

APPLICATION OF THE CLIMATE VULNERABILITY INDEX (CVI): VEGAØYAN – THE VEGA ARCHIPELAGO WORLD HERITAGE PROPERTY



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- Climate Vulnerability Index, Townsville

Images

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Front and back cover: Vega Archipelago

Inside cover: Eider houses and buildings at Lånan, *Photo: R. Johansen, Vega World Heritage Foundation*



VALUES-BASED | SCIENCE-DRIVEN | COMMUNITY-FOCUSED

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EXECUTIVE SUMMARY



Eider tender Kirsten Steinbru Hansen
at Bremstein

EXECUTIVE SUMMARY

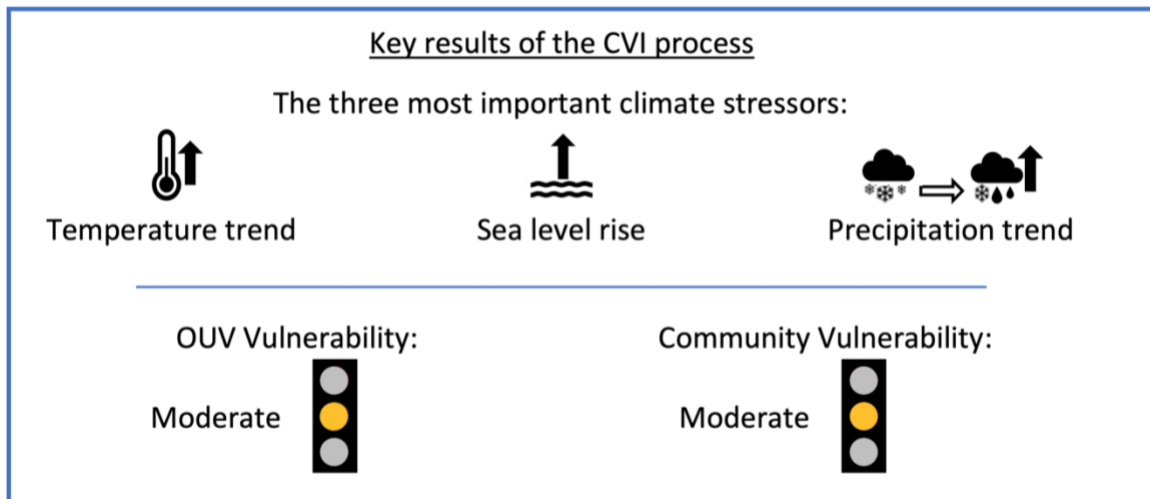
Climate change has been identified as the fastest-growing threat to World Heritage (WH) and many WH properties are already experiencing negative impacts. This has resulted in the degradation of the values for which many WH properties were listed and, as a consequence, there are impacts upon the communities associated with these properties. As the climate crisis intensifies, there remains an urgent need to understand the climate vulnerability of the world's natural and cultural heritage.

This report describes the outcomes from an application of the Climate Vulnerability Index (CVI) for the Vega Archipelago. The CVI is a methodology to rapidly assess the vulnerability of natural and cultural WH properties. It systematically evaluates the realised and potential impacts upon the values that collectively comprise the Outstanding Universal Value (OUV) of the property, as well as the consequent impacts upon the economic, social and cultural (ESC) elements of the associated community. The CVI process was carried out through workshops involving the property managers, researchers, and representatives from relevant agencies, municipalities, NGOs and the community. The other seven Norwegian WH properties were also represented, providing an opportunity to increase the awareness about climate change, and to acquire and exchange knowledge and experience relevant to cultural and natural heritage management.

The Vega Archipelago is a complex cultural landscape, encompassing a wide range of natural and cultural values. The justification for inscribing Vega Archipelago as a WH property is the unique cultural interaction between humans and nature over a long period of time. Particular emphasis is placed on the unique tradition of tending wild eiders, including the collection and processing of their down. The natural environment in Vega provides the foundation for a traditional way of life based on fishing, farming, sustainable land management techniques and the harvesting of eider down. The importance of traditional management in the maintenance of the terrestrial and marine environment in Vega underpins the cultural identity and traditional ways of life and cannot be overstated.

The CVI workshop for Vega Archipelago determined that the **OUV Vulnerability** for the property to be **Moderate** (on a three-point scale, Low/Moderate/High), indicating the potential for some decline or alteration of many of the values and attributes that comprise the OUV; and assessed the **Community Vulnerability** to be in the middle category (**Moderate**). Each of these assessments considered the adaptive capacity of WH values and their management, and of the community.

Within the CVI process, participants selected ca. 2050 as the future time scale on which to assess vulnerability and chose to consider a high-emissions scenario (RCP8.5), noting that climate projections for mid-century would be similar under an intermediate emissions scenario (RCP4.5). The workshop participants identified the three key climate stressors presenting the greatest threat to the Vega Archipelago for this scenario and time scale as: **Temperature Trend**, **Sea Level Rise** and **Precipitation Trend**. The potential impact on the overall OUV of the property, derived from the exposure and sensitivity, was determined as Extreme (on a four-point scale, Low/Moderate/High/Extreme) for both Temperature Trend and Sea Level Rise, and High for Precipitation Trend. These three key stressors are likely to interact with each other, as well as with other stressors, to increase the vulnerability. Potential impacts discussed included: (i) negative impact on heritage structures (from all three key stressors, as well as storm surge); (ii) species complexity changes, influenced by climate-related invasive species (linked with Temperature Trend); and (iii) a longer sheep grazing season due to the warming Temperature Trend, though salt intrusions (resulting from Sea Level Rise) may lead to a reduction in the extent of grazing land. Climate change is expected to threaten some areas more than others in the archipelago and to increasingly impact upon some of the values that collectively contribute to the OUV. The biological values of the cultural landscape were considered



more vulnerable to impacts from climate change than the cultural/archaeological values, principally due to the relative spatial scales affected and available options for adaptive capacity.

The results of the CVI workshops indicate that changes to the WH values expected over the next 30 years (ca. 2050 scenario) are anticipated to have significant effects upon the Vega community, in terms of its economic, social and/or cultural (ESC) connections. The future impact on each component of ESC resulting from a loss of WH values due to climate change was assessed to be negative at a Moderate level (on a four-point scale, Minimal/Low/ Moderate/High). The ESC adaptive capacities were each assessed as Moderate (four-point scale). A focus on reducing impacts upon the community would likely incorporate benefit to the WH values.

The workshop participants identified a **broad range of potential management actions**, including:

- applying a precautionary approach to ensure that new activities do not have negative impact on the OUV;
- minimising other stressors on the ecosystem, thereby enhancing the natural resilience of the system;
- enhancing research and monitoring efforts to better predict and understand changes in the marine systems in Vega to address knowledge gaps;
- improving collaboration between WH managers and research/academia to address management needs;
- implementing concrete adaptive actions such as traditional maintenance of the cultivated landscape and of built heritage, moving the eider duck houses etc.; and
- including the outcomes from the CVI workshop in the forthcoming review of the Vega Management Plan; climate change mitigation and adaptation need to be integrated throughout the entire Plan.

Immediate global action to substantially reduce greenhouse gas emissions is critical, especially to reduce climate change impacts in the near term. The combination of actions to address climate change (mitigation) and support climate adaptation will be essential to maintain the OUV of the Vega Archipelago.

SAMMENDRAG

Klimaendringer er nå den raskest voksende trusselen mot verdensarv og mange verdensarvområder påvirkes allerede negativt av endringene. Foringelse av verdensarvverdiene har også konsekvenser for lokalsamfunnene tilknyttet verdensarvområdene. Etter hvert som klimakrisen forsterkes, er det derfor viktig å vite hvor sårbar verdens natur- og kulturarv er for klimaendringer.

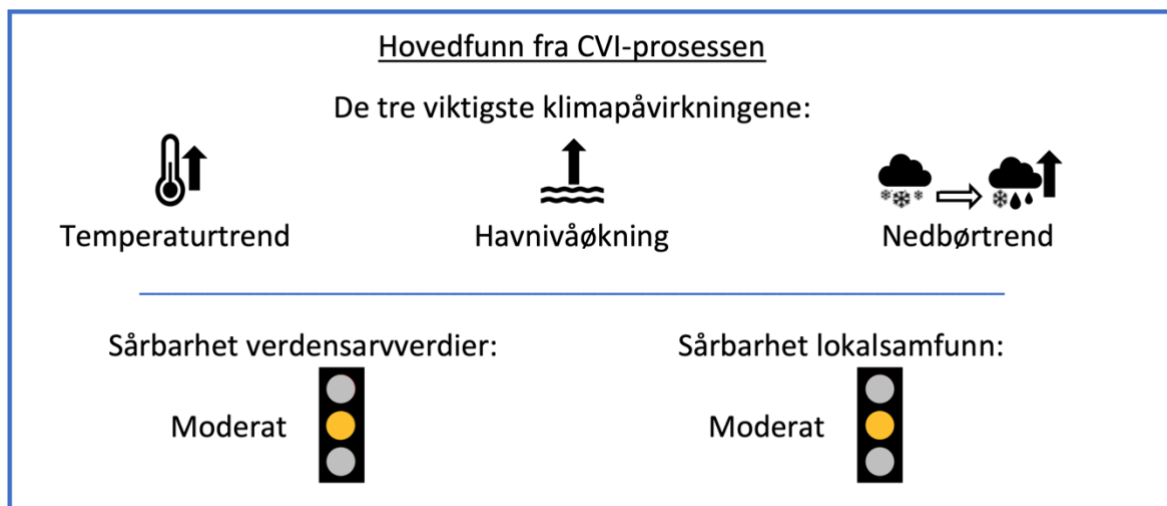
Denne rapporten beskriver resultatene av en klimasårbarhetsvurdering (Climate Vulnerability Index, CVI) for Vegaøyen. CVI er en metode som brukes for å vurdere sårbarheten til områder med natur- og/ eller kulturarv på verdensarvlisten. Metoden vurderer eksisterende og mulige effekter av klimaendringer for områdets fremragende universelle verdi (Outstanding Universal Value, OUV), og effekten på økonomiske, sosiale og kulturelle forhold i lokalsamfunnet tilknyttet verdensarven. CVI-prosessen ble gjennomført som workshoper hvor representanter fra forvaltning, forskning, kommuner, frivillige organisasjoner og lokalsamfunn med flere deltok. De øvrige syv norske verdensarvområdene var også representert for å lære mer om klimaendringer og for å dele kunnskap og erfaringer om kulturmiljø- og naturforvaltning.

Vegaøyen er et komplekst kulturlandskap med et bredt spekter av natur- og kulturverdier. Innskrivning av Vegaøyen på verdensarvlisten er begrunnet med det unike samspillet mellom mennesker og natur over lang tid. Det ble lagt særlig vekt på den unike tradisjonen med å stelle vill ærfugl, inkludert sanking og bearbeiding av dun. Naturmiljøet i Vega gir grunnlag for en tradisjonell levemåte som er basert på fiske, jordbruk, bærekraftig arealbruk og sanking av dun fra ærfugl. Betydningen av tradisjonell bruk og forvaltning for å opprettholde miljøverdier på land og i sjøen er del av den kulturelle identiteten i Vega. Betydningen av tradisjonelle levemåter kan ikke overvurderes.

CVI-workshopen for Vegaøyen kom fram til at **OUV-sårbarheten** for området er **moderat** på en trepunktsskala, Lav/Moderat/Høy, som indikerer at klimaendringer potensielt kan svekke eller ha negativ effekt på mange av verdiene som utgjør OUV. Sårbarheten til lokalsamfunnet ble også vurdert å være **moderat**. Begge vurderinger tok hensyn til tilpasningsevnen lokalsamfunnet, forvaltningen og verdensarvverdiene har.

