Participatory MCDA workshop to involve stakeholders in the remediation of a NORM site.

Experience from the phosphogypsum ponds in Huelva, Spain.

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Background

- WP3 of TERRITORIES project is aimed at analysing the decision-making processes in long-lasting radiological exposure situations, taking into account stakeholder concerns, preferences and needs.

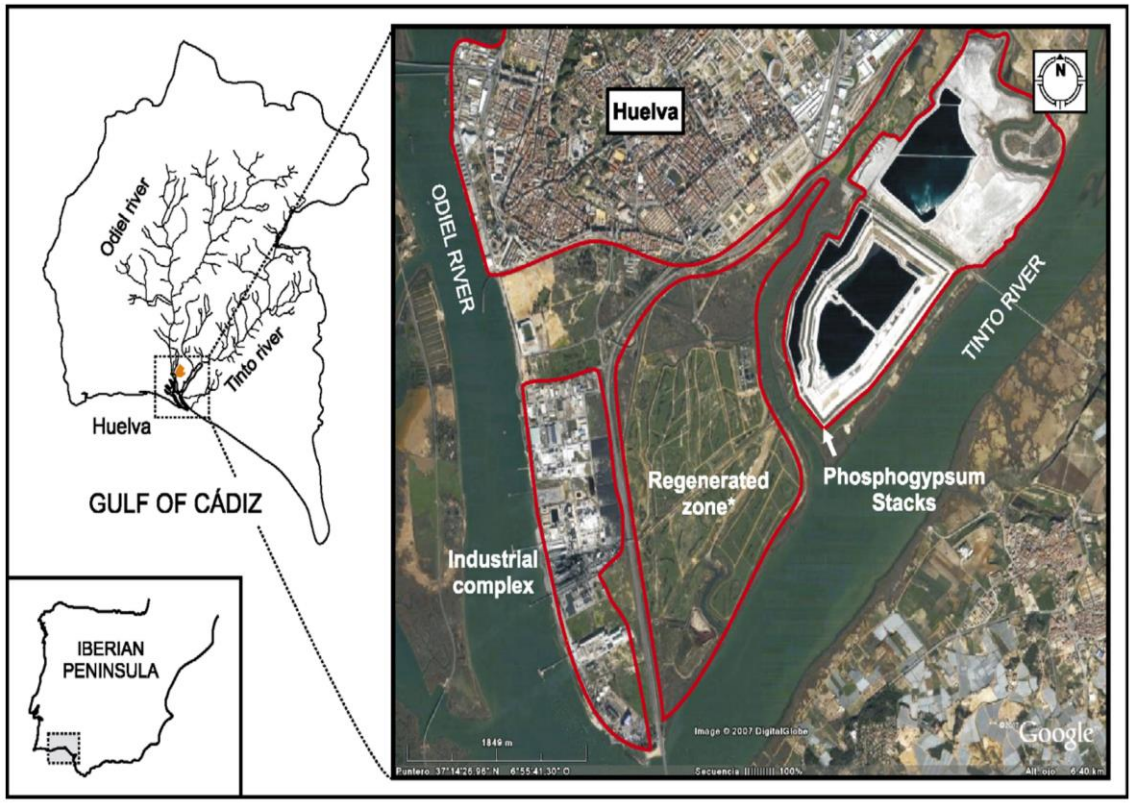
Theoretical background

- Long-lasting NORM contaminated sites and remediation processes often generate public concern and social controversy. It is assumed that involving a wide range of stakeholders in the remediation process can modulate these potential negative social effects (Booth, 2015).

- In contaminated land remediation, different authors have argued for going beyond the prevention of unacceptable risks to human and environmental health as the unique decision criterion, and basing the decision-making in the sustainability framework (Bardos et al., 2011; Murray, Hugo Seymour, Rogut, & Zechowska, 2008).

Source: Huelva24.com, 2018

Case setting



Location map of the phosphogypsum ponds and Huelva (Source: Pérez-López, Álvarez-Valero, & Nieto, 2007)

The Phosphogypsum ponds in Huelva (south-west, Spain): cover an area of approximately 1200 hectares, and it is estimated that the total amount accumulated during 42 years of operation (1968-2010) is 120 million tons.
From 2002, environmental NGOs and other associations started to mobilise against the waste.

