ecosystem services (ES). Particularly concerning wetlands it is known they cover a small percentage of the earth's surface provide nearly half of the global ES

- Ly et al (2022) specifically investigate the ES provided by flooded forests, classified into provisioning, regulating, supporting and cultural ecosystem services. In their case study (Asia Tonle Sap Lake floodplain), the human-nature interaction is particularly intense, and the local communities' perception and dependence on wetland ES are influenced by the interplay of socioeconomic factors, cultural characteristics, and political phenomena.

- An exhaustive list of these factors is necessarily contextual and dependent on the number and types of the provided ES. If you consider different types of wetlands, some biophysical characteristics and functions could obviously be different, but most of the functions are common.

- Ly et al. (2022) focus on the cultural services of flooded forests (cultural heritage, ecotourism, aesthetic value, spiritual and religious value, inspirational value, and social relations).

- Andrews and Russo (2022) ranked citizens' opinions on most important functions of wetlands: biodiversity conservation, water quality improvement, and habitat creation emerge. Importance varied depending on the type of stakeholder

- Vulnerability is determined by the exposure to stressors and sensitivity of the system (the external impact) and by the ability to withstand or mitigate these impacts (adaptive capacity). (Van Alphen et al. 2021)

- Some vulnerabilities affect the totality of wetlands, while others are type- and context-specific. Generally, wetlands of high natural value are at risk of being abandoned or harmed, leading to a decrease in ecosystem functioning, biodiversity, and cultural values (Busse et al., 2019).

- Climate change is considered a global problem and can cause different issues depending on the type of wetland considered.

- Consider natural climate variability and distinguish it from changes caused by human populations

- The main threat to coastal wetlands is the joint action of climate change and humans (including natural hazards such as extreme weather events, flooding, coastal erosion, saltwater intrusion and changes in wetland inundation. (Different from threats to flooded forest)

- Main problems identified at different coastal wetlands case studies sites (Zsuffa et al., 2012):

- - desiccation and territorialization

- - encroachment and disturbance

- - pollution, e.g. discharging untreated waste-waters that bring diseases, eutrophication, habitat degradation

- - provision of habitats for disease vectors

How to Assessing social acceptability of wetlands restoration actions

A) Explicit methods:

- Questionnaire-based surveys

- Environmental Economic Priority (EEP) scale, Likert scale

- Visual scenic assessment

- Descriptive statistics, logistic regression models.

B) Implicit methods (monetary and non monetary)

- Contingent Valuation (CV)

- Cost-Benefit Analysis (CBA)

- Cost-Effectiveness Analysis (CEA)

C) Qualitative content and text analysis:

- Interviews in-depth analysis

- Acceptability as a dynamic process

D) Mixed methods:

- Multicriteria Analysis

- EEP scale

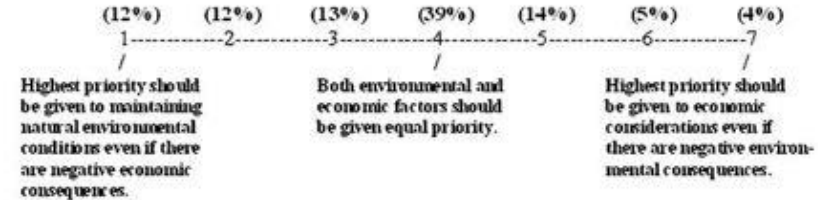(12%) (12%) (13%) (39%) (14%) (5%) (4%)
1-----------2-----------3-----------4-----------5-----------6-----------7

Highest priority should be given to maintaining natural environmental conditions even if there are negative economic consequences.

Both environmental and economic factors should be given equal priority.

Highest priority should be given to economic considerations even if there are negative environmental consequences.

Figure 2. The Environmental-Economic Priority Scale (EEP) as presented to respondents in the survey. The percentage of respondents in each category is indicated in parentheses.

From Abrams et al., 2005. pp. 498

- Likert scale

Now, we'd like to ask about your preferences using a what-if game.

What-if Game 1
Let's imagine that it is the year 2025. The Ohio state government has provided education, technical assistance and cost sharing to encourage farmers to voluntarily adopt best management practices. Although some reductions were achieved, they were not able to reach the 40% reduction target. The risk for severe harmful algal blooms is still high. The government is considering if they should introduce fines for any farmers who allow too much fertilizer runoff to enter streams and rivers that flow to Lake Erie.