Deltakerne valgte 2050 som referansepunkt for sårbarhetsvurderingene. Et høyutslippsscenario (RCP8.5) ble lagt til grunn for vurderingene samtidig som man merket seg at klimaprognoser for midten av århundret ville vært tilsvarende ved et middels utslippsscenario (RCP4.5). Workshopdeltakerne identifiserte de tre påvirkningsfaktorene som utgjør den største trusselen for Vegaøyen innenfor dette tidsrommet; **temperatortrend, havnivåstigning og nedbørstrend**. Den mulige effekten på verdensarven ble vurdert ut fra hvor eksponerte og sårbare verdensarvverdiene var for påvirkning fra hver enkelt faktor. Effekten av temperatortrend og havnivåstigning ble vurdert som **ekstrem** (på en firepunktsskala, Lav/Moderat/Høy/Ekstrem). For nedbørstrend ble effekten vurdert å være **høy**. De tre nøkkelpåvirkningsfaktorene vil trolig forsterke hverandre og i tillegg virke sammen med andre påvirkningsfaktorer som ytterligere bidrar til å øke sårbarheten.

Mulige effekter som ble diskutert inkluderer: (i) negativ påvirkning på kulturmiljøene fra alle de tre påvirkningsfaktorene, samt fra stormflo; (ii) endret artssammensetning som følge av klimarelaterte invaderende arter knyttet til temperatortrend; og (iii) lengre beitesesong for sau på grunn av varmere klima, men saltinntrengning som følge av havnivåstigning kan føre til en reduksjon i omfanget av beiteareal. Det forventes at klimaendringene vil ha større konsekvenser for noen områder i Vegaøyen enn andre og i økende grad påvirke noen av verdiene som ligger til grunn for verdensarvstatusen.



De biologiske verdiene i kulturlandskapet ble ansett som mer sårbare for påvirkning fra klimaendringer enn kulturmiljø-/arkeologiske verdier. Dette skyldes først og fremst det arealmessige omfanget og at det finnes få alternativer for tilpasning.

Resultatene fra CVI-workshopene indikerer at forventet effekt på verdensarvverdiene de neste 30 årene (2050) sannsynligvis vil ha betydelig virkning på økonomiske, sosiale og/eller kulturelle forhold i Vega-samfunnet. Den fremtidige negative virkningen på disse som følge av tap av verdensarvverdier ble vurdert som moderat (på en firepunkts skala, Minimal/Lav/Moderat/Høy). Tilpasningskapasiteten ble vurdert som moderat (firepunkts skala). Fokus på å redusere effekten av klimaendringer på lokalsamfunnet vil sannsynligvis også være fordelaktig for å ivareta verdensarvverdiene.

Workshopdeltakerne identifiserte et **bredt spekter av mulige forvaltningstiltak**, blant annet:

- å bruke en føre-var-tilnærming for å sikre at nye aktiviteter ikke har negativ innvirkning på OUV;
- minimere andre påvirkningsfaktorer på økosystemet, og dermed øke systemets naturlige motstandskraft mot effekten av klimaendringer;
- styrke forskning og overvåking og tette kunnskapshull for å bli bedre i stand til å forutse og forstå endringer i de marine systemene i Vega;
- styrke samarbeidet mellom verdensarvforvaltning og forskning/akademia for å treffe forvaltningens behov;
- iverksette konkrete tilpasningstiltak som skjøtsel av kulturlandskap og tradisjonelt vedlikehold av bygningsarven; og
- bruke resultatene fra CVI-workshopen i den kommende oppdateringen av forvaltningsplanen for Vegaøyen. Klimahensyn må integreres i hele planen.

Umiddelbare globale tiltak for å redusere utslipp av klimagasser er nødvendig for å begrense effektene av klimaendringer på kort sikt. For å ta vare på verdensarvverdiene i Vegaøyen vil det være avgjørende å iverksette både utslippskutt og tilpasningstiltak.

INTRODUCTION



SECTION 1: INTRODUCTION

1.1 Background to this report

This report outlines the results of applying the Climate Vulnerability Index (CVI) to assess Vegaøyen – The Vega Archipelago cultural landscape, one of eight UNESCO World Heritage (WH) properties in Norway.

Climate change is a growing global risk to most WH properties, many of which – natural, cultural, and mixed – are already being impacted.

“...The impacts of [climate-related] changes are already damaging infrastructure, ecosystems and social systems – including cultural heritage – that provide essential benefits and quality of life to communities.” (ICOMOS¹)

The Intergovernmental Panel on Climate Change (IPCC) has predicted with ‘high confidence’ that ‘global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate’ (IPCC 2018).

The urgency for climate action demands an assessment of the climate change impacts on heritage as well as the wider implications of climate change as a driver and/or constraint for sustainable development. This requires identifying, understanding, and assessing interactions between heritage and development, and appreciating how heritage management can have a positive or negative impacts upon these.

The CVI process, outlined in sections 1.2 and 5.2, is best undertaken through a workshop of diverse stakeholders (including site managers, researchers, community representatives, management agency representatives, and other stakeholders). The initial plan to conduct a CVI workshop in Vega in April 2020 was disrupted by the Covid pandemic. In mid-2021, it was decided to conduct the first phase of the CVI as an online workshop; this was undertaken over four half-days in Nov-Dec 2021, given the time zone differences between Norway and Australia where the workshop facilitators were based. The Phase 2 workshop was subsequently conducted as an in-person workshop in Vega in April 2022 (each workshop schedule is provided in Appendix 5).

1.2 Overview of the Climate Vulnerability Index

The CVI is a systematic and rapid assessment tool that is values-based, science-driven and community-focused. It was initially developed to assess the impacts of climate change upon WH properties, considering the Outstanding Universal Value (OUV) and the associated community. Subsequent applications beyond WH have been undertaken.

The CVI process works sequentially through the steps outlined in Section 5, enabling a systematic evaluation of the threats of climate change. Unlike many other risk assessment approaches, the CVI comprises two distinct primary outcomes, assessing:

- **OUV Vulnerability**, evaluating potential impacts to the values and attributes for which the property has been internationally recognised; and

¹ <https://www.icomos.org/en/focus/climate-change/68239-comos-s-message-to-cop25-cultural-heritage-can-help>

- **Community Vulnerability**, assessing the level of economic, social, and cultural dependence that associated communities (local, national, and international) have on the WH property (collectively referred to as “ESC dependencies”) and their adaptive capacity to cope with climate change-related loss of WH values.

Both assessments of vulnerability are highly relevant for key stakeholders, including site managers, responsible management agencies, and the local communities that live in and around the property. Through its application, the CVI enables managers and stakeholders to consider what may be appropriate adaptive capacities for the management of their natural, cultural and community assets.

While the CVI was initially developed in Australia, input for the CVI has subsequently come from many experts around the world. This includes the International Council on Monuments and Sites (ICOMOS) and the International Union for Conservation of Nature (IUCN), the two primary advisory bodies to the WH Committee. There was also extensive input and guidance from the Steering Committee established specifically for the Vega CVI process.

This application of the CVI for Vega provided important precedents: it was the first CVI application in a Norwegian WH property, the first in a polar region, and the first time the accompanying public event for the local community was conducted predominantly in the local language.

1.3 Why was Vega Archipelago chosen for the CVI?

Riksantikvaren, the Norwegian Directorate for Cultural Heritage, took part in the CVI workshop for the Heart of Neolithic Orkney (Scotland) in 2019 (Day et al. 2019). Discussions there included how to move forward in developing the CVI methodology; assessing a World Heritage (WH) cultural landscape was suggested. Riksantikvaren, in cooperation with the WH coordinator/manager for Vega Archipelago and the Norwegian Environment Agency, offered to host a CVI workshop at Vega, the only Norwegian WH property inscribed as a cultural landscape.

As climate change has become a critical factor for managing WH properties, Norway saw potential in the CVI methodology to assess and understand the impacts of climate change, especially impacts upon the community due to a loss of WH values. Norway therefore prioritised funding for hosting a CVI workshop, recognising the potential to contribute to the development of the method. In addition, the workshop could increase the awareness of all Norwegian WH managers about climate change, and about cultural and natural management in general.

**VEGA ARCHIPELAGO
CULTURAL LANDSCAPE**



Nesting eider

SECTION 2: VEGA ARCHIPELAGO CULTURAL LANDSCAPE

2.1 Location

Vegaøyen – The Vega Archipelago is centrally located on the Helgeland coast, in the southern part of the county of Nordland just south of the Arctic Circle at 65.67°N, 11.96°E. (see Figure 2.1).

Vegaøyen is comprised of 6,500 islands, islets and skerries spanning 107,294 ha, of which 6,881 ha is land. The exposed area of sea has provided livelihoods for generations of fishers, farmers and eider keepers.

The sea around the archipelago is called 'Støvelhav' (literally "boot sea") because the sea is so shallow in many places you can walk from one island to the next. The area represents one of the best developed areas of strandflat in the world, some 30 kilometres wide from coast to open ocean. Thus, the dominant natural element of the property is the sea, more particularly the productive shallow sea of the strandflat, containing important biodiversity which provides rich fish and bird populations that are available for human use.

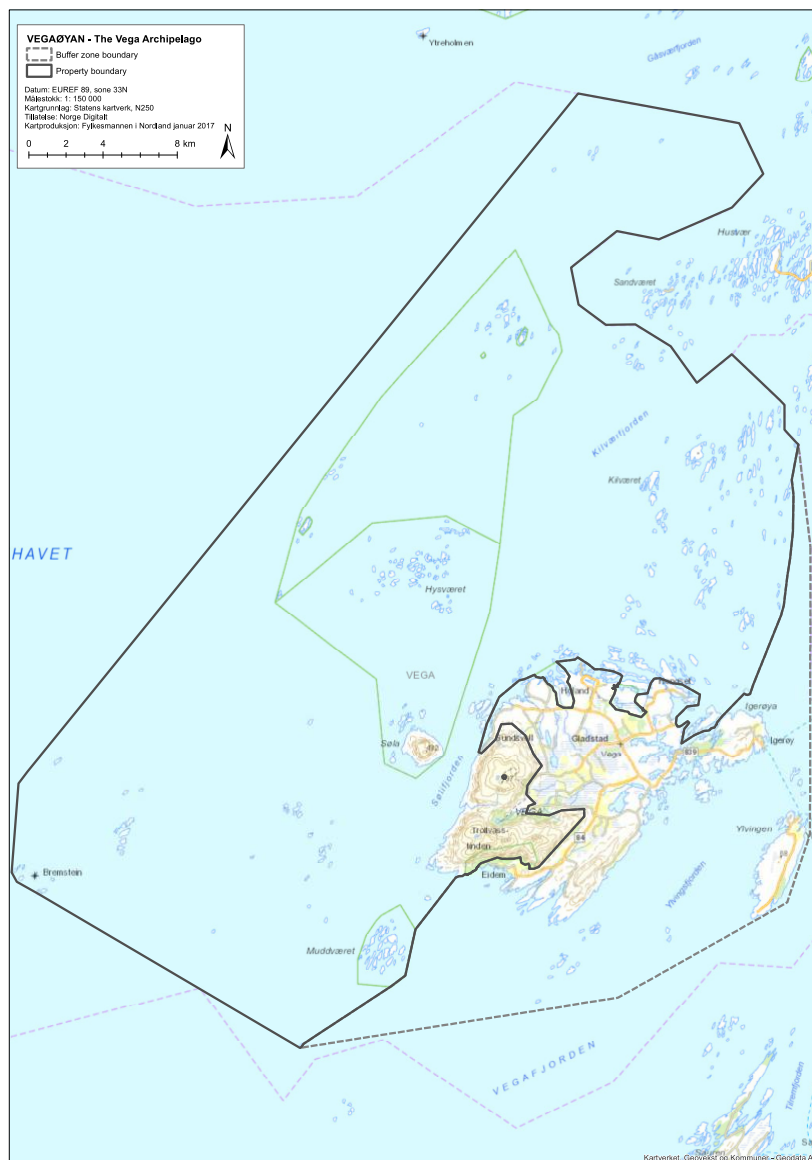


Figure 2.1 Vegaøyen – The Vega Archipelago World Heritage property (boundary in black) is supported by a designated buffer zone (dashed line) and contains several nature reserve areas (green line).