Demonstrations against phosphogypsum ponds (Source: Huelvaya.es, 2016)

Research objectives

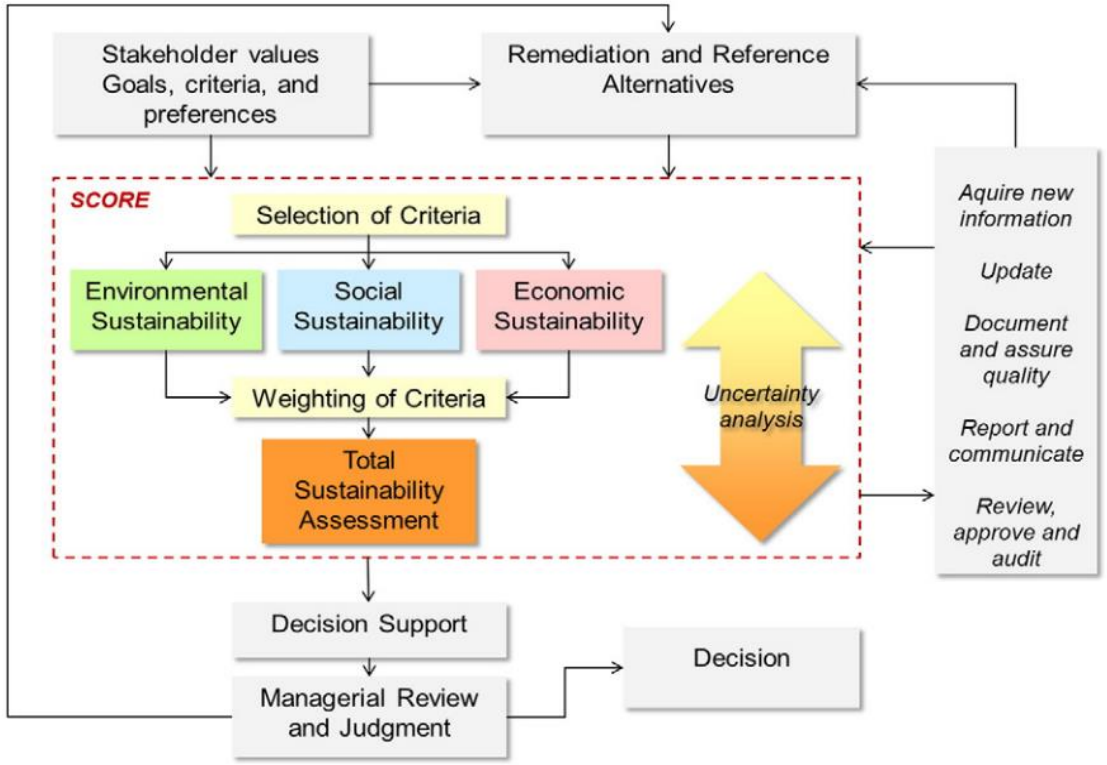
- **General goal:** To improve the decision-making about remediation in NORM contaminated sites including stakeholders' multiple values and preferences.

- **Specific objectives:**
  - To weight the importance of different criteria to consider when deciding about remediation.
  - To assess different prototypical remediation alternatives.

Method

One-day workshop in Huelva (6th March 2019).

Participatory Multi-Criteria Decision Analysis method was applied to incorporate the variety of stakeholders' views and values in the selection and weighting of the criteria for the decision making about remediation.



Multi-criteria decision analysis approach (Source: Rosén et al., 2015)

Selection of criteria

Technical criteria 
Radiological risk
Chemical risk
Waste
Administrative difficulty
Technical viability
Duration

Environmental criteria 
Soil
Underground water
Superficial water
Flora and fauna
Air quality
Non-renewable natural resources
Non-recyclable waste

