A glimpse into NIKU's projects involving cultural heritage on Svalbard

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Norwegian Institute for Cultural Heritage Research

CULTCOAST: Cultural Heritage Sites in Coastal Areas. Monitor, Manage and Preserve Sites and Landscapes under Climate Change and Development Pressure

April 2019-March 2023. Research project NFR MILJØFORSK/ RCN environmental research, Project Number: 294314

- **Vibeke Vandrup Martens, NIKU. Researcher, PhD, geoarchaeology and medieval archaeology, environmental deposit monitoring, climate change and heritage.**
- **Tom Dawson, University of St Andrews, Scotland, UK . Researcher, PhD, archaeology, climate change adaptation, local involvement, citizen science.**
- **Anne-Cathrine Flyen, NIKU. Researcher, architecture, preservation and degradation studies, Svalbard.**
- **Cecilie Flyen, SINTEF Community/ NIKU . Researcher, architecture, climate change adaptation, local involvement, citizen science.**
- **Hans Renssen, University of South-East Norway (USN). Professor, PhD, quaternary geology, climate change.**
- **Knut Stalsberg, Norway's Geological Survey (NGU). Researcher, PhD, geology, geo hazards.**
- **Lena Rubensdotter, NGU. Researcher, PhD, geographer, geo hazards.**
- **Ionuț Cristi (Cris) Nicu, NIKU . Researcher, PhD, geographer, geo hazards, GIS.**


Vibeke


Tom


Anne-Cathrine


Cecilie


Hans


Knut


Lena


Cris

CULTCOAST

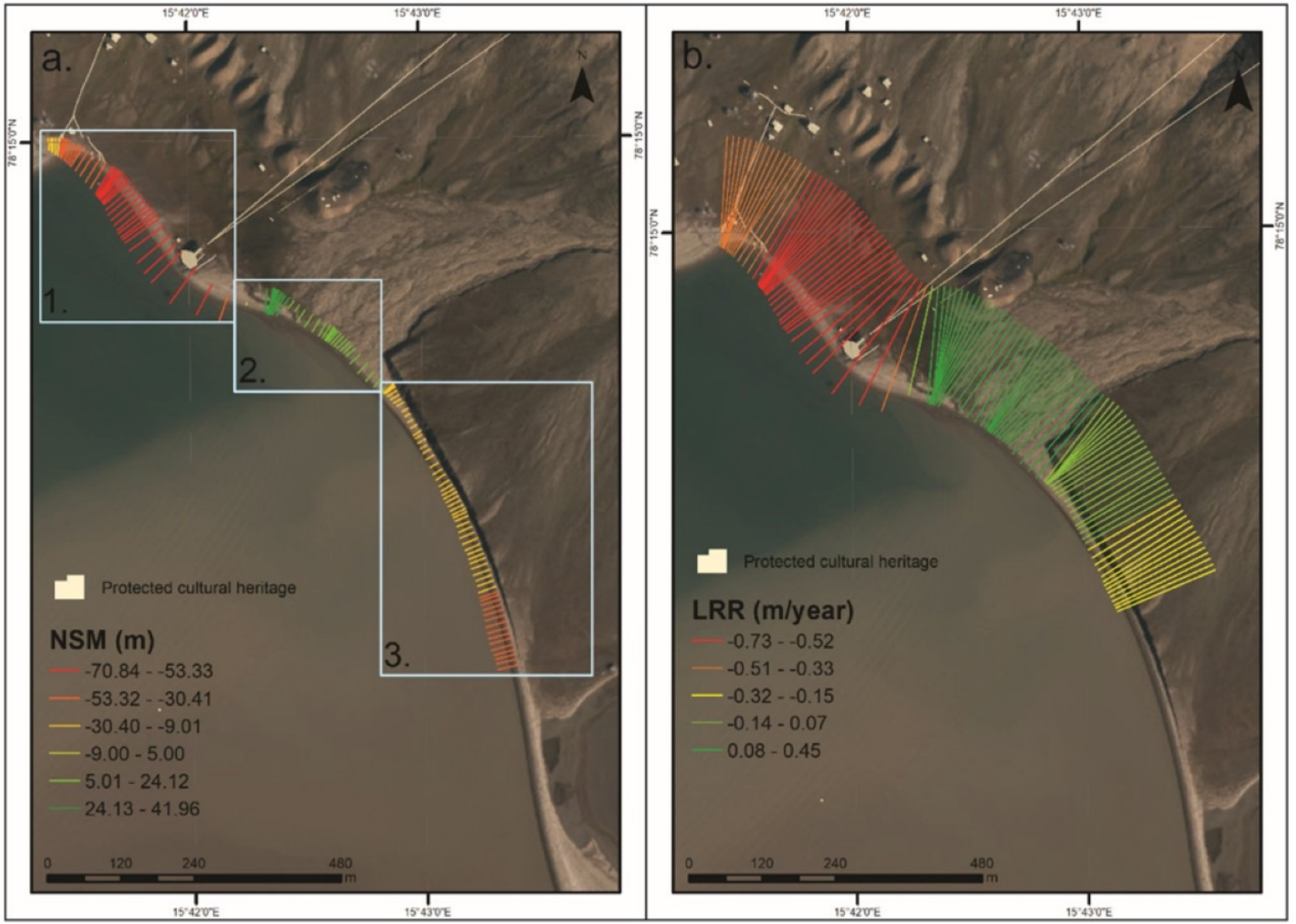
DSAS analysis (DSAS=Digital Shoreline Analysis System), based on:

- rectified old maps,
- the official orthophoto
- Drone data
- Calculations of change
- EPR = end point rate of change (m/yr)
- SCE = Shoreline change in total in m

Coastal stability derived from Net Shoreline Movement analysis (in m)

Linear Regression Rate parameter expressed in m/year.