17. Here are three hypothetical scenarios of fertilizer runoff reduction that education, technical assistance and cost share programs were able to achieve in 2025. For each scenario, you were asked to vote on a policy proposal to introduce fines on Ohio farmers who allow too much runoff.

Scenario 1: If the education, technical assistance and cost share programs reduced fertilizer runoff to Lake Erie by **5%** (instead of the 40% target), how much would you support state government introduce fines for farmers who allow too much agricultural runoff?

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐
Strongly oppose			Neither Oppose nor Support			Strongly Support

Fig. 2. Snapshot of the questionnaire showing the scenario used to measure support for fines.

From Alaira et al., 2022 pp.24

- Visual scenic assessment

From Arnberger et al. 2022; pp. 6

Figure 2. Images of the Lakewood Southeast Project area: (a) Open landscape in 1928, prior to

- Correlation between value orientation and age, gender, income, educ. and town size (Abrams et al., 2005)

Table 2. Overall acceptance levels and correlation between the environmental–economic priority (EEP) score[a] and approval of various forest management activities[b] under two forest conditions: overstocked and healthy

Management practice	Forest Condition % Acceptance (correlation)	
	Overstocked	Healthy
Trees thinned selectively	88 (0.134[c])	50 (0.279[c])
Prescribed fire used to control forest fuels	39 (0.176[c])	27 (0.210[c])
All forest fires extinguished	24 (0.178[c])	29 (0.186[c])
Clear-cut logging used	12 (0.251[c])	7 (0.249[c])
Nature left to take its course	8 (−0.170[c])	37 (−0.264[c])

Note. Positive correlation scores represent higher levels of support from economically oriented respondents; negative scores represent higher levels of support from environmentally oriented respondents.
[a] The EEP score ranges from 1 (environmentally-oriented) to 7 (economically oriented).
[b] Respondents were asked to indicate what practices from a supplied list were acceptable under different forest conditions.
[c] Significant at $P < 0.01$

	Pearson's R
Gender (M = 0, F = 1)	−0.097[b]
Age	0.155[c]
Size of town (from rural to city of >500,000)	−0.235[c]
Education level (from some high school to graduate/professional degree)	−0.180[c]
Income	−0.098[b]

EEP, environmental or economic priorities
[a] Scale for the dependent variable (EEP scale) ranges from 1 (environmentally-oriented) to 7 (economically oriented).
[b] significant at $P < 0.05$
[c] significant at $P < 0.01$

From Abrams et al., 2005, pp.14-15

- Contingent Evaluation to wetlands functions and WTP

- Cost Benefit Analysis (CBA)

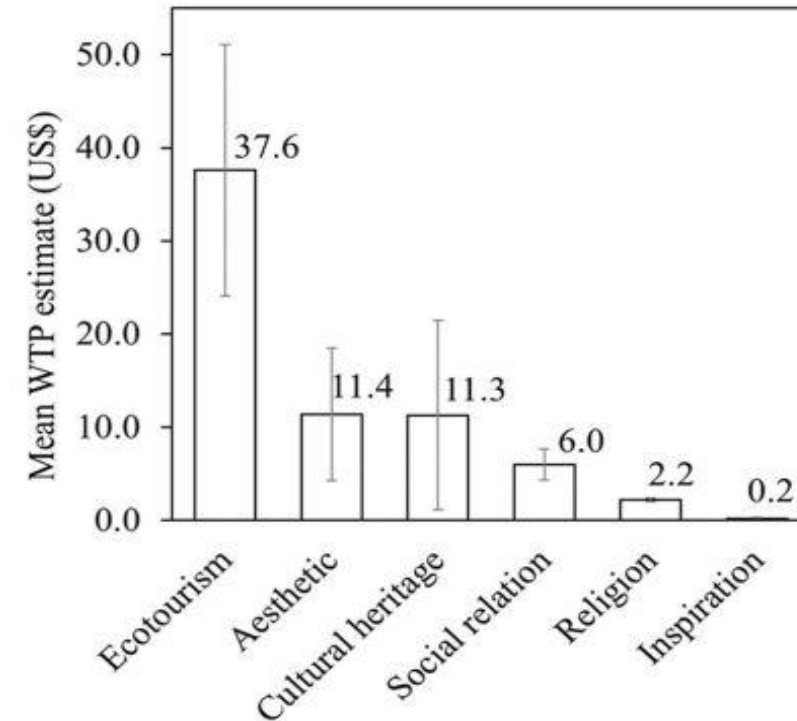- Cost-Effectiveness Analysis (CEA)