2.2 The World Heritage property

The Vega Archipelago was added to the UNESCO WH List in 2004, the first Norwegian cultural landscape to achieve this status. The UNESCO WH Committee explained their decision to include the property on this prestigious list in the following manner:

‘The Vega Archipelago demonstrates how generations of fishing and farming communities have, throughout the past 1,500 years, upheld a sustainable way of life in an inhospitable group of islands, close to the Arctic Circle. The now unique cottage industry, which utilises the collection and use of eider-duck down, has been a major source of income and the industry is run almost entirely by women. Therefore, entry on the [WH] List is also something of a tribute to the women of Vega.’²

The justification for inscribing the Vega Archipelago is the unique cultural landscape of the area, which results from interaction between humans and nature over a long period of time. Particular emphasis is placed on the unique tradition of tending wild eiders, and collecting and processing their down. While the men were away fishing, the women looked after the eiders that were sitting on their eggs in the nests and ‘eider houses’ that families in the Vega archipelago had made for them during the spring. The women also cleaned the down, which was an outstanding and valuable export commodity from Norway to Europe.

Within the Vega cultural landscape, around 60 of the islands have at some time been inhabited. Fishing, trapping and snaring have been carried out in the Vega islands for the last ten thousand years. As people gradually moved to the islands and settled, they helped to shape the characteristic landscape, which has been formed by the interplay between fishing, farming and the inhospitable but bountiful nature that surrounds the islands.

The remainder of the main island of Vega, along with the islands south-east of the main island, are not part of the listed WH property but are part of the buffer zone for the property (see Figure 2.2). All 1,200 inhabitants of Vega municipality live within the buffer zone. Active (contemporary) farming, including livestock husbandry dominates land use in this zone.

Within the World Heritage property, 22% of the land surface is designated for nature protection under the Nature Diversity Act of 2009³. Five nature reserves, four bird sanctuaries and one protected landscape area have been designated by Royal decrees.

2.3 Identifying the values of the World Heritage property

2.3.1 World Heritage values

When formally listing an area as a WH property, UNESCO’s WH Committee summarises the significant in a Statement of Outstanding Universal Value (SOUV), a fixed description of the values of the property referenced to the date of inscription. The SOUV for Vega Archipelago (Attachment 1) forms part of the property’s UNESCO webpage⁴.

Prior to the CVI workshop, excerpts from the SOUV for Vega were identified and grouped together to form seven ‘key values’ (listed here and expanded in Table 2.1). This was initially compiled by the CVI developers and subsequently endorsed by the Steering Committee. The key values are underpinned by associated ‘attributes’, which are the elements of a heritage place that convey its heritage/conservation values and enable an understanding of those values. Attributes can be physical qualities, material fabric and other tangible features but can also be intangible aspects such

² <https://www.norgesverdensarv.no/the-vega-archipelago.134750.en.html>

³ <https://www.regjeringen.no/en/dokumenter/nature-diversity-act/id570549/>

⁴ <https://whc.unesco.org/en/list/1143>

as processes, social arrangements, cultural practices, associations and relationships that are reflected in physical elements of the property. Management is typically undertaken considering the tangible attributes. Appendix 2 shows how the excerpts were grouped and how these key values and their attributes were derived.

The seven key values identified for Vega are:

1. Unique cultural landscape
2. Distinctive coastal landscape & open seascape
3. Marine biological resources
4. Eider ducks
5. Traditional management
6. Distinctive built heritage
7. Archaeological heritage

These key values became a foundation for the initial assessments in the CVI process.



2.3.2 Other Significant Property Values



As well as values that have been internationally recognised as being of OUV, WH properties invariably include other significant values, whether they are heritage values (tangible or intangible) or other values (e.g., social, cultural, economic, spiritual, environmental, scientific). These values may be important locally, regionally, or nationally, and may even be considered 'significant' under local or regional by-laws, or even national legislation. For the CVI, these are referred to as other *Significant Property Values* (SPVs), recognising that these other values will also be subject to impacts from stressors like climate change. Appendix 3 provides the list of SPVs developed for Vega Archipelago.



2.4 Evaluation of current condition and recent trend of the key World Heritage values


Using the key values of the property and the corresponding excerpts from the SOUV, assessments were made of the current condition (four-point categorical scale from Good to Critical) and recent trend (since inscription; improved, stable, deteriorated or unknown) were made during a plenary session of the Phase 1 workshop. Where the assessments were consistent across all excerpts within a key value, they were reported at the key value level; where there was variation, excerpts were grouped accordingly (Table 2.1).



Table 2.1 Key values derived from the Statement of Outstanding Universal Value, together with the current condition and recent trend since inscription in 2004 assessed within the CVI process (legend below table).

Key values	Excerpts taken directly from the Statement of OUV	Attributes (site-specific characteristics that inherently contribute to a value)	Assessment of current condition and recent trend (since 2004 inscription)
Unique cultural landscape	A cluster of dozens of islands centred on Vega.... forms a cultural landscape of 107,294 ha, of which 6,881 ha is land.	<p><i>Tangible attributes</i></p> <ul style="list-style-type: none"> · characteristic field patterns · haymaking techniques · farming techniques · down harvesting <p><i>Intangible attributes</i></p> <ul style="list-style-type: none"> · a unique cultural context · a Nordic perspective · a frugal way of life · interaction between natural & cultural elements 	
	... bear testimony of how people developed a distinctive, frugal way of life centred around fishing, farming		
	the characteristic landscape became shaped by the interaction between fishermen-farmers and the bountiful nature in this exposed area.		
	The Vega Archipelago now stands as a testimony to people who have developed unique, simple ways to live in and interact with nature.		
	show a farming-related biodiversity, linked to centuries of grazing and haymaking.		
	The Vega archipelago reflects the way generations of fishermen-farmers have, over the past 1500 years, maintained a sustainable living in an inhospitable seascape		
	... property showcases the diversity and interaction of the natural features and cultural heritage of the Vega Archipelago, forming a unique cultural landscape. This diversity ranges from the islets where down was gathered to the fishing settlements and traditional farming complexes with characteristic field patterns, forming a mosaic in the landscape		
	the interaction between characteristic natural and cultural elements of the cultural landscape allow for the long-term conservation of the area's Outstanding Universal Value.		
	authorities work closely together in order to preserve the cultural landscape of the Vega Archipelago		





Key values	Excerpts taken directly from the Statement of OUV	Attributes (site-specific characteristics that inherently contribute to a value)	Assessment of current condition and recent trend (since 2004 inscription)
Distinctive coastal landscape and open seascape	<p>The Vega Archipelago is a just south of the Arctic Circle, on the west coast of Norway – an open seascape and coastal landscape made up of a myriad of islands, islets and skerries. A cluster of low islands centred on the more mountainous islands of Vega and Sjøla</p>	<p><i>Tangible attributes</i></p> <ul style="list-style-type: none"> · islands · islets · skerries · strandflat · heathland 	
	<p>where peaks tower to nearly 800 m ... numerous new islands gradually rose from the sea</p>	<p><i>Intangible attributes</i></p> <ul style="list-style-type: none"> · A distinct seascape · unique geo-diversity 	
	<p>The islands and islets are either in groups or isolated, spread across the 50 km broad strandflat that stretches from the mainland to the edge of the continental shelf.</p>	<ul style="list-style-type: none"> · seasonal variation · northern lights (<i>aurora borealis</i>) 	
	<p>The outermost islands are barren and have just a thin, patchy soil cover, whereas those closer to the mainland feature more nutrient-rich bedrock, are greener</p>		
	<p>The boundaries of the World Heritage property encompass 6,500 islands, islets and skerries, as well as the waters north and west of Vega and parts of that main island and its coastal strip</p>		
Marine biological resources	<p>The rich maritime resources of the Vega Archipelago not only benefited local peoples...</p>	<p><i>Tangible attributes</i></p> <ul style="list-style-type: none"> · seabirds, ducks, geese, waders · over-wintering areas 	
	<p>also as many as 228 species of birds that can be observed in the archipelago, considered as the most important wintering area for seabirds in the Nordic region</p>	<ul style="list-style-type: none"> · rich fish stocks · kelp forests · seaweed · marine mammals (otters, seals) · clean water with good visibility 	
	<p>The bird life in the area is vulnerable to human disturbance in the breeding season</p>	<p><i>Intangible attributes</i></p> <ul style="list-style-type: none"> · biodiversity 	
	<p>Five nature reserves, four bird sanctuaries ... designated by Royal decrees</p>	<ul style="list-style-type: none"> · ocean currents 	
	<p>one protected landscape area ... designated by Royal decrees</p>		
	<p>existing biological diversity</p>		

Key values	Excerpts taken directly from the Statement of OUV	Attributes (site-specific characteristics that inherently contribute to a value)	Assessment of current condition and recent trend (since 2004 inscription)
Eider ducks	By the 9th century, the islands had become an important centre for the supply of down, which appears to have accounted for around a third of the islanders' income.;	<i>Tangible attributes</i> · bird houses/nests · down harvesting · 'eider farming'	
	contribution of women to eiderdown harvesting	<i>Intangible attributes</i> · local's relationship with the wild "tame ducks", · women's role in eider down process	
	the harvesting of eider down (the down of the eider duck) in an extremely exposed seascape		
	making the tending of eider ducks the centre of their way of life. The local peoples also built shelters and nests for the wild eiders that came to the islands each spring. The birds were protected from any unnecessary disturbance throughout the breeding season. In return, the people could gather the valuable eider down when the birds left their nests with their chicks.		
	As early as the 9th century, tending eiders was reported to be a way for people in Norway to make a living, and the Vega Archipelago was the core area for this tradition		
	Women played a key role in this lifestyle, and the World Heritage property of the Vega Archipelago also celebrates their contribution to the tending of eider ducks. The tradition remains alive today, albeit to a smaller extent.		
	based on the now unique practice of eider down harvesting, and it also celebrates women's contribution to the eider down process		
	Bird tenders maintain the more than 1,000-year-old tradition of making houses and nests for the eiders on several of the down islets, protecting the birds through the breeding season, gathering the down and making the traditional eider downs.		

Key values	Excerpts taken directly from the Statement of OUV	Attributes (site-specific characteristics that inherently contribute to a value)	Assessment of current condition and recent trend (since 2004 inscription)
Traditional management	islands bear testimony to a distinctive frugal way of life based on fishing and the harvesting of the down of eider ducks, in an inhospitable environment	<i>Tangible attributes</i> · livestock grazing · haymaking · traditional farming techniques	
	The Vega Archipelago reflects the way fishermen/farmers have, over the past 1,500 years, maintained a sustainable living	· traditional fishing techniques · seaweed cutting · museum/exhibitions	
	They lived as fishermen-farmers- down harvesters	<i>Intangible attributes</i> · eiderdown tradition	
	where grazing and haymaking are no longer practiced and where no appropriate management strategies are in place, some of the cultural landscape is becoming overgrown or eroded	· traditional knowledge · unique cultural traditions · dialect names · superstitions	
	and the landscape may show signs of wear and tear if too many people visit the area		
	cultural landscape of the Vega Archipelago continues to be managed in a traditional manner, using time-honoured management techniques		
	The down tradition and the cultural landscape are taken care of by landowners and the local community in cooperation with the Vega Archipelago World Heritage Foundation and the management authorities		
	A Management plan for the property has been drawn up based on the careful documentation of ancient practices		
	Increasing numbers of grazing livestock and growing haymaking activities in several areas help to restore the overgrown landscape and safeguard the mosaic aspects of the landscape		
	The attributes of the property that convey its values are documented and passed on to the local community and visitors by teaching children and young people through “hands-on” projects, research, guided excursions and information via the Internet, brochures and the like. A local “Society of Friends of the World Heritage Area” is helping to pass on traditional knowledge gained by experience.		