(Nicu et al. 2020)



Forskningsrådet

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NORGES GEOLOGISKE UNDERSØKELSE - NGU -

USN

SINTEF

University of St Andrews

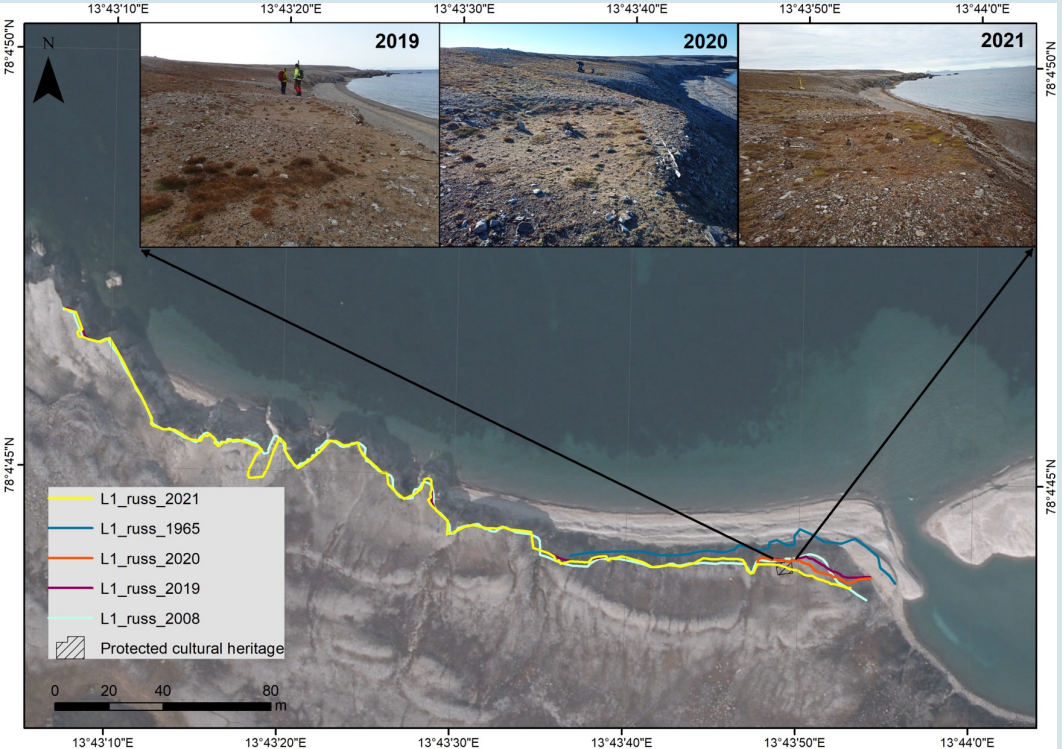
Mitigation measures taken in 2022 by the local authorities

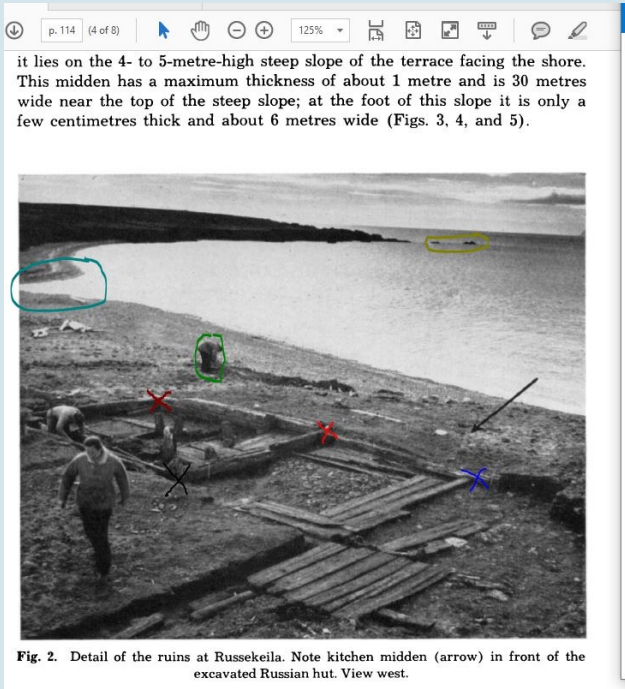
GEOCULT

Project participants: NIKU and NGU (2020-2021)

Funding from Fram Centre, add-on of CULTCOAST project, with the following aims:

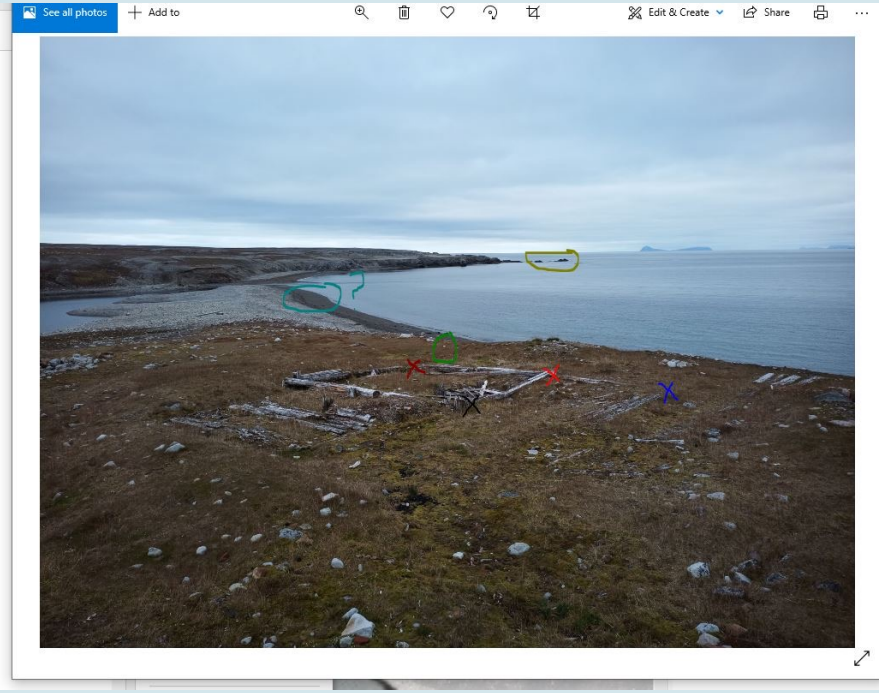
- support in maintaining a longer monitoring effort of climate induced geohazards;
- enable high resolution measurements and hence geohazard understanding and quantifications of rates of change on identified cultural heritage.
- focus on the sites from Hiorthhamn and Russekeila





