WG3 workshop report

A METHODOLOGY WORKSHOP ON VALUATION TECHNIQUES FOR SALT-AFFECTED LANDS

COST Action CA22144 (SUSTAIN), Working Group 3. Alberese, Tuscany, Italy, 26 and 27 March 2025.

Participants of the workshop in Alberese, March 2025.

1. Introduction

In March 2025, members of COST Action CA22144 (SUSTAIN) met in Alberese, Italy, for a workshop on the valuation of ecosystem services in salt-affected lands. In the SUSTAIN Memorandum of Understanding this activity is Deliverable D3.3, "A methodology workshop on valuation techniques for salt-affected lands", and it was organised by Working Group 3, whose theme is the total value of saline ecosystems and landscapes.

The workshop was developed and facilitated by Kate Negacz and Zenepe Dafku, with contributions on GIS and spatial analysis from Federico Martellozzo. Nadia Bazihizina coordinated the local organisation in Alberese.

It brought together Early Career Investigators, PhD students and researchers, not only from the SUSTAIN COST Action but also from other projects, networks and institutions, with backgrounds ranging from soil, plant and environmental sciences to economics and geography. Local stakeholders, including farmers, also joined on the second day, during the field visit and the "Farmers' café". The idea was to move from concept to practice, combining short talks, real case studies brought by the participants, group work, poster presentations and a field session.

Programme

The workshop followed the agenda below:

1. Introduction and getting to know each other
2. Ecosystem services: a recap
3. Valuation of ecosystem services
4. Interactive exercise
5. Results presentation
6. Way forward

The workshop in session at the venue in Alberese.

2. Objectives and intended outcomes

The workshop had three learning objectives. By the end of the session, participants would be able to understand the concept of ecosystem services and how it applies to salt-affected lands; to apply valuation techniques to saline environments; and to think critically about the strengths and limits of the different techniques.

Three concrete outputs were planned: a shared list of the ecosystem services present in salt-affected lands; an overview (a first step towards a meta-analysis) of the valuation techniques used in different types of land; and the basis for a possible joint article among interested participants.

3. Ecosystem services in salt-affected lands

The first part revisited the concept of ecosystem services and the frameworks most useful for the Action. The Millennium Ecosystem Assessment (MEA, 2005) distinguishes provisioning, regulating, supporting and cultural services. The Common International Classification of Ecosystem Services (CICES, 2018) reorganises them into provisioning, regulation and maintenance, and cultural services, in a form designed for accounting. The IPBES notion of Nature's Contributions to People (NCP) adds a complementary view, with material, regulating and non-material contributions, and makes room for cultural and relational values.

The group then translated these frameworks to saline settings. In salt-affected environments, provisioning services include the yields from salt-tolerant crops and from aquaculture. Regulating services include erosion control by salt-tolerant vegetation and biodiversity conservation, which in turn supports nutrient cycling and pest regulation. Cultural services include ecotourism, heritage and local products, and supporting services include soil formation and nutrient and water cycling. Seen this way, salt-affected land stops being simply "degraded" ground and becomes a multifunctional system that delivers real, measurable benefits to society.

4. Valuation of ecosystem services

The valuation part introduced the Total Economic Value framework, which separates use values (direct use such as crops, livestock and fisheries, and indirect use such as pollination, pest control and water cycling) from non-use values (existence and bequest values, which matter especially for cultural services and for the landscape itself). Because each method captures a different part of this value, it helped to fix the vocabulary first.

Participants then went through the main families of methods and when each is appropriate:

- **Direct market valuation:** market prices, adjusted market prices, resource-rent and production-function approaches, used where a service is traded or has a close market equivalent.
- **Indirect (revealed-preference) methods:** travel cost and hedonic pricing, which infer value from observed behaviour.
- **Non-market (stated-preference) methods:** contingent valuation and choice modelling, which elicit willingness to pay or to accept for services that are not traded.
- **Cost-based methods:** replacement cost, restoration cost, damage cost avoided, mitigation and substitute cost.
- **Deliberative and multi-criteria approaches:** group deliberation (for example the Delphi method) and multi-criteria analysis, where expert and stakeholder judgement is central.
- **Benefit or value transfer:** reusing existing value estimates for a new site, where primary valuation is not feasible.