Key values	Excerpts taken directly from the Statement of OUV	Attributes (site-specific characteristics that inherently contribute to a value)	Assessment of current condition and recent trend (since 2004 inscription)
Distinctive built heritage	Fishing villages, quays, warehouses, eider houses (built for eider ducks to nest in), farming landscapes, lighthouses and beacons	<i>Tangible attributes</i> <ul style="list-style-type: none"> · quays · farmhouses · warehouses 	
	Most of the old buildings are intact, from dwellings to boathouses, warehouses and sheds, beacons and lights; most of them have been renovated, making the area as a whole representative of settlements on the strandflat	<ul style="list-style-type: none"> · boathouses · slipways · eider houses · beacons/lights · use of flotsam & jetsam for building 	
	special protection orders ... have been issued for 29 buildings at Skjærvær and for Bremstein Lighthouse.	<i>Intangible attributes</i> <ul style="list-style-type: none"> · form & function of buildings · special protection orders 	
Archaeological heritage	evidence of human settlement from the Stone Age onwards	<i>Tangible attributes</i> <ul style="list-style-type: none"> · archaeological remains 	
	Fishermen and hunters have lived on the islands of Vega and Sjøla... for more than 10,000 years	<ul style="list-style-type: none"> · Stone Age habitation sites (dwellings; stone rings) · Stone age implements/ artefacts/ flakes 	
	All pre-Reformation (pre-1537) archaeological and historical monuments and sites are protected by the Cultural Heritage Act of 1978	<ul style="list-style-type: none"> · historic monuments · shipwrecks <i>Intangible attributes</i> <ul style="list-style-type: none"> · cultural heritage · special protection orders 	

Legend for Table 2.1

Current condition (i.e., colour of box around arrows)	Rating	Criteria
	Good	The site's values are in good condition and are likely to be maintained for the foreseeable future, provided that current conservation measures are maintained.
	Good with some concerns	While some concerns exist, with minor additional conservation measures the site's values are likely to be essentially maintained over the long-term.
	Significant Concern	The site's values are threatened and/or may be showing signs of deterioration. Significant additional conservation measures are needed to maintain and/or restore values over the medium to long-term.
	Critical	The site's values are severely threatened and/or deteriorating. Immediate large-scale additional conservation measures are needed to maintain and/or restore the site's values over the short to medium-term or the values may be lost.
Recent trend	 STABLE  IMPROVED  DETERIORATED  UNKNOWN	

INTERACTING WITH THE VEGA ARCHIPELAGO



Fisherman
Photo: R. Kluge

SECTION 3: INTERACTING WITH THE VEGA ARCHIPELAGO

3.1 Management and governance of the World Heritage property

The Management Plan for the World Heritage property (2015-2022)⁵ provides direction for site management to the Municipality Board, the Protected Area Board, the World Heritage Foundation and other stakeholders. The operational work plan points out activities that direct the overall implementation of the plan.

Under the supervision of the Municipality Board, the Municipal Plan for Vega is used to monitor any development in other parts of the property and its buffer zone and to safeguard the Outstanding Universal Value of the property.

The Protected Area Management Board oversees the immediate management of the Vega Archipelago property. The Board consists of: members from the Municipality Council of Vega, including the mayor of Vega who is the Chairperson; the protected area manager, who is employed by the County Governor of Nordland and acts as the Secretary; and Board members elected by the Parliament of Nordland County. Management of the property occurs under a kaleidoscope of governance protocols.

The Vega Archipelago World Heritage Foundation promotes World Heritage and coordinates local World Heritage efforts. Representatives of management authorities, the Norwegian Nature Inspectorate, the regional museum and the local World Heritage coordinator work jointly to ensure a good follow-up of the World Heritage property.

3.1.1 Governance

All pre-Reformation (pre-1537) archaeological and historical monuments and sites are protected by the Cultural Heritage Act of 1978. In addition, special protection orders for later cultural heritage have been issued for 29 Vega buildings at Skjærvær and for Bremstein Lighthouse.

The Local Government Act of 1992 regulates the authority of a municipality to self-govern; however, self-governance is limited by state laws that impose on municipalities the responsibility for a number of statutory tasks. In practice, this means that the municipalities exercise self-government within the framework set by the state. Relevant to the WH property, this framework includes, among other things, the tasks they are required to do, the size of state transfers, state supervision of the municipal sector and objections to plans under the Planning and Building Act.

The National Government allocates funds annually to carry out management and protection, dissemination, and restoration efforts in the Vega Archipelago WH property.

3.1.2 Management of climate change effects

The Norwegian Government's White Paper on Climate Change Adaptation in Norway⁶ defines that the responsibility for climate adaptation lies with the actor who is responsible for a task or function that is affected by climate change. This entails that the entire society has a responsibility for climate adaptation – individuals and households, private enterprises, government and non-governmental organisations. In a management context, this means that all national authorities are responsible for mitigating and adapting to the consequences of climate change within their area of responsibility.

⁵ <https://www.verdensarvvega.no/s/FvPlan20152022.pdf>

⁶ <https://www.regjeringen.no/en/dokumenter/meld.-st.-33-20122013/id725930/>

The local nature of climate change effects places municipalities in the front line of climate change. In order for municipalities to be able to carry out their tasks in a way that ensures resilient and sustainable local communities in the future, consideration of a changing climate is an integral part of municipal responsibilities.

One of the aims of Central Government Planning Guidelines (SPR) for *Climate and Energy Planning and Climate Adaptation*⁷ is to ensure that the municipalities use a wide range of their roles and instruments in the work on climate adaptation.

By law, the municipality is given an important role as a community developer and land use planner. Planning should set objectives for the physical, environmental, economic, social, cultural and aesthetic development in the municipality.

Municipal planning work

Municipalities and county authorities have central roles in climate adaptation work. Adaptation to the effects of climate change concerns basic social structures and must be taken into account in all aspects of social planning. Climate change requires more attention, and more efficient and targeted community and land use planning than before. The municipalities' responsibility for climate adaptation was also stated in the *National expectations regarding regional and municipal planning 2019-2023*⁸.

According to the *Planning and Building Act*⁹ (§3-1g), plans must take climate considerations into account, including adaptation to expected climate change. This is specified in more detail in the SPR³, within which planning guidelines are further described in the Guide to the Climate Adaptation section. Key points in the overall municipal planning work include:

- The precautionary principle: Due to the uncertainty of the projections of greenhouse gas emissions, continued high emissions should be used when assessing the consequences of climate change in national policy. "High emissions" is a set of emission scenarios where global greenhouse gas emissions continue to increase at about the same rate as in recent decades. Considering high emissions scenarios, rather than lower emissions options, is an application of the precautionary principle. This is also the approach used in the countywide climate profiles.
- Planning strategy: A planning strategy is to be prepared and adopted no later than one year after the constitution of a new municipal council. The planning strategy describes development features and challenges, including the current and future climate. Both existing and new knowledge about climate change and its consequences should be considered and discussed in the strategy. Understanding of how climate change affects World Heritage properties in the municipality is relevant to include in the planning strategy.
- Components of the municipal master plan include:
 - The social element: This section outlines the strategically important steps and ambitions of the municipality to ensure that climate change affects the World Heritage values of the Vega Archipelago to the least possible extent. This might be done by, for example, contributing to agriculture that utilizes uncultivated land to reduce the overgrowth of such areas. There may also be strategic measures related to securing and maintaining buildings that will be exposed to sea level rise and storm surge; e.g., by prioritizing which areas are the most important.

⁷ <https://lovdata.no/dokument/SF/forskrift/2018-09-28-1469?q=klimatilpasning>

⁸ <https://www.regjeringen.no/contentassets/cc2c53c65af24b8ea560c0156d885703/nasjonale-forventninger-2019-engelsk.pdf>

⁹ <https://www.regjeringen.no/en/dokumenter/planning-building-act/id570450/>

- The land use element: In the land use element of the municipal plan, as well as in the more detailed zoning plans, a long-term perspective on the conservation (not development) of areas that will be affected by climate change is important. For coastal areas affected by sea level rise, planning for buffer zones behind these areas can allow the natural coastal landscape to re-establish itself as change occurs (where this is not possible, zones requiring special consideration and with associated provisions could be used).

Other municipal instruments

In addition to the importance of incorporating climate change adaptation in planning work, the local nature of climate change implies that the municipality also must use other instruments. The municipality's roles are also described under "Step 8: Responsibility for climate adaptation" in the SPR³. Examples of particular relevance to the Vega Archipelago and World Heritage properties include:

- Agriculture – the Agricultural Guidance Service (a working group established under the Ministry of Agriculture) could play an active role to support farmers and in the development of agricultural practices that strengthen resilience to climate change (e.g., through subsidies)
- Business sector – the municipality also works to strengthen and organize business sectors (in the case of Vega, agriculture and fisheries are of particular importance), including through strategic considerations to ensure that the sectors support the conservation of the World Heritage values of the Vega Archipelago. These may be included in thematic sections of the municipal plans or in separate thematic plans.

It is important that climate adaptation is embedded in the administrative and political management of the municipality at a strategic level. This will simplify decision making processes at a subordinate level, while at the same time strengthening projects requiring simple processing (through, for example, applications for grants and other financial support, including loans).

3.2 A living testimony

Vega's current population of about 1200 inhabitants, living in an archipelago with 6500 islands, islets and skerries, is about half that of the early 1950s (Figure 3.1). The population lives within the buffer zone – mostly at the main island Vega, where there is evidence of human settlement from the Stone Age. Whilst there are some young families, the age distribution of the population shows a predominance around 60-70 years of age; gender is fairly balanced in all ages (Figure 3.2), While the WH property was populated in earlier times, now people live and conduct activities there only in the Eider season and summertime.

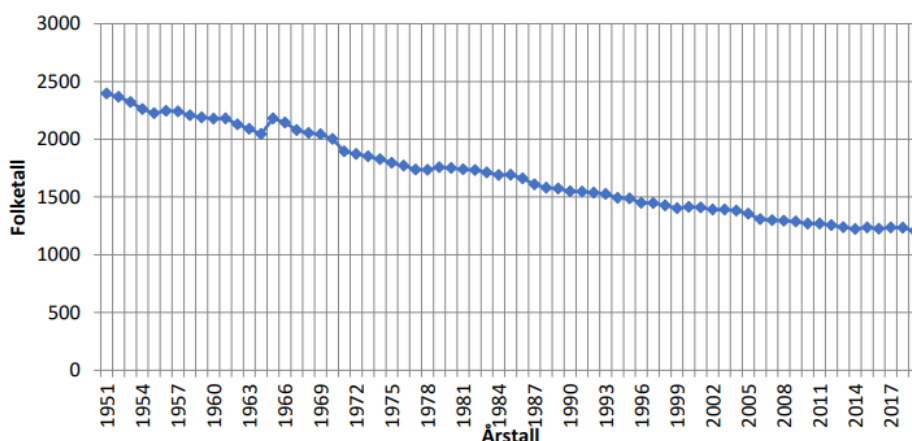


Figure 3.1 Population of the Vega municipality, 1951-2019. The population in 2020 was 1207.