it lies on the 4- to 5-metre-high steep slope of the terrace facing the shore. This midden has a maximum thickness of about 1 metre and is 30 metres wide near the top of the steep slope; at the foot of this slope it is only a few centimetres thick and about 6 metres wide (Figs. 3, 4, and 5).

Fig. 2. Detail of the ruins at Russekeila. Note kitchen midden (arrow) in front of the excavated Russian hut. View west.



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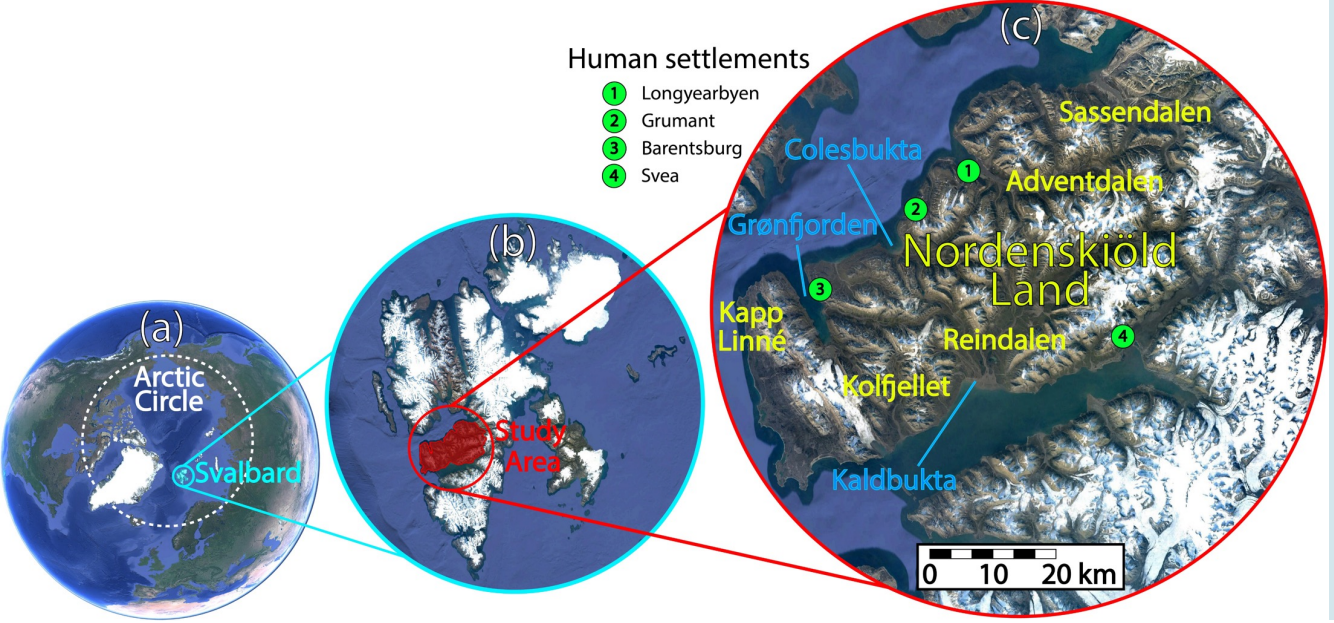
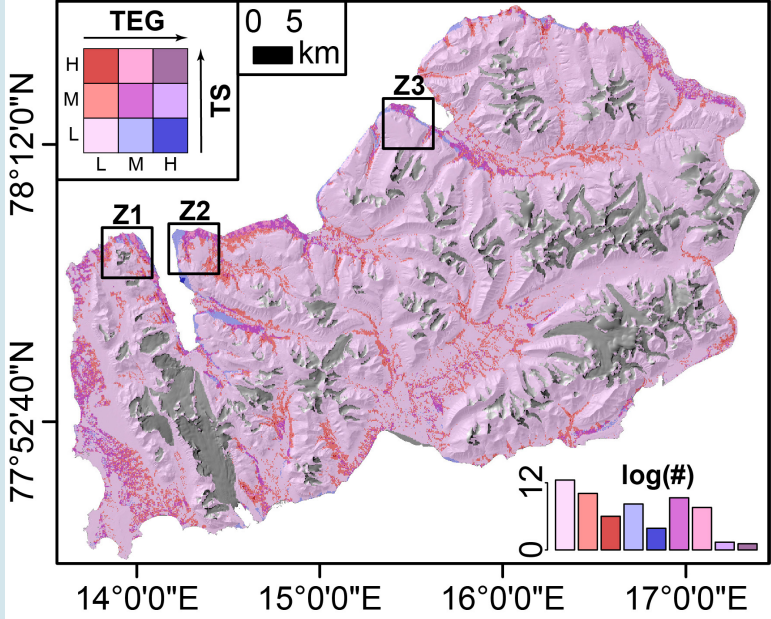
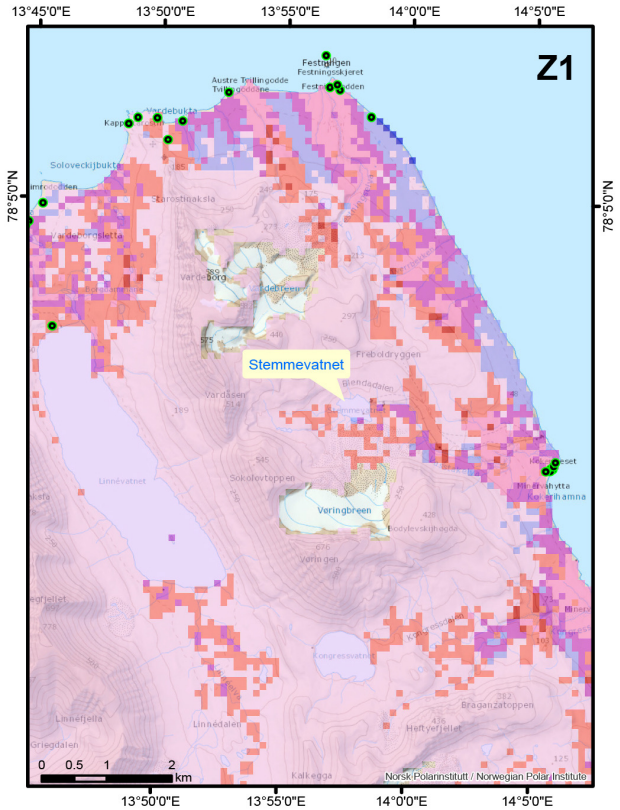
Renovated
Russian cabin
Russekeila
cabin
Polish research
cabin
Graves
Solifluction sheet