Economic criteria 
Direct costs
Employment
Externalities

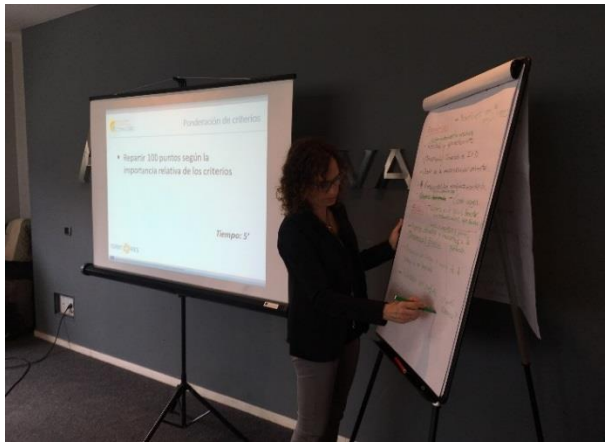
Social criteria 
Land use
Health and safety
Impact in the neighbourhood
Equity / justice
Acceptance of the community
Community involvement

Top-down approach: list derived from a literature review ("participatory MCDA" AND "(land remediation OR environmental problems")

Antunes et al., 2011; Joyce, Goronovski, Tkaczyk, & Björklund, 2017; Langemeyer, Palomo, Baraibar, & Gómez-Baggethun, 2018; Nisbet & Mercer, 2004; Oughton, Forsberg, Bay, Kaiser, & Howard, 2004; Posthumus, Hewett, Morris, & Quinn, 2008; Rosén et al., 2015

Sample

- 48 stakeholders were invited to the event.
- A sample of 14 attended it.



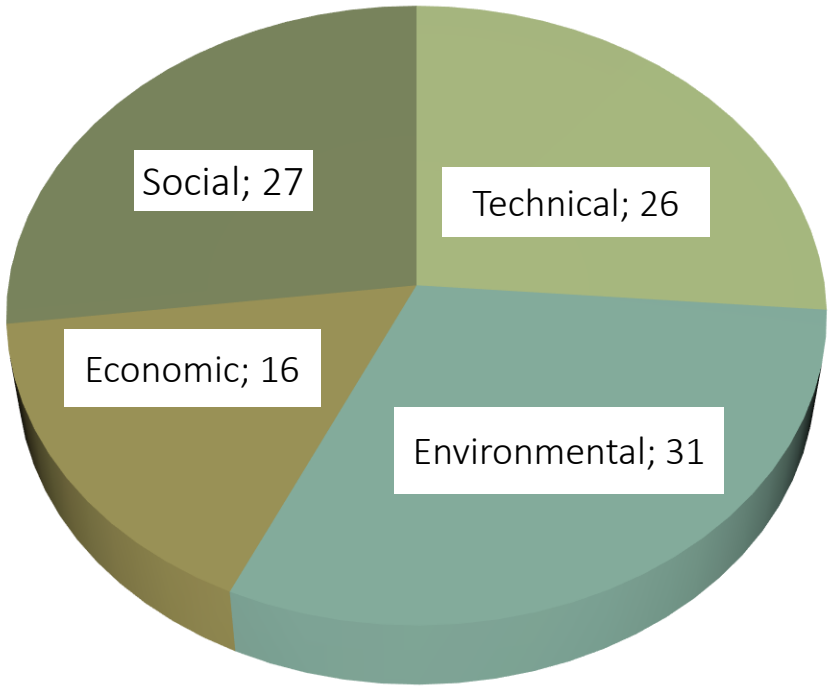
Workshop session (Source: CIEMAT)