(Source: <https://www.ssb.no/kommunefakta/vega>)

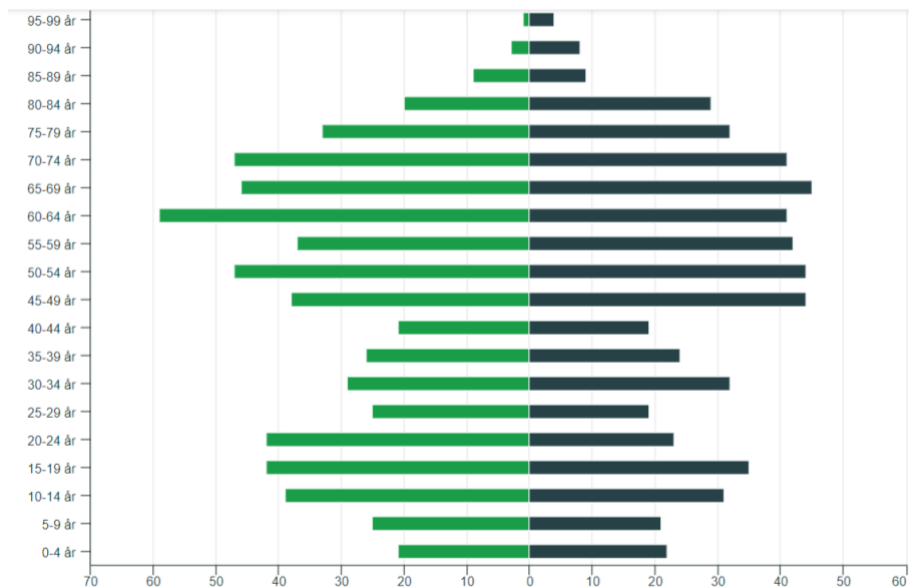


Figure 3.2 Population by age and gender of the Vega community.
 (Source: <https://www.ssb.no/kommunefakta/vega>)

Though Vega has had a decreasing population for decades (like other small communities in Norway, Figure 3.1), the WH status has been positive for the pride and identity of the local society. However, its status as a living cultural landscape is also a huge challenge to cope with – where is the interface between sustainable development, use and protection of the WH values?

Farming is the main occupation in the municipality, with many people working in public sector, oil industry and service sector. The total number of farms decreased from around 75 to less than 50 in the decade from 2008-2019 (Figure 3.3), driven by the reduction in dairy and cattle farms. In contrast, the number of pig and sheep farms was fairly stable (Figure 3.3).

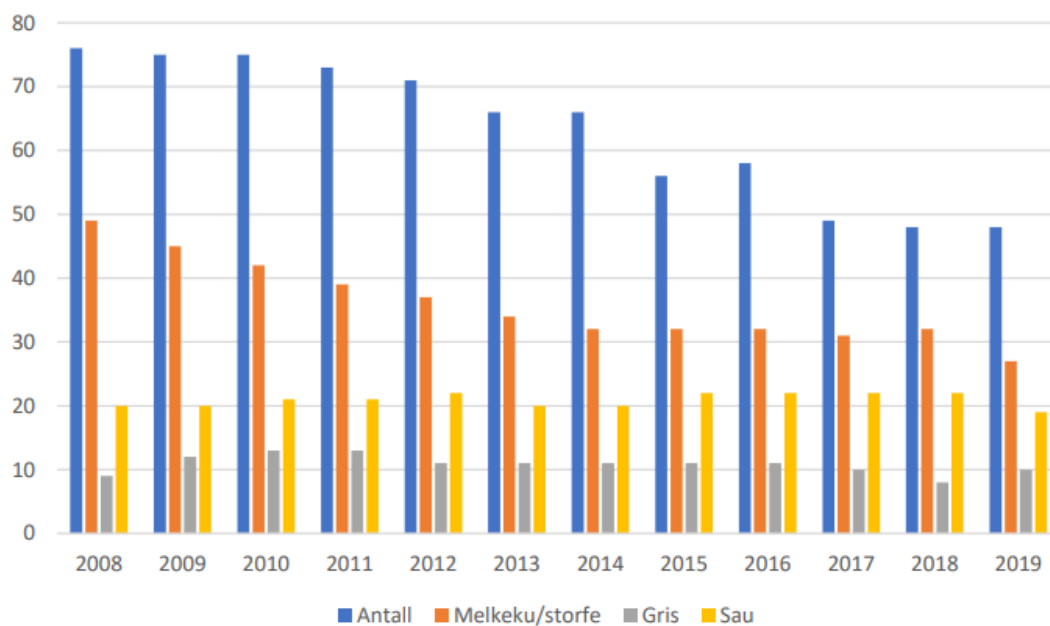


Figure 3.3 The number of farms (blue) producing dairy and cattle (orange); pig (grey) and sheep (yellow).
 (Source: <https://www.landbruksdirektoratet.no/nb/statistikk-og-utviklingstrekk/utvikling-i-jordbruket/jordbruksforetak-jordbruksareal-og-husdyr>)

The number of fishermen has declined significantly in recent decades, from around 150 in the late 1980s (both fulltime and parttime), to around 25 at present (Figure 3.4). This is consistent with the pattern in the South Helgeland region, where the number of fulltime fishermen has declined from 334 in 1988 to 70 in 2019.

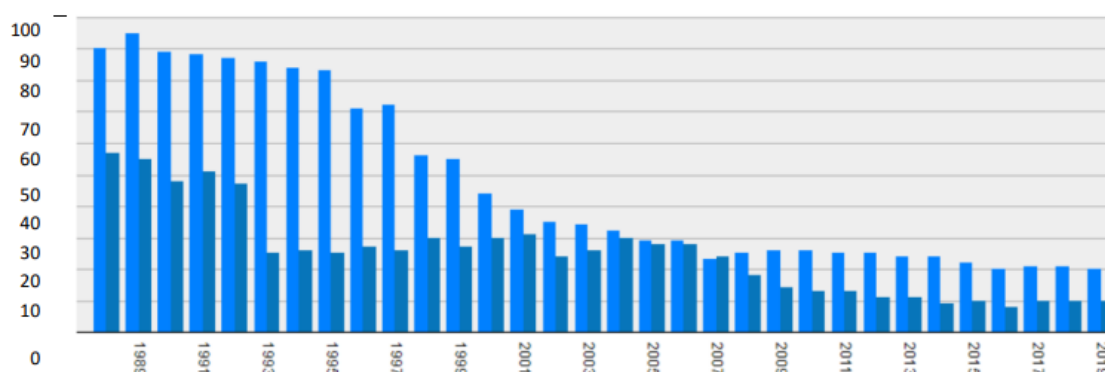


Figure 3.4 Number of fulltime (light blue) and parttime (dark blue) fishermen in Vega, 1988-2019.
 (Source: <https://www.fiskeridir.no/Yrkesfiske/Registre-og-skjema/Fiskermanntallet>)

Small-scale tourism plays an increasingly important role, as Vega has 40-60 thousand visitors annually. This represents a 10-fold increase from 2004, the year of inscription (Figure 3.5). The peak visitor season is June to August, though there has been a notable increase in visitations from April to October. However, only a few hundred visit the World Heritage property itself. Most local entrepreneurs have tourism as a part time occupation, and combine this with farming, fishing or other jobs.

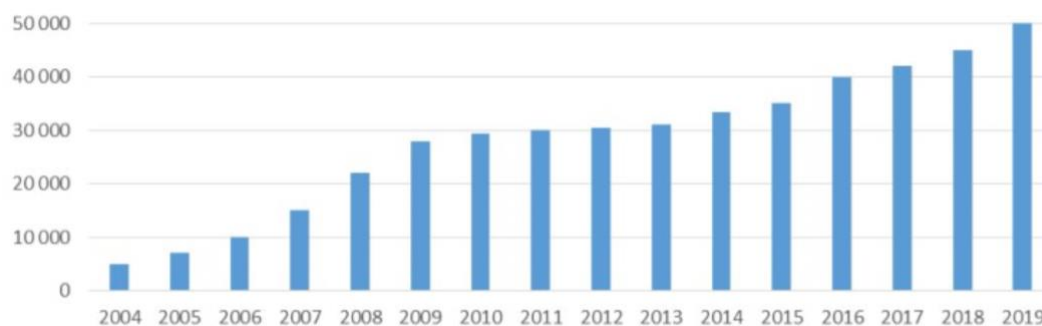


Figure 3.5 Visitor numbers to Vega, 2004-2019.
 (Source: Hilde Vega, Tourist manager, Vega Municipality Administration)

Vega has been certified as one of five Norwegian pilot destinations for sustainable tourism under the guidance of Innovation Norway. The local community has worked together with regional and national authorities to develop a strategy for tourism focusing on targeted development, orderly traffic and local value creation.

The establishment of the Vega World Heritage Centre in 2019 has proved very important as a hub for activities, dissemination of information, and the development of skills and capacity to support protection of the property values. It provides a fulcrum to address future challenges to maintain the WH values, including from climate change, whilst supporting the holistic development of the local society in a sustainable direction in the face of a declining population. The facility is a focus for local engagement and to increase understanding for protection of the values in the area.

CLIMATE AND ITS INFLUENCE ON VEGA ARCHIPELAGO



Lånan

Photo: R. Johansen, Vega World Heritage Foundation

SECTION 4: CLIMATE AND ITS INFLUENCE ON VEGA ARCHIPELAGO

4.1 Current climate

The climate of Vega results from its oceanic location, strongly influenced by the relatively warm Norwegian Current. Comparing monthly climate normals (climatological averages) of temperature from 1961-1990 and from 1991-2020 (Table 4.1) reveals a consistent timing of seasons and a dramatic warming of $\geq 1.6^{\circ}\text{C}$ in December and January. In the recent era, there were no winter months with average temperature below freezing (0°C). Spring and summer exhibit contrasts of slight cooling in early-summer and substantial warming ($\geq 0.7^{\circ}\text{C}$) in late-summer. Precipitation varies seasonally with autumn and winter months experiencing around twice the rainfall of those in spring and summer (Table 4.1).

Table 4.1 Climate normals for temperature and precipitation from the weather observatory at Vega-Vallsjø

	Temperature ($^{\circ}\text{C}$)		Precipitation (mm)
	1961-1990	1991-2020 (change)	1991-2020
January	-0.9	0.8 (+1.7)	126
February	-0.6	0.1 (+0.7)	112
March	0.8	1.0 (+0.2)	115
April	3.4	4.0 (+0.6)	82
May	7.8	7.5 (-0.3)	59
June	10.8	10.6 (-0.2)	64
July	12.5	13.2 (+0.7)	66
August	12.5	13.2 (+0.7)	84
September	9.7	10.5 (+0.8)	126
October	6.5	6.4 (-0.1)	128
November	2.5	3.3 (+0.8)	129
December	0.1	1.7 (+1.6)	147

4.2 Observed climate trends

Changes in the climate of Vega are closely linked to changes in the climate of mainland Norway. Over the past century, the temperature and rainfall for northern Norway (Figure 4.2) have each shown increasing trends punctuated by extreme years, both high and low. Compared with the 1961-1990 average, the subsequent 30-year period has been demonstrably warmer (cf. Table 4.1) and wetter.