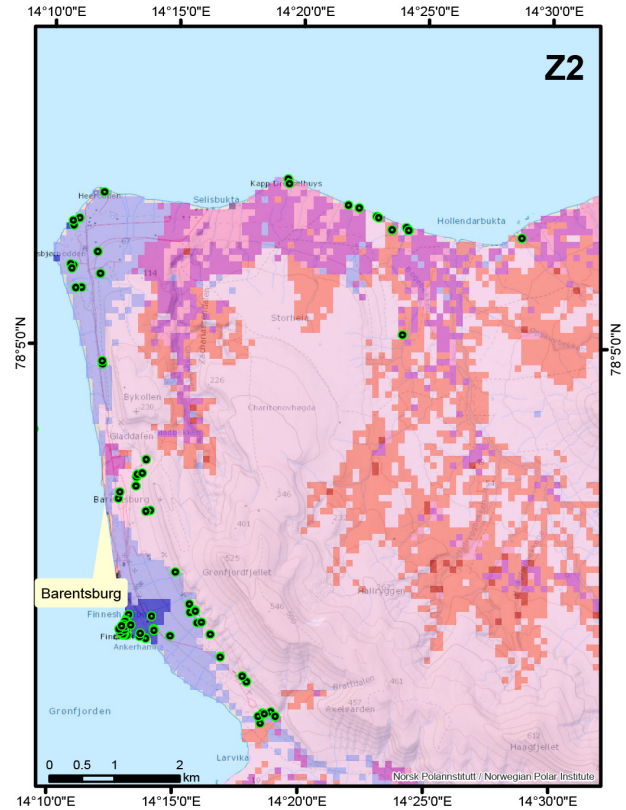

Site 1
Russekeila - East
Russekeila - West
Site 2

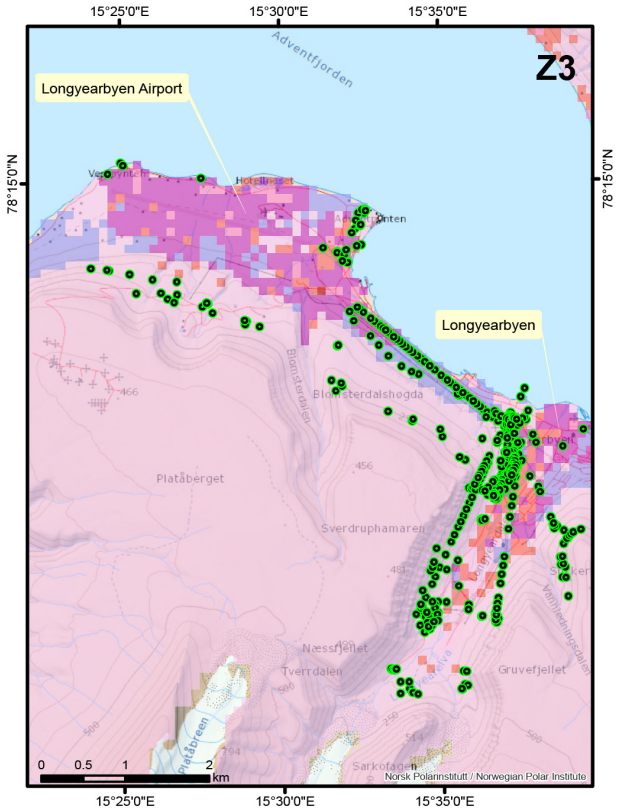


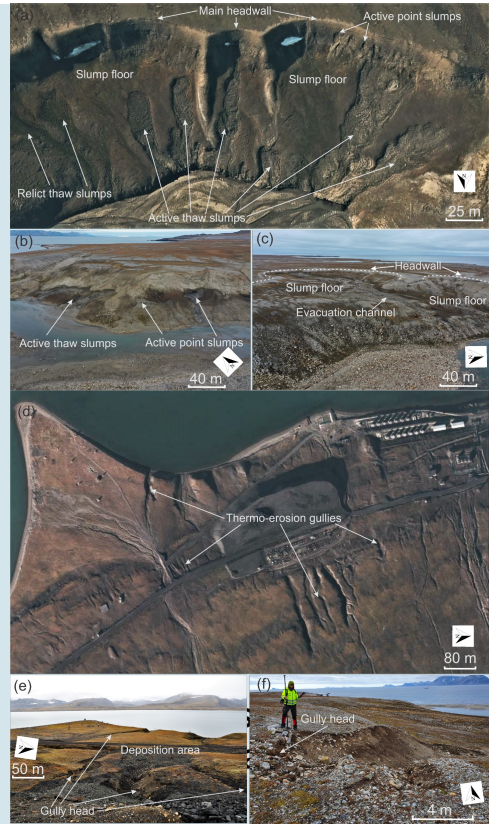
Multi-hazard mapping of TEG and TS in central Svalbard









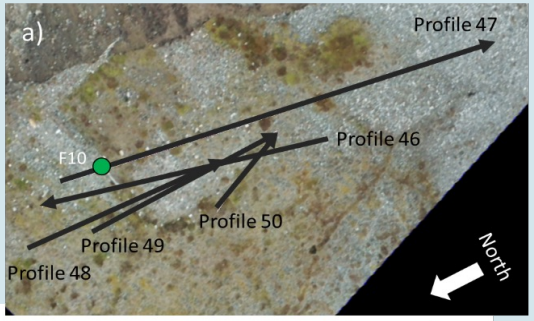


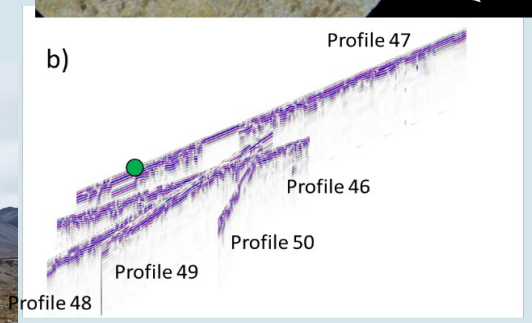
ARCHEPHYSICS (Mapping of the vulnerable cultural heritage sites in Russekeila, Svalbard using geophysical tools) – an Arctic Field Grant from Norwegian Research Council

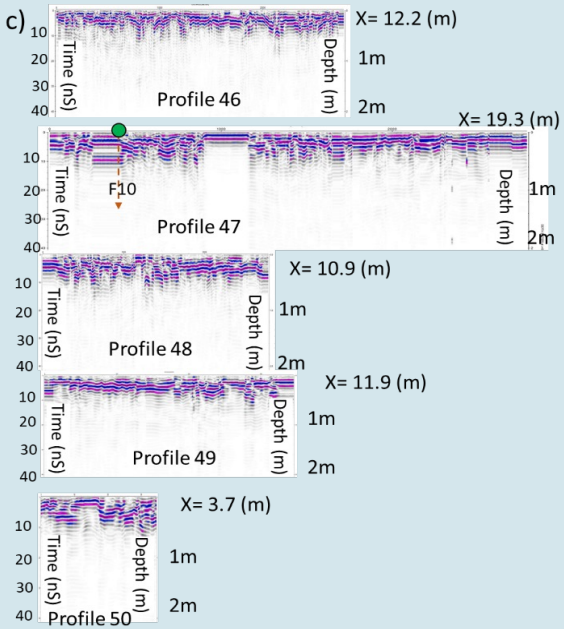
Project participants: Norwegian Geotechnical Institute (NGI) and NIKU (2022)

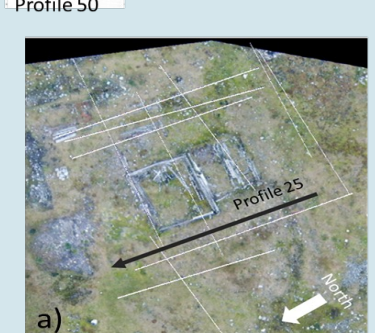
Aim:

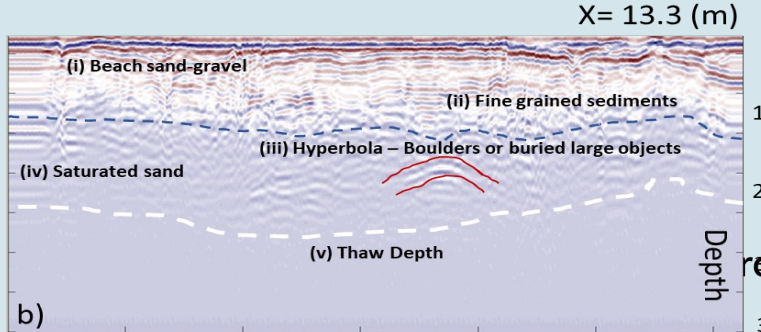
- to develop a near-surface and non-invasive geophysical approach to image the known and unidentified cultural heritages in Russekeila, Svalbard which are susceptible to the effects from climate changes and human-activities