Fig. 2 Estimate of mean WTP for CS per household per year. The error bars denote 95% confidence

From Ly et al., 2022

C) Qualitative content and text analysis:

- Deconstructing stakeholders' discourse and action

- Interviews and in-depth analysis

- Coding values, actions and attitudes from obtained texts and divided them in cathegories

- Degrees of acceptability
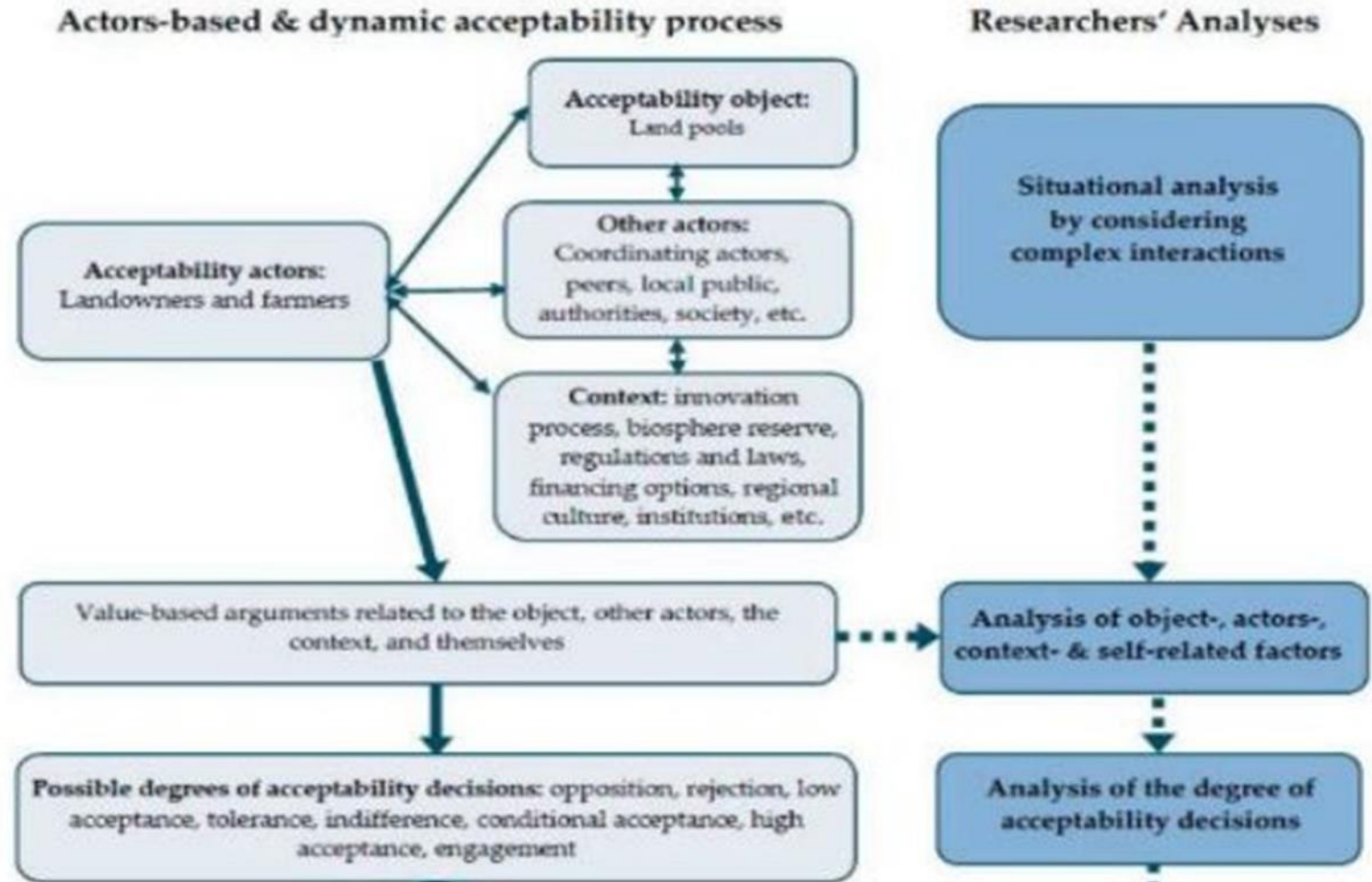
From Busse et al., 2019 p.4