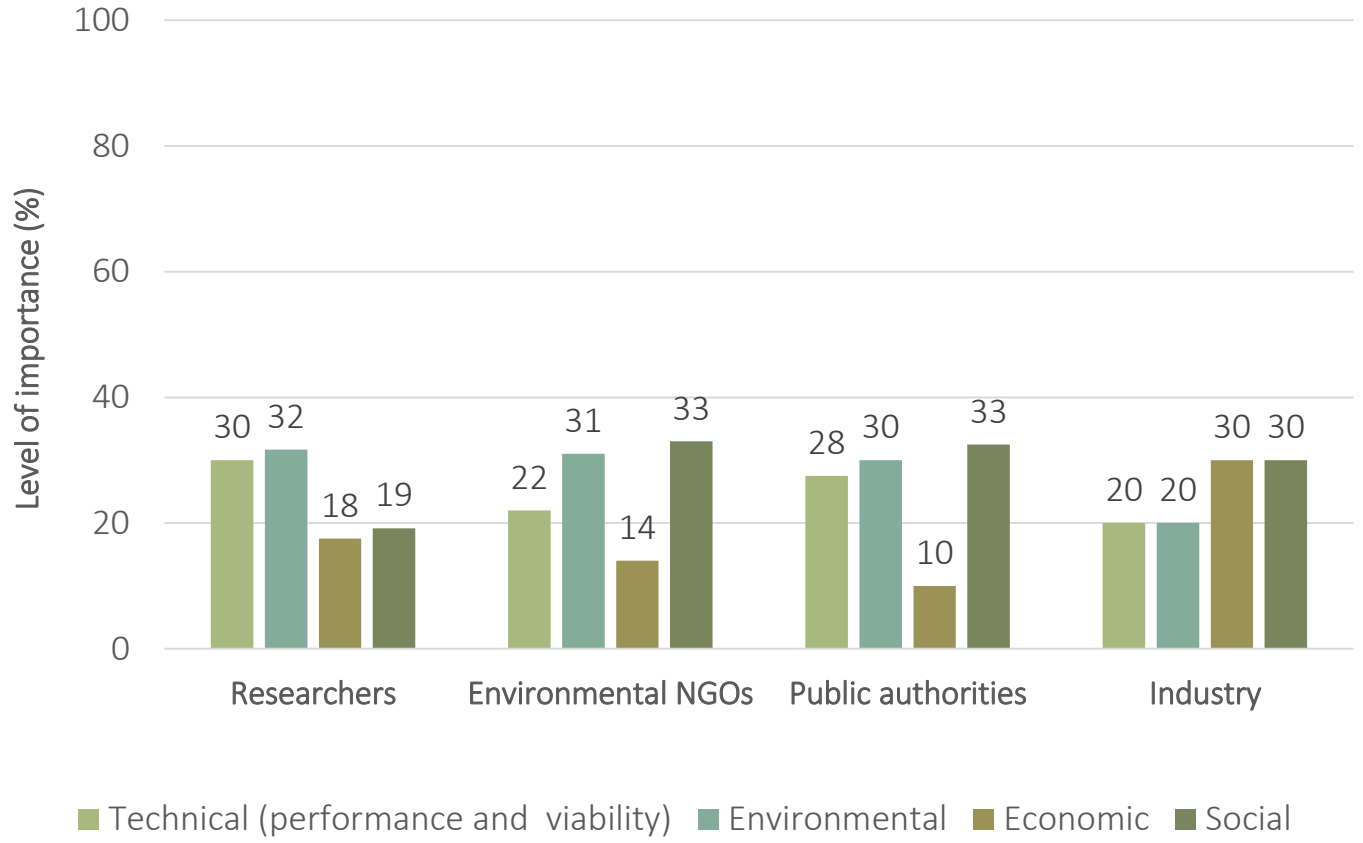
Stakeholders' group	N
Industry	1
Authorities (local and regional)	2
Researchers	7
Environmental NGOs	4
TOTAL	14

After the workshop, the discussion was transcribed and the questionnaires were processed. Both quantitative and qualitative analysis were carried out.