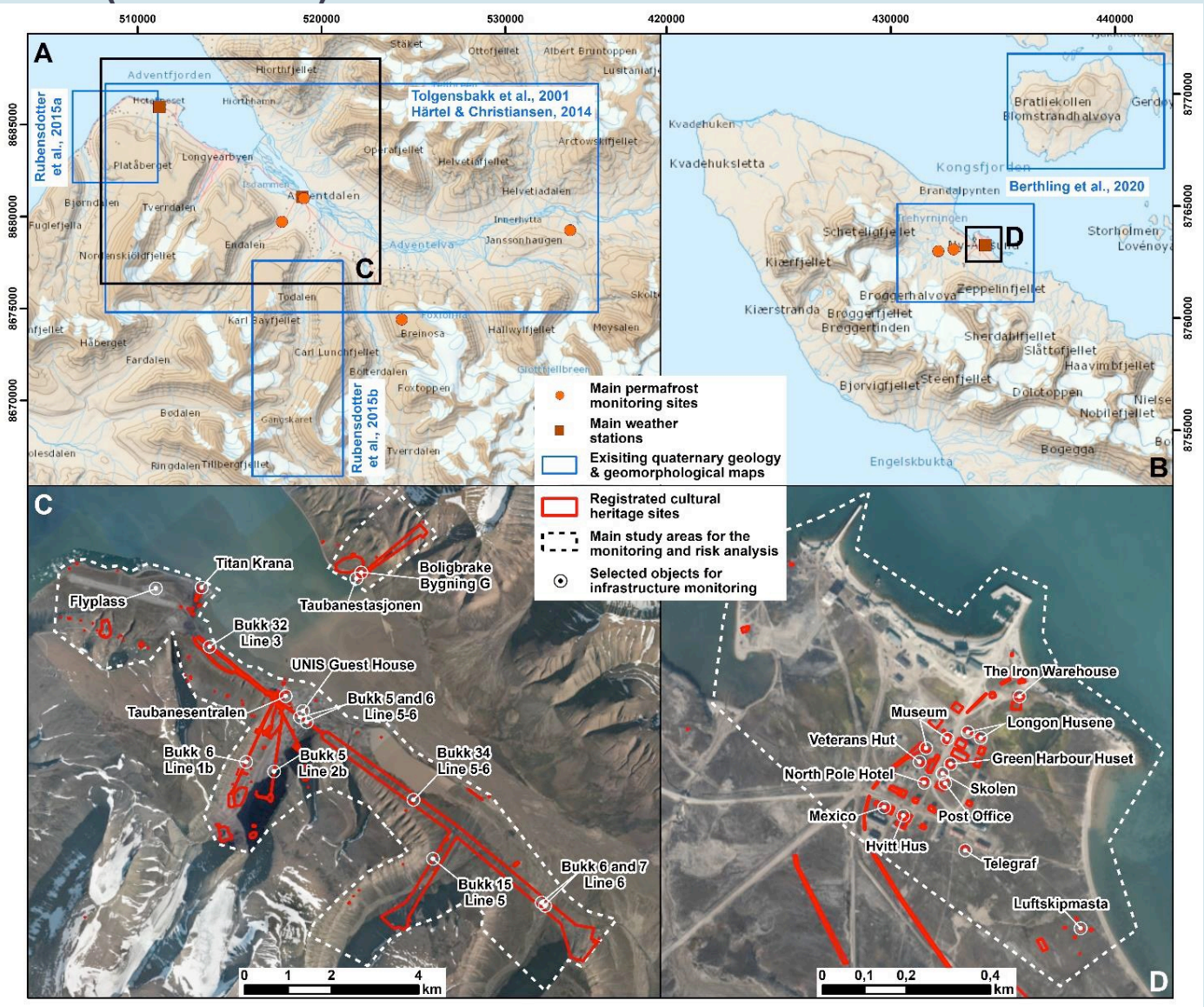


PERMARICH (Advanced Mapping and Monitoring for Assessing Permafrost Thawing Risks for Modern Infrastructure and Cultural Heritage in Svalbard)

Project participants: NORCE, SINTEF, NIKU, NGU, UNIS (2023-2025)

Funding from Fram Centre, with the following aims:

- assess the risks related to terrain movement in inhabited permafrost landscapes and the deformation of modern infrastructure (MI) and cultural heritage (CH) sites in and around Longyearbyen and Ny-Ålesund (Central and Western Svalbard);
- innovative integration of advanced satellite remote sensing technology and traditional methods to map, monitor and model ground disturbances from permafrost thawing and their consequences on infrastructure stability;
- final goal is to evaluate the risks for future MI and CH damage and suggest adaptation measures to key stakeholders in Longyearbyen and Ny-Ålesund



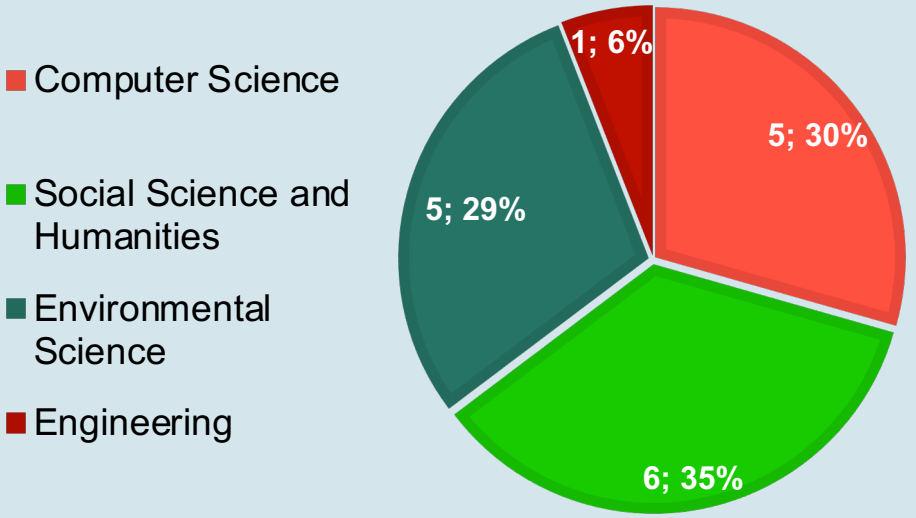
THETIDA (Technologies and methods for improved resilience and sustainable preservation of underwater and coastal cultural heritage to cope with climate change, natural hazards and environmental pollution)