D) Mixed methods: Multi-criteria Analysis

- Analysis of stakeholder preferences with economic, social and environmental evaluations

- 5 steps hierarchical MCA:

1. Define site context

2. Weight the criteria with decision makers

3. Assess the impact of alternative options on the criteria

4. Normalise the values

5. Evaluate the score of each option and identify best option
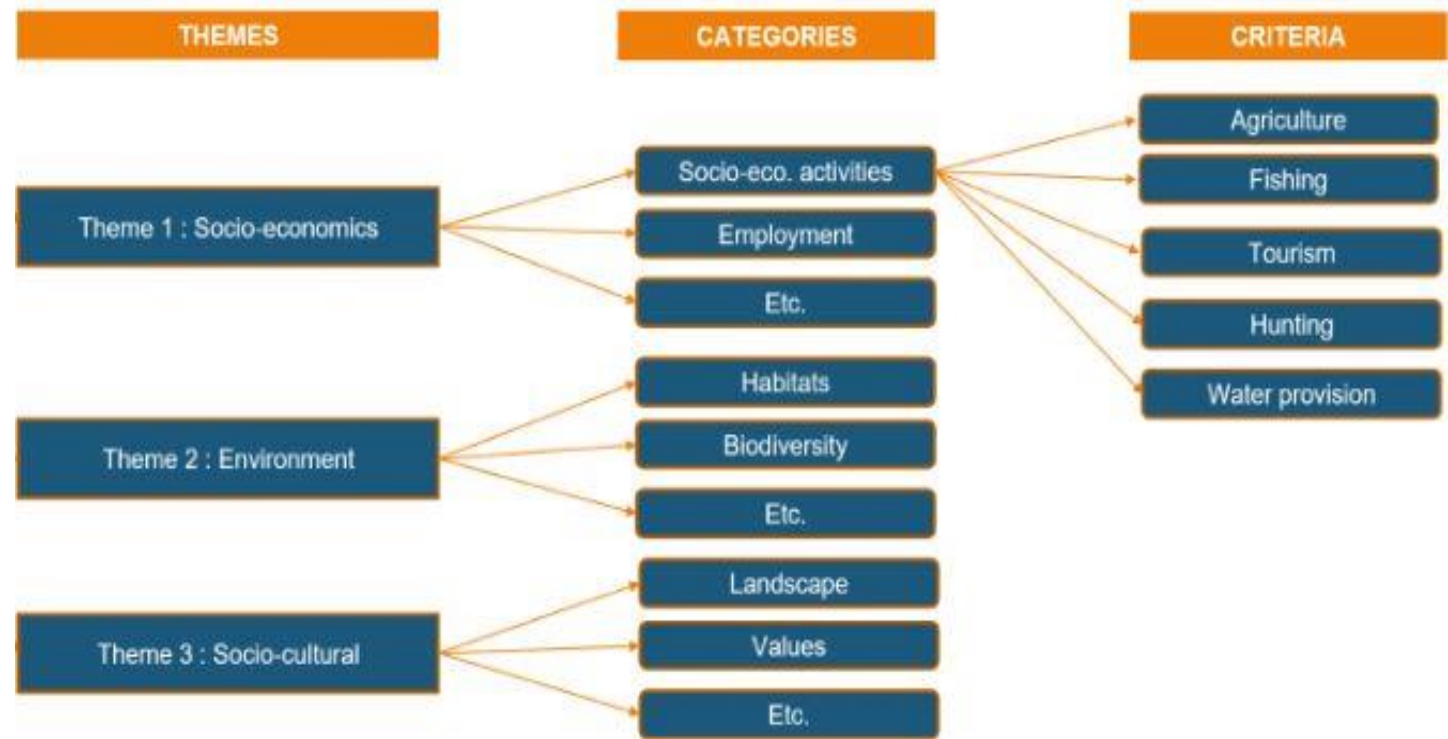
Graph elaborated under the guidance of Clementine Anglada, Lisa Sella, Manuel Lago, Francesca Rota (WP5 RESTORE4CS)

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Thank you for your attention