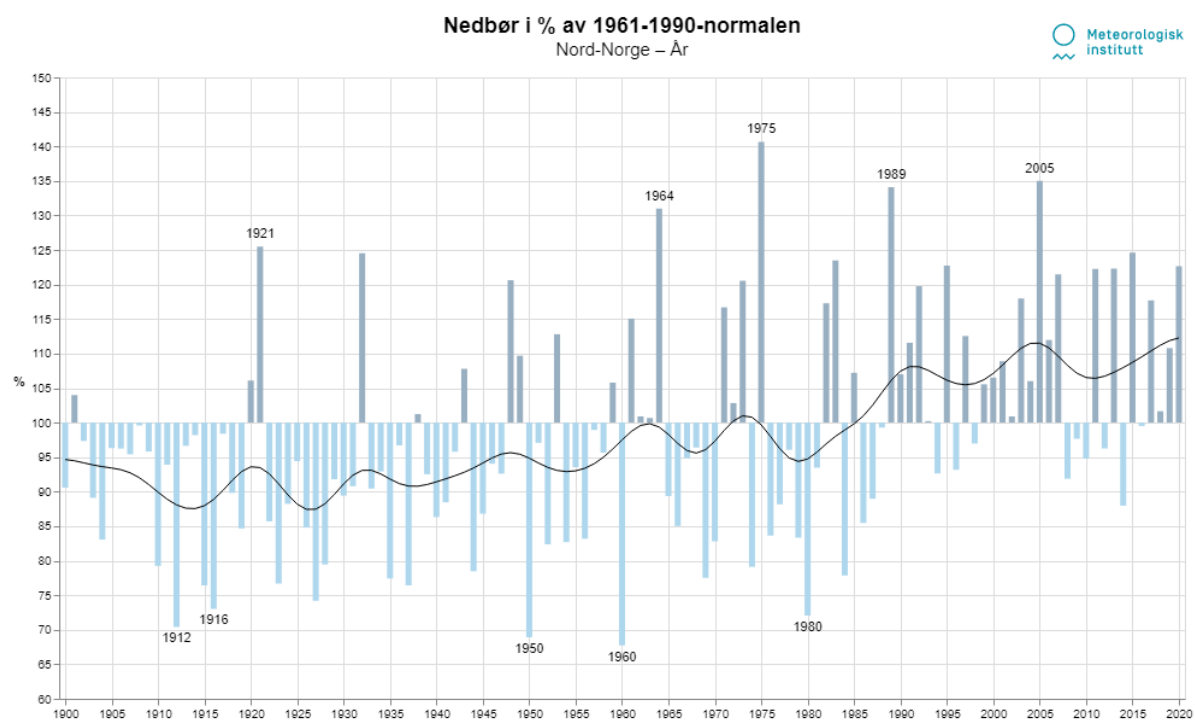
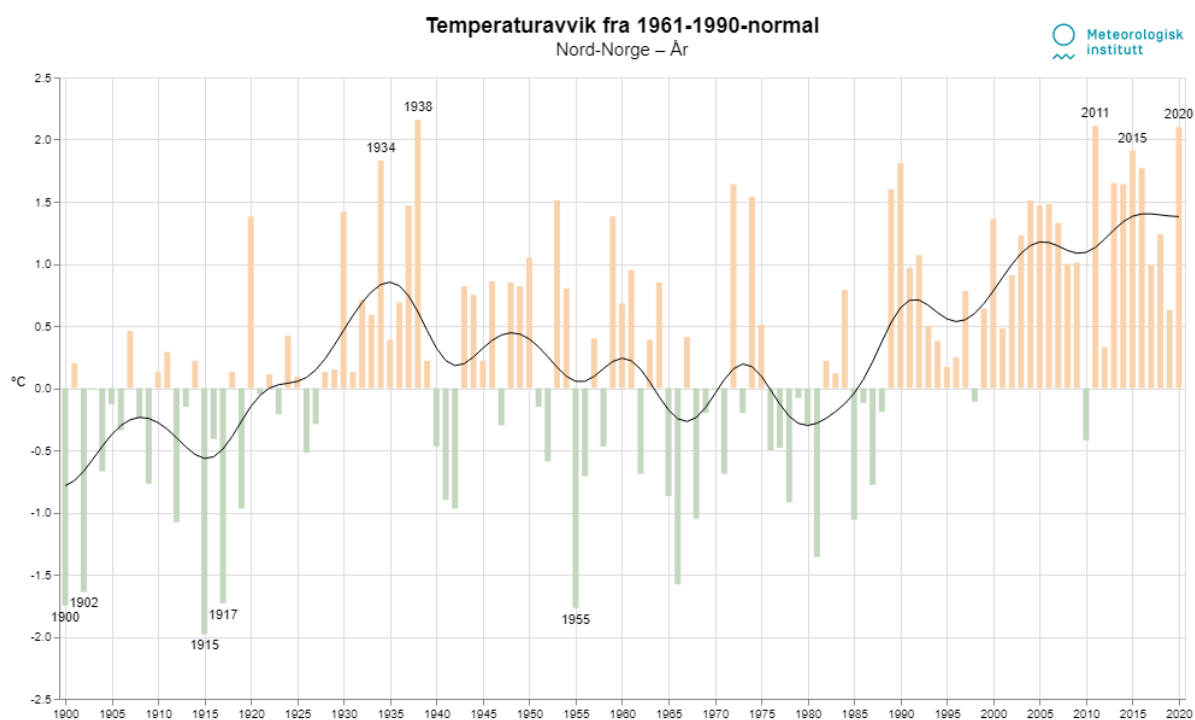


Figure 4.2 Time series of temperature anomaly (upper panel) and rainfall ratio (lower panel) from 1900 to 2020, compared with the 1961-1990 average. Source: Norwegian Meteorological Institute.

4.3 Climate projections

Future impacts on marine and coastal areas can be informed by reports of the Intergovernmental Panel on Climate Change (IPCC), specifically the 5th and 6th Assessment Reports (AR5 and AR6, respectively; IPCC 2013, 2021) and the Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC; IPCC 2019). At the time of the workshop, AR6 outputs were not available for use in the Norwegian context. The IPCC model projections for AR5 and the SROCC were informed by the Coupled Model Intercomparison Project Phase 5 (CMIP5; Taylor et al. 2012). This defined four major scenarios for climate emissions (Representative Concentration Pathways, RCP): RCP8.5, RCP6.0, RCP4.5 and RCP2.6, where the number describes the total radiative forcing (in W/m²) from each scenario in 2100. These scenarios represent various degrees of international regulations on greenhouse gas emissions. RCP8.5 is a high-emissions scenario representing a continued increase in fossil fuel dependency; RCP6.0 and RCP4.5 are scenarios in which emissions are stabilised to peak mid-century; and RCP2.6 is a low-emissions scenario in which greenhouse gas emissions are mitigated to achieve the target of the Paris Agreement to limit warming above pre-industrial levels to within 2°C (UNFCCC 2015).

The Norwegian Centre for Climate Services used information in AR5 and CMIP5 outputs to develop the report “Klima i Norge 2100”¹⁰. Information from the report using the RCP8.5 scenario was compiled into a fact sheet for each county in Norway, called Klimaprofiler (available from the same website). Vega is part of the Nordland County in Norway and much of the following information on future climate will be based on this fact sheet, augmented with results for RCP4.5⁴.

Temperature

Annual-average temperature is projected to rise by 4.8°C (compared with the 1981-2010 average) by the end of this century under RCP8.5 (Table 4.2, Figure 4.3). There is a minor variation between the seasons with an estimated increase of 4.6°C in the summer and 5.1°C in the winter. Under RCP4.5, the projected temperature increase is 2.9°C for the full year (Table 4.2), with the same pattern seasonally. Seasonal projections consistently reveal that winter is projected to warm faster than the other seasons, which will lead to a clear decrease in zero-crossing days (Figure 4.4).

Table 4.2 Projected annual and seasonal change in temperature (°C) for the county of Nordland, compared with the 1981-2010 average.

	2050		2100	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5
Winter	2.1	2.8	3.0	5.1
Spring	1.8	2.4	2.9	4.8
Summer	1.7	2.1	2.5	4.6
Autumn	1.8	2.5	2.8	4.8
All year	1.9	2.4	2.9	4.8

¹⁰ Available from <https://klimaservicesenter.no> together with a summary in English

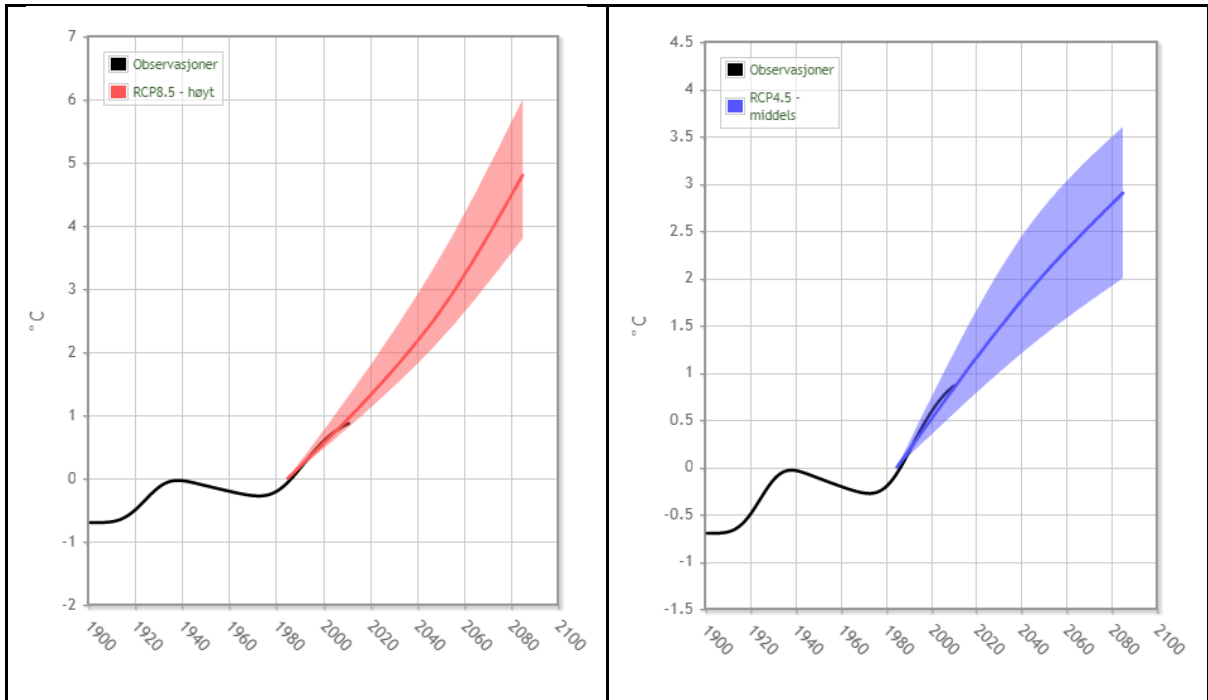


Figure 4.3 Observed (black line) and projected change (colour) in annual-average temperature for Nordland County under Representative Concentration Pathway (RCP) 8.5 (left panel) and RCP4.5 (right panel).
 Source: www.klimaservicesenter.no