An EU HORIZON-CL2-2022-HERITAGE-01-08 project
Partners involved:

No.	Participant Organisation Name	Short Name	Country	Type
1*	Institute of Communication and Computer Systems	ICCS	EL	RTO
2	EdgeLab s.r.l.	ELB	IT	SME
3	Eindhoven University of Technology	TUe	NL	ACA
4	University of Padova	UNIPD	IT	ACA
5	National Technical University of Athens	NTUA	EL	ACA
6	Universidade Do Algarve	UAlg	PT	ACA
7	Norwegian Institute for Cultural Heritage Research	NIKU	NO	ACA
8	SignalGeneriX Ltd	SG	CY	SME
9	ResilienceGuard	RG	CH	SME
10	MOOI Noord-Holland	MOOI	NL	NGO
11	Cyprus Marine and Maritime Institute	CMMI	CY	RTO
12	Centro de Ciência Viva do Algarve	CCVAlg	PT	NGO
13	IANTD s.r.l. (International Association of Nitrox and Trimix Divers)	IANTD	IT	NGO
14	Association Européenne EURISY	EURISY	FR	NGO
15	Ephorate of Antiquities of Cyclades	EFAKYK	EL	PUB
16	University of Cyprus	UCY	CY	ACA
17	Marina Diving di Corrado Ambrosi	MDCA	IT	SME

* Coordinating Organisation

Scientific Background distribution



Social Science and Humanities

Museums
Archaeology
Architecture/Landscape
Planning Policy
Geography
Dissemination and communication

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The THETIDA system aims to be an enhanced visualisation tool that can provide a simple and easy way to create virtual environments for CH presentation.

Data from the deployed sensors coupled with Citizens' Science data (coming from personal devices) will be used to update our simulated data and prediction models over the wider CH area.

The produced vulnerability map (based on the produced risk regional models) will be used together with participatory Living Labs to:

- evaluate and prioritize threats and solutions,
- provide appropriate adaptation and mitigation strategies, and support sustainable plans