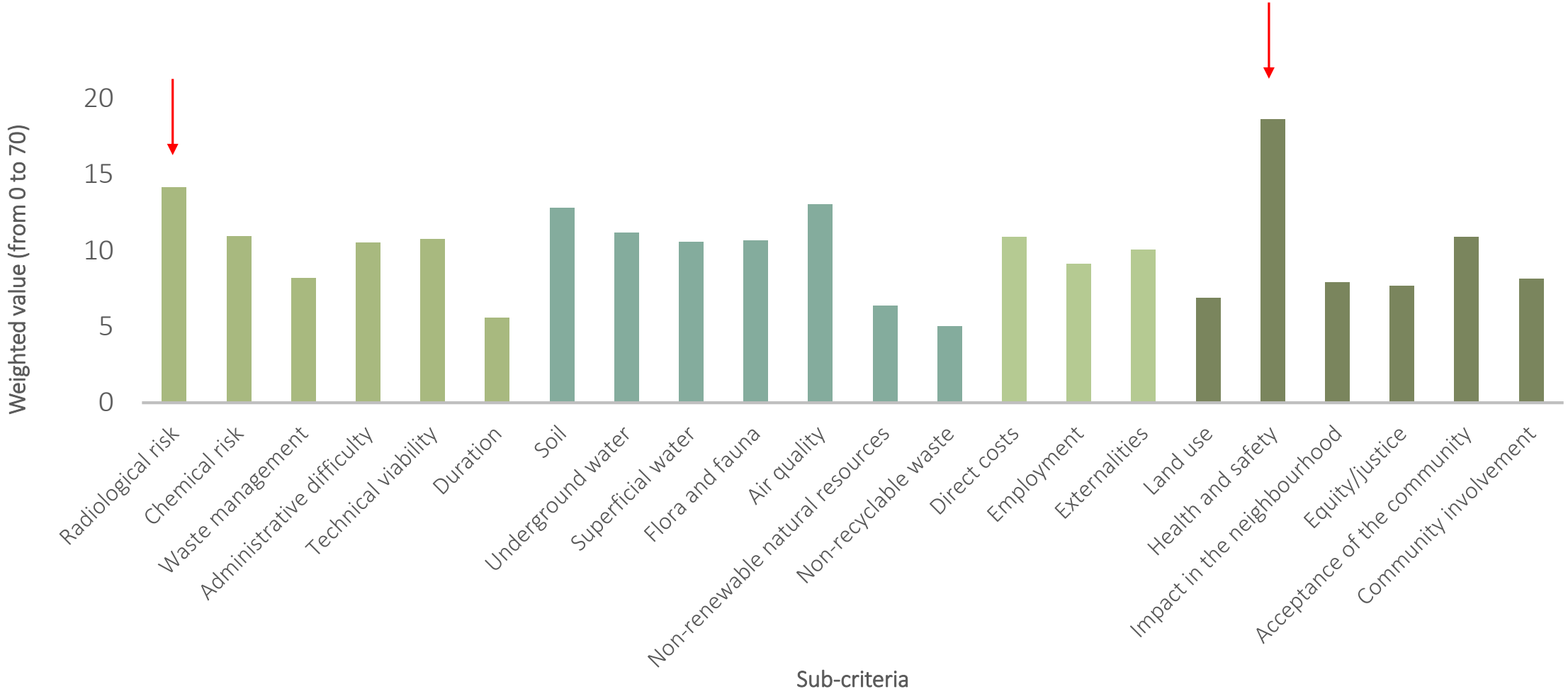
Findings

Weighting of criteria





Weighting of sub-criteria



Proposed remediation options

Three alternative remediation options have been assessed:

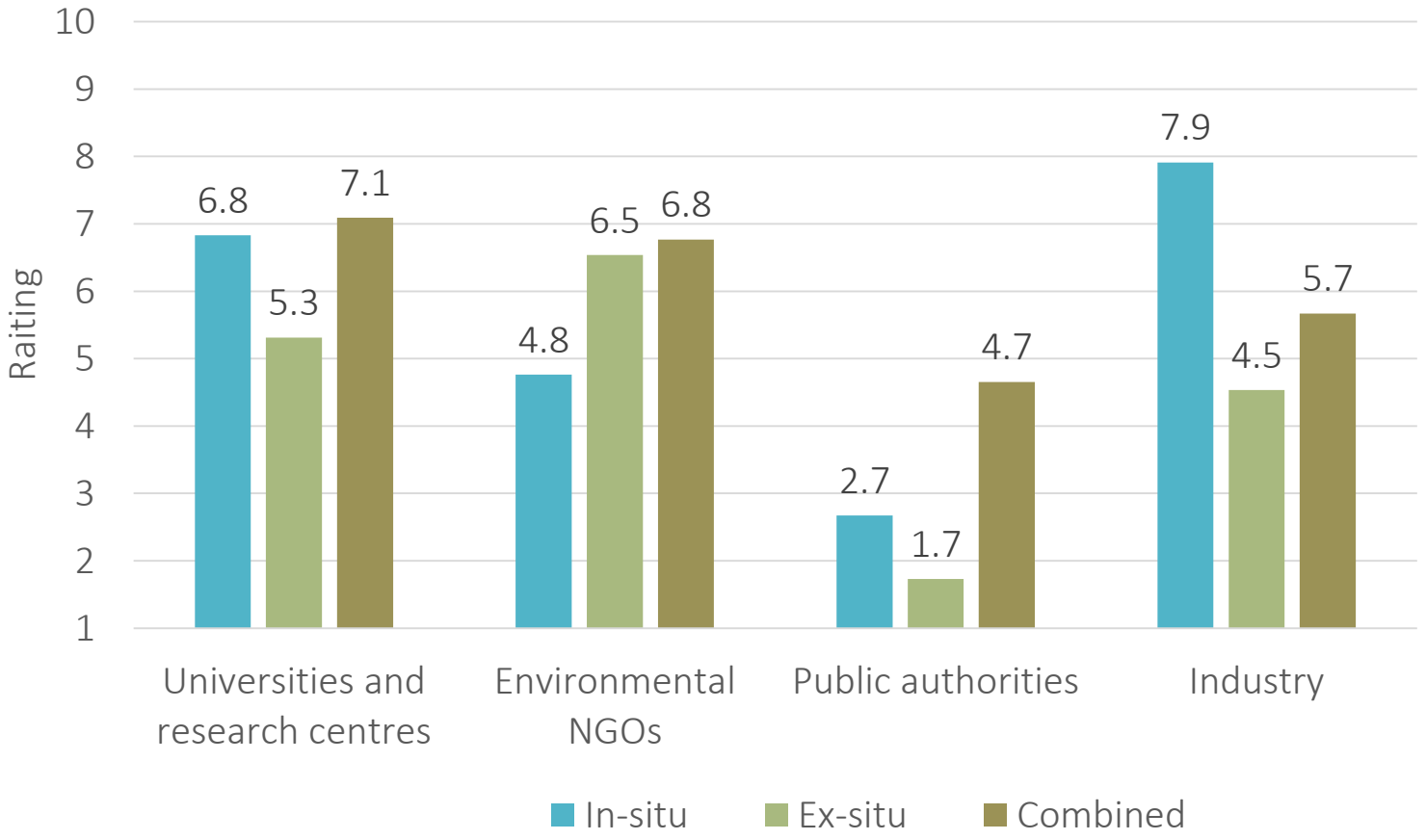
In situ: Conditioning at the same site.

Ex situ: Removal and transport of the material to another location.

Combined: Combination of in-situ and ex-situ options, together with the possible reuse of phosphogypsum as commercial material.

Evaluation of remediation options

Remediation option	Average
In-situ	5.8
Ex-situ	5.4
Combined	6.7



Conclusions

- Stakeholders highlighted the importance of environmental aspects together with social and technical ones when making a decision on the remediation strategy of a NORM site.
- Health and safety of the affected population and workers together with radiological risk were, according to participants, the most relevant criteria to take into account when evaluating a potential remediation option.
- Other aspects were considered important: air and soil quality, chemical risk, administrative difficulties, acceptance of the community, etc.
- Combined remediation strategy was assessed as the best of the proposed options.
- Differences among stakeholders' groups were not as big as expected before the event (considering that there met together people with really opposite views!).

Limitations

- Findings represent the views of those involved and cannot be generalized neither to all stakeholders of the Huelva site nor to all NORM contaminated sites.
- We did not achieve to involve decision-makers.

Implications

1. Need to consider different criteria when taking the decision about remediation.
2. Important role of communication: *Stakeholders highlighted the need to adequately explain the proposed approach of the remediation, its risks, benefits, and impacts in a transparent manner. As suggested by Booth (2015) this could be crucial to obtain support and trust in the decision-making.*
3. Need for more dialogue and public participation: *The use of participatory MCDA could be a good tool to enhance the involvement process around the remediation of NORM sites by eliciting a dialogue and including relevant stakeholders' views and preferences in the decision-making process.*

The workshop serve as a communication forum and allowed to collect stakeholders' views and concerns, which encourage cooperation and understanding between different interested parties

Main references

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Thank you for your attention!

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