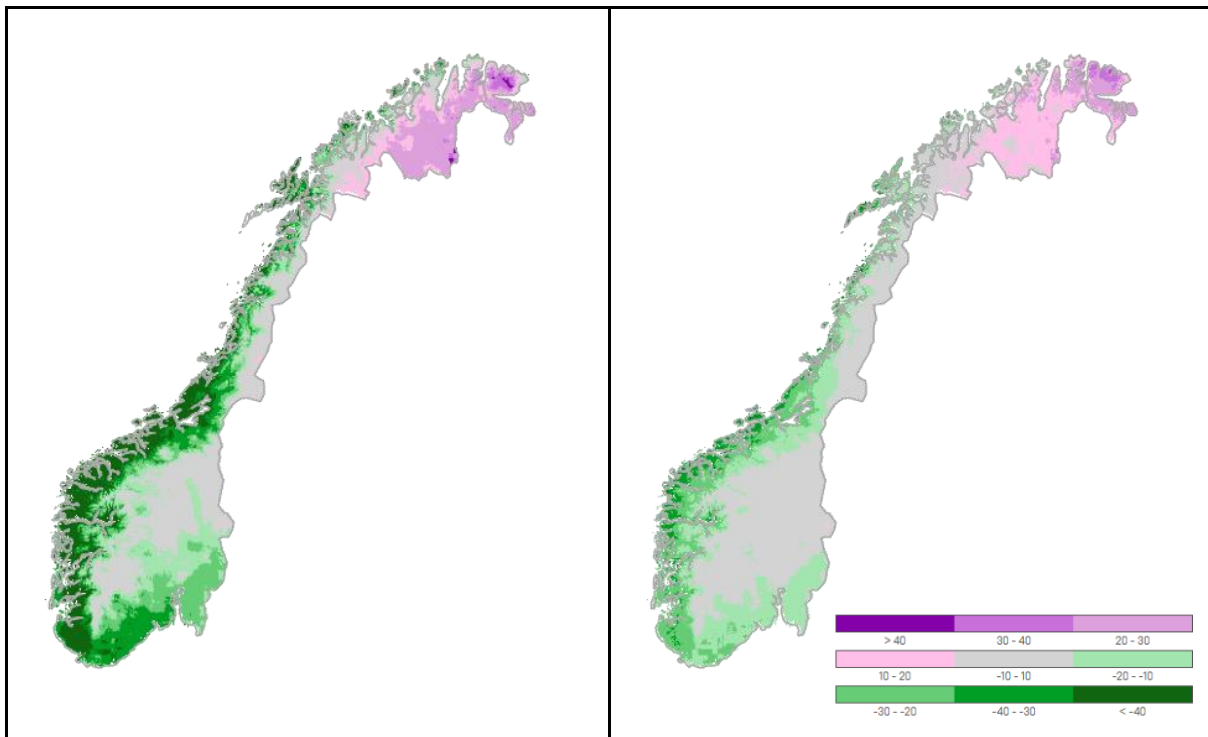


Figure 4.4 Projected change in the number of days with zero-crossing towards the end of the century under Representative Concentration Pathway (RCP) 8.5 (left panel) and RCP4.5 (right panel)

Extreme temperatures at the latitude of Vega are usually associated with extreme cold spells, but the marine influence on the climate of Vega moderates temperature lessening the occurrence of both cold events and the risk of heatwaves.

Precipitation

Projected changes in precipitation indicate an increase in annual totals this century. This increase may be as much as 20% by the end of the century under RCP8.5 (Figure 4.5). Seasonally, the main signal is that the summer rain is increasing faster than the other seasons (Table 4.3). This increase is expected to be mainly due to increased heavy precipitation, especially in summer. More information on heavy precipitation can be found in the climate fact sheet "Klimaprofil Nordland"¹¹.

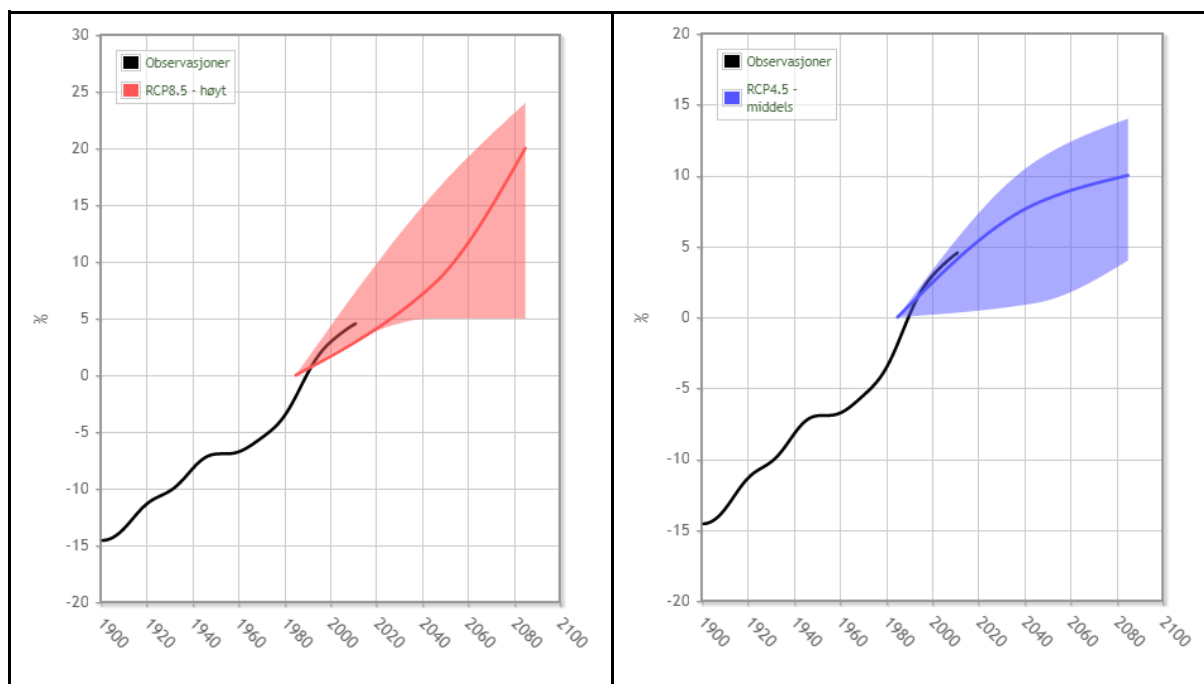


Figure 4.5 Predicted change in annual precipitation in Nordland County under Representative Concentration Pathway (RCP) 8.5 (left panel) and RCP4.5 (right panel). Source: klimaservicesenter.no

Table 4.3 Projected annual and seasonal change in precipitation (%) for the county of Nordland, as a ratio of the 1981-2010 average.

	2050		2100	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5
Winter	2	5	3	11
Spring	1	7	12	5
Summer	8	15	21	30
Autumn	11	13	8	26
All year	8	8	10	20

¹¹ See klimaservicesenter.no

Snow

Due to increased temperature, the number of days with snow on Vega will be severely limited in the future, but some snow should still be expected during most winters in the future (Figure 4.6).

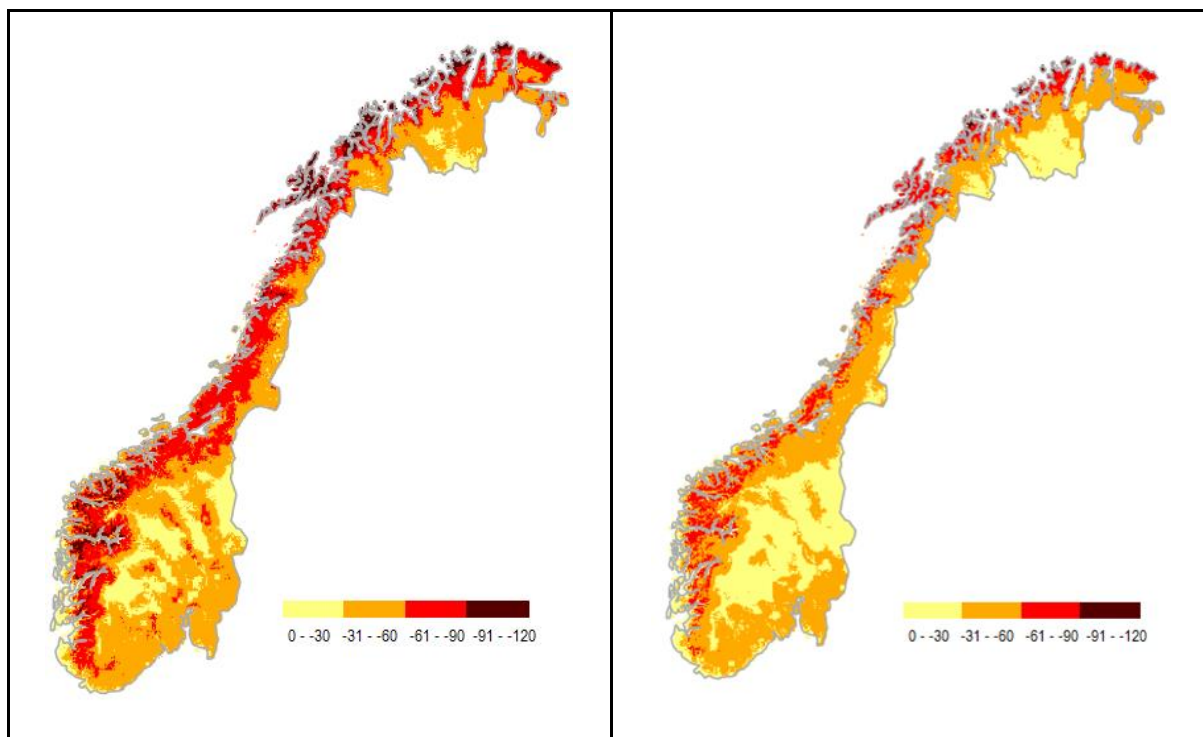


Figure 4.6 Projected mid-century changes in number of snow days for Norway under Representative Concentration Pathway (RCP) 8.5 (left panel) and RCP4.5 (right panel), relative to the average number of snow days during 1971-2000.

Hydrology

Even with the afore-mentioned increase in precipitation, the projected risk of drought is increased due to higher evaporation in a warmer climate. The increase in heavy rainfall also increases the flood risk, which probably is relevant only to the main island of Vega.

Sea level

Sea level is monitored by the Norwegian Mapping Authority¹². Projected sea level shows a 40-82 cm increase for the Nordland region, compared with 1981-2010, consistent with the estimates of the Norwegian Mapping Authority (the agency responsible for monitoring sea level). This has the potential for severe effects on some coastal regions of Vega, illustrated (Figure 4.7) by a modelled 1-in-200-year flooding event that incorporates sea level rise and storm surge for a north-west region of the island of Vega towards the end of the century under RCP8.5.

¹² <https://www.kartverket.no/sehavniva/>

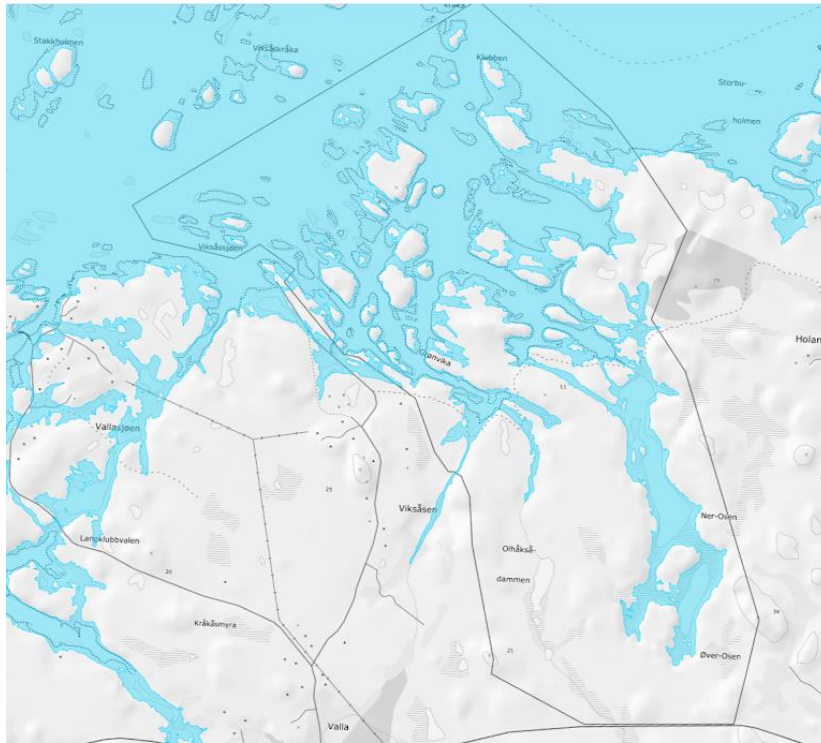


Figure 4.7 Modelled impacts of a 1-in-200-year flood event at the end of the century under Representative Concentration Pathway (RCP) 8.5.

Wind

Projections of future wind are very uncertain and contain no statistically robust answers. The best available information suggests a minor increase in the severity of extreme winds.