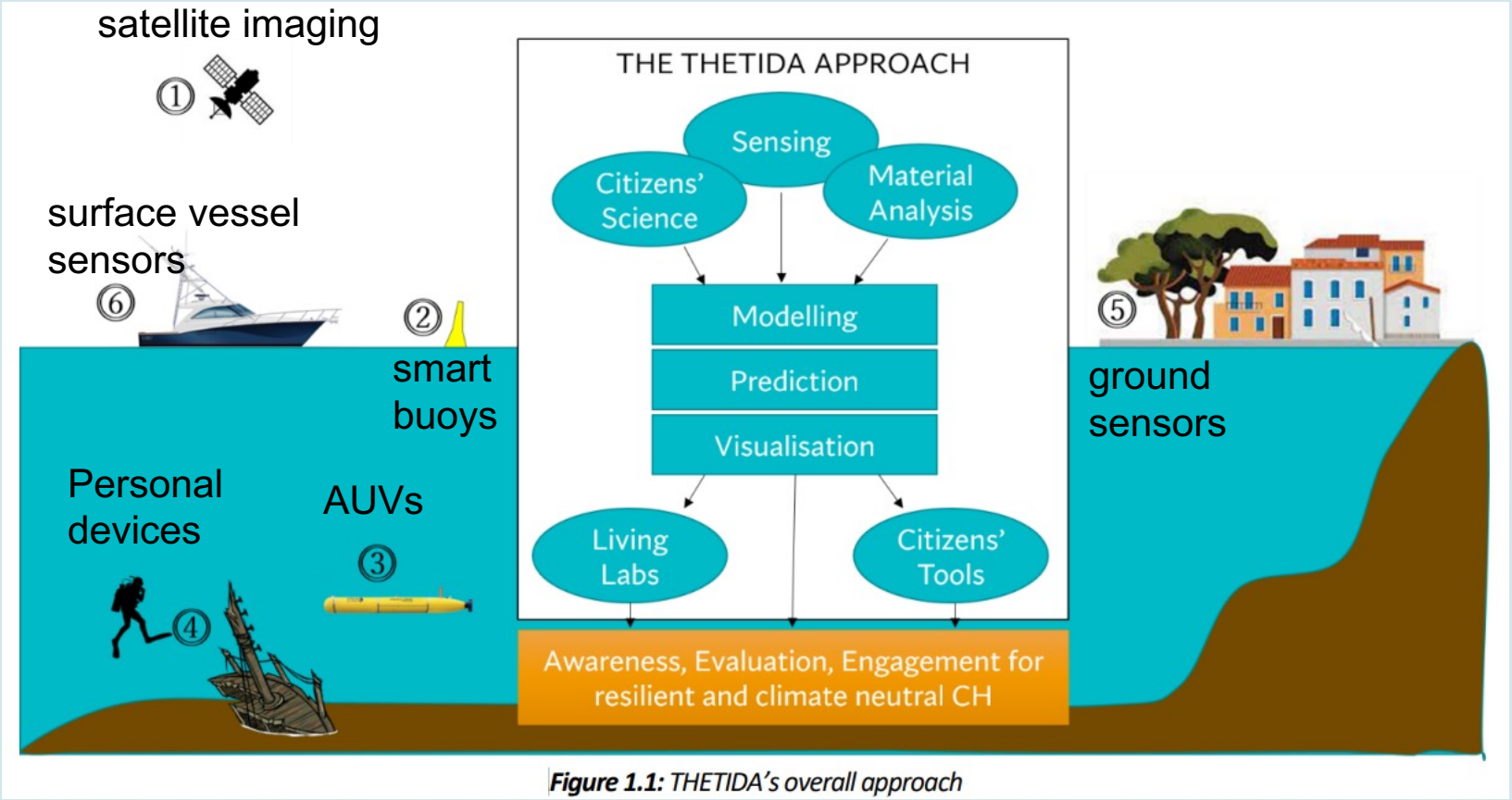

Figure 1.1: *THETIDA's overall approach*

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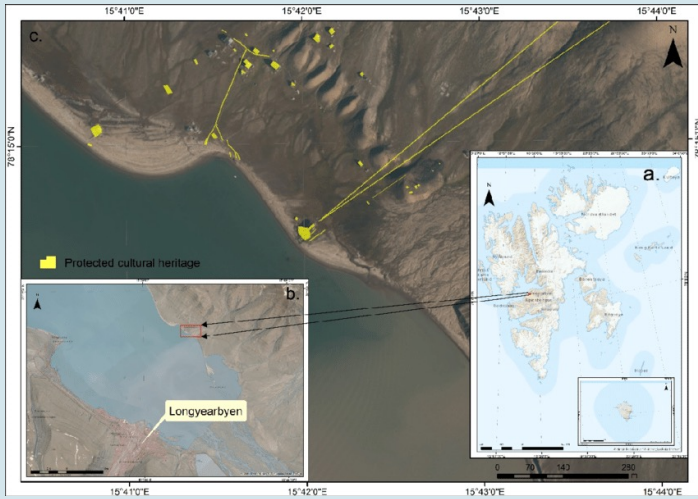
SIX PILOT SITES

Pilot Sites	Climate	Heritage Type
Lake Ijssel (NL)	North Sea	Coastal/ Underwater
Svalbard (NO)	**Arctic Ocean**	**Coastal archaelogical**
Algarve (PT)	Atlantic	Underwater
Gallinara, Spezia (IT)	Western Med	Underwater/ Coastal archaelogical
Paralimni (CYP)	Eastern Med	Underwater/ Coastal archaelogical
Mykonos (GR)	Aegean Sea	Coastal



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NIKU'S ROLE AND INSTITUTIONAL PARTNERSHIPS

WP3 - Development of participatory and crowdsourcing tools:

Citizen Science and Living Labs

Aims to

- Engage a wide range of relevant stakeholders (local and/or regional administrators, experts and professional groups, SMEs, cultural and creative industries, NGOs), citizens and community groups involved with and affected by both cultural heritage management and climate change-related issues