The discussion focused on the trade-offs: how much data and time each method needs, how easily results can be transferred, and, for benefit transfer in particular, the risk of error when estimates are moved between very different regions. The synthesis of valuation methods in the materials (after Koetse and colleagues) and worked examples for saline systems (Negacz and Vellinga, 2021) served as references.

5. Interactive exercise

The core of the workshop was a rotating group exercise in a "world café" format. Participants worked in small groups and moved between tables, so that ideas built up and everyone took part in each topic. The discussion was grounded in real evidence, because each participant had brought a scientific article or case study to work from.

Participants working in groups during the interactive exercise.

Four questions guided the work:

- **1. Ecosystem services.** What ecosystem services does your salt-affected land provide (provisioning, regulating, cultural or supporting), and which do you think is most important, and why?
- **2. Valuation method used.** What valuation method does your article present? Is it direct, indirect or non-market, and which values does it capture?
- **3. Best-suited method.** Which method is best suited to salt-affected lands, and what criteria would you use to choose it?
- **4. Application.** How could you use valuation in your next project or study? What ideas do you have, and what would you need to start?

The case studies showed how wide the field is. They came from very different places and used very different methods: geostatistical mapping of soil salinity and boron toxicity in Central Anatolia, Turkey (semivariogram modelling and kriging, together with remote sensing and machine learning); salt-affected soils in Ciechocinek, Poland; and further work from Italy, Portugal, the Netherlands and elsewhere, from spatial and biophysical assessment to economic analysis of salinity-related land degradation. The lesson was clear: the right method depends on the service, on the data available and on the decision the valuation is meant to support.

Recording ideas and preparing the group posters.

Group outputs

From these discussions, the groups produced posters that listed the ecosystem services of salt-affected landscapes across the four categories and linked them to possible valuation methods. The services highlighted included:

- agricultural production and other provisioning services;
- climate, water-quality and erosion regulation;
- recreation, heritage and ecotourism (cultural services);
- pollination, nutrient cycling, soil formation and other supporting functions.

Groups presenting their posters and key ideas in the plenary.

On methods, participants compared monetary, non-monetary, participatory and spatial approaches. Every group reached the same conclusion: no single method fits all saline landscapes. In most cases a combination is needed, using biophysical assessment and GIS to describe the

resource, economic valuation to express benefits and trade-offs, and stakeholder-based or deliberative methods to capture values that markets do not.

6. Assessment and valuation

One of the most useful conclusions of the workshop was the clear separation between assessment and valuation, two steps that are often mixed up. Assessment describes the physical reality: remote sensing, soil and water analysis and spatial mapping tell us the condition and distribution of salinity across a landscape. Valuation is the next step: it links those conditions to ecosystem services, economic impacts, stakeholder preferences and, in the end, benefits to society. Assessment tells us what is there and where; valuation tells us what it is worth, to whom, and why it matters for decisions. This distinction framed the second day.

7. Outputs of the workshop

The workshop produced several concrete outputs:

- **A list of ecosystem services of salt-affected lands,** across the four categories, captured on the group posters.
- **An overview of valuation methods,** matched to services and to different contexts, compiled through a shared case-study template (study focus, ecosystem services, valuation method, geographic region, key findings). This is the starting point for the D3.4 meta-analysis.
- **A collection of case studies,** the articles and presentations brought by participants, covering several countries and methods.
- **The basis for a joint article** on the valuation of ecosystem services in salt-affected landscapes (to be confirmed).
- **Teaching and dissemination material,** presentations, the case-study template, posters, field protocols and photographs.

9. Contribution to WG3 deliverables and next steps

The workshop is the main activity for Deliverable D3.3. It also feeds other outputs of the Action: D3.4, the meta-analysis on the economic potential of salt-affected lands, to which the case studies and methods contribute directly; D3.5, the synthesis of ecological and socio-economic knowledge, supported by the assessment and valuation framing; and D6.6, the SUSTAIN teaching materials, for which the presentations, templates, posters and field protocols are ready to use.

As a next step, interested participants will bring the collected services and studies together into a structured overview and look into a co-authored article. The presentations, templates, posters, field data and photographs will support the continuing work of WG3.