- Upscale Cultural heritage management role in planning and policy for Sustainable Development and Climate Action

European

TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY

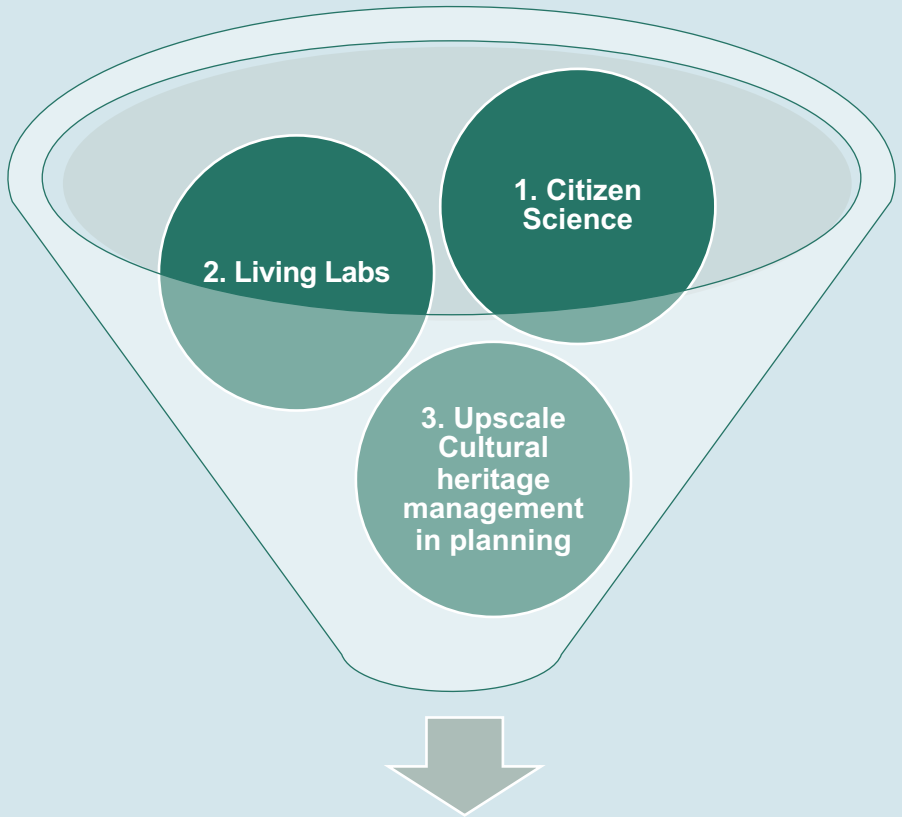
MOOI NOORD-HOLLAND
ADVISEURS OMGEVINGSKWALITEIT

National

SVALBARD MUSEUM

niku Norwegian Institute for Cultural Heritage Research

CITIZEN SCIENCE AND LIVING LABS



Citizen science is often used to actively engage local communities in understanding changes and documenting impacts. These, often have limited capacities to empower communities in using the collected data to enable sustainable climate futures

Living Labs are interaction spaces (virtual and real) in which diverse actors collaborate for co-creating new solutions to complex problems. However these tend to focus on societal/economic problems.

The combination of both aims to enable local communities to situate their participation in a personal, local and cultural context. In this way, management practices can transform towards more sustainable ones.