Other natural hazards

The changing climate might adjust the risk of other natural hazards like mudslides, quick clay and avalanches. Most of these other hazards have a probable slight increase due to more precipitation; however, changes in these threats were not quantified.

Wood decay risk

The changing climate will also affect the built environment. Increased rainfall and more-frequent periods of increased humidity will increase the impacts of water ingress on wooden constructions. This is also associated with an increased risk of wood decay. Estimated wood decay in the current climate is amplified in potential wood decay projections based on a scenario similar to RCP8.5 (Figure 4.8).

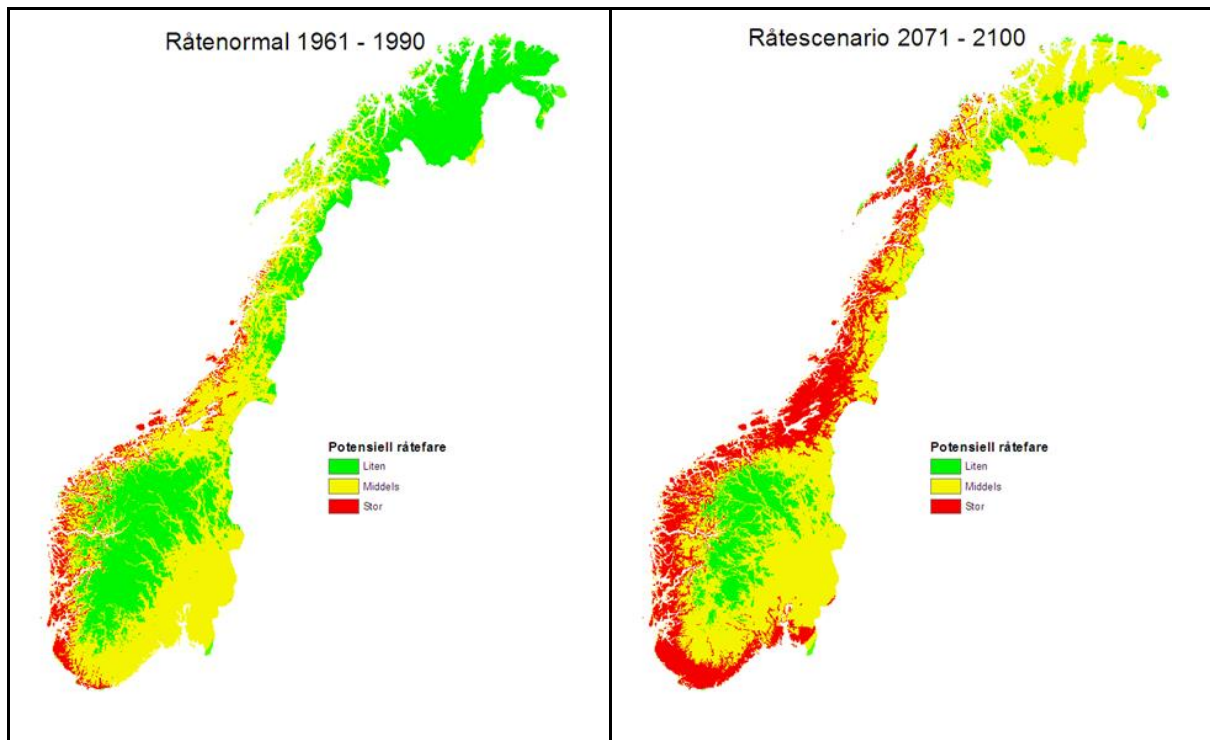


Figure 4.8 Estimated wood decay in the current climate (left panel) and projected potential wood decay (low/moderate/high) under a scenario similar to RCP8.5 (right panel).

APPLYING THE CLIMATE VULNERABILITY INDEX TO VEGA ARCHIPELAGO



Overturned boats transformed into eider houses

SECTION 5: APPLYING THE CLIMATE VULNERABILITY INDEX TO VEGA ARCHIPELAGO

5.1 Background

The Climate Vulnerability Index (CVI) is a systematic and rapid tool developed to assess the vulnerability to climate change of all types of WH properties (natural, cultural and mixed), considering the Outstanding Universal Value (OUV) and the associated community (local, national and international). The CVI framework builds upon the vulnerability framework approach described in the 4th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC 2007). Vulnerability of OUV is determined by assessing the exposure, sensitivity and adaptive capacity with respect to determined climate stressors (Figure 5.1). The OUV Vulnerability becomes the exposure term to assess the vulnerability of the community associated with the property, combining with assessments of economic-social-cultural dependency (sensitivity) and adaptive capacity (Figure 5.1). A customised spreadsheet-based worksheet is used to determine outcomes based on user inputs. A more detailed outline of the CVI methodology is provided by Day et al. (2020).

The foundation for the CVI process is the Statement of OUV for a property (Appendix 1), from which key WH values are summarised (Table 2.1). The key climate stressors most likely to impact the key values (and attributes) are identified for a defined and agreed time scale (e.g., by 2050) from a list of possible stressors (Table 5.1). With this foundation established, the CVI process is initiated (for a more detailed outline of the CVI process, see Day et al. 2020).

The first phase of the CVI process (assessing the OUV Vulnerability) is determined by assessing the exposure, sensitivity and adaptive capacity (Figure 5.1) with respect to the three chosen key climate stressors. The OUV Vulnerability then becomes the exposure term to assess the vulnerability of the community associated with the property (the second phase), combining with assessments of economic-social-cultural dependency (sensitivity) and adaptive capacity.

At the time of this report, applications of the CVI had occurred in natural WH properties in Australia, Germany/Netherlands/Denmark, Finland/Sweden, and Seychelles, and in multiple diverse cultural WH properties in Scotland and Africa (see CVI website¹³).

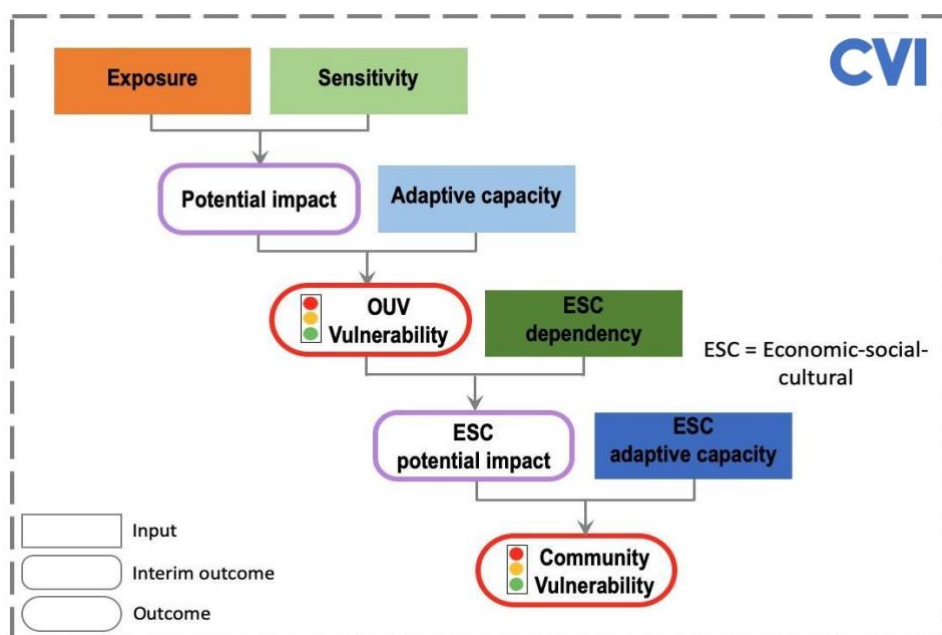


Figure 5.1 The CVI framework used to undertake rapid assessment of climate change vulnerability of World Heritage properties and the associated community

¹³ <https://cvi-heritage.org>

5.2 The CVI process for Vega

Prior to application of the CVI framework in Vega, various preparatory steps were undertaken:

1. The Statement of OUV for Vega was analysed and distilled into key values and their accompanying attributes (see Table 2.1);
2. Background information was prepared outlining key aspects of climate change;
3. A list of other Significant Property Values (SPVs) was compiled (see Appendix 3); and
4. An overview of information related to economic, social and cultural connections was compiled.

The CVI application for Vega was undertaken during two workshops assessing the OUV Vulnerability and Community Vulnerability, respectively. Due to constraints on international travel due to the COVID-19 pandemic, the first workshop was conducted online (using the Zoom platform) over four half-day periods, spanning 30th November to 3rd December 2021. The participants joined the workshop from locations across Norway (and one from USA), whilst the facilitators were located in Townsville, Australia.

The second phase, to assess Community Vulnerability, was planned for April 2022 by which time international travel had become possible. Participants and facilitators met at the WH property, with the workshop conducted at the Vega World Heritage Centre following an opening event at the Vega Havhotell (where most participants stayed), during 4th to 6th April 2022.

Both workshops were conducted through a series of plenary and breakout sessions, in which information was presented and assessments were undertaken and discussed. In the online Phase 1 workshop, the breakout sessions were held using the breakout rooms feature of the Zoom platform. Four breakout groups were defined for Phase 1 and the participants within these were (largely) consistent for the Phase 2 workshop. All assessed outputs from the groups were reported back to subsequent plenary sessions for synthesis. Outcomes for each component were recorded in a customised spreadsheet to determine final results.

The second workshop culminated with a public event, in which the outcomes of the CVI process were described. This fostered substantial discussion amongst those present (approximately 70 people; Figure 5.2) of vulnerability to climate change of both the property and the community. Notably, these discussions confirmed many of the perspectives shared within the breakout and plenary sessions of the workshop.



Figure 5.2 The public meeting at the Vega World Heritage Centre on 7th April 2022. *Photo: C. Day*

5.3 Key climatic stressors

A list of 15 climate stressors typically considered in the CVI process was provided to participants at the workshop (Table 5.1). Participants analysed those likely to have the most impact on each of the key values of OUV (Table 2.1). The workshop selected the time scale to consider impacts as ca.

2050 and considered future effects under a high-emissions climate scenario (RCP8.5, SSP5-8.5). The climate stressors appearing in the top three for each value (including equal-third) were used to rank the stressors (Table 5.1; Figure 5.3). From this, the three climate stressors assessed as likely to have the greatest impact on the OUV for Vega were determined as:

- Temperature trend (air and/or water) – TT;
- Sea level rise (trend) – SLR; and
- Precipitation trend – PT.

Notably, the impacts resulting from these three key climate stressors are likely to unveil at different timepoints. While effects of all three may be apparent to some degree, increases in temperature and precipitation (and the associated impacts) are already occurring. In contrast, the greatest impacts from sea level rise will not occur until later this century.

Table 5.1 Climate stressors identified as likely to have the greatest impact for each of seven attributes of OUV. Marked cells indicate that the climate stressor was in the top three responses (including equal-third) for each key value. Stressor impacts were assessed for ca. 2050 and a high-emissions climate scenario.

Key values of OUV	Temperature trend (air and/or water)	Extreme temperature events	Precipitation trend	Intense precipitation events	Flooding (fluvial, pluvial)	Drought (severity, duration, frequency)	Mean wind trend	Storm intensity and frequency	Sea/lake ice change	Snow cover change	Sea level rise (trend)	Coastal flood	Storm surge	Coastal erosion	Changing currents
Unique cultural landscape	x		x								x			x	
Distinctive coastal landscape and open seascape	x										x			x	
Marine biological resources	x	x		x							x	x			x
Eider ducks	x										x	x			
Traditional management	x		x			x		x			x		x		
Distinctive built heritage	x		x					x			x				
Archaeological heritage	x			x							x			x	
Total	7	1	3	2	0	1	0	2	0	0	7	2	1	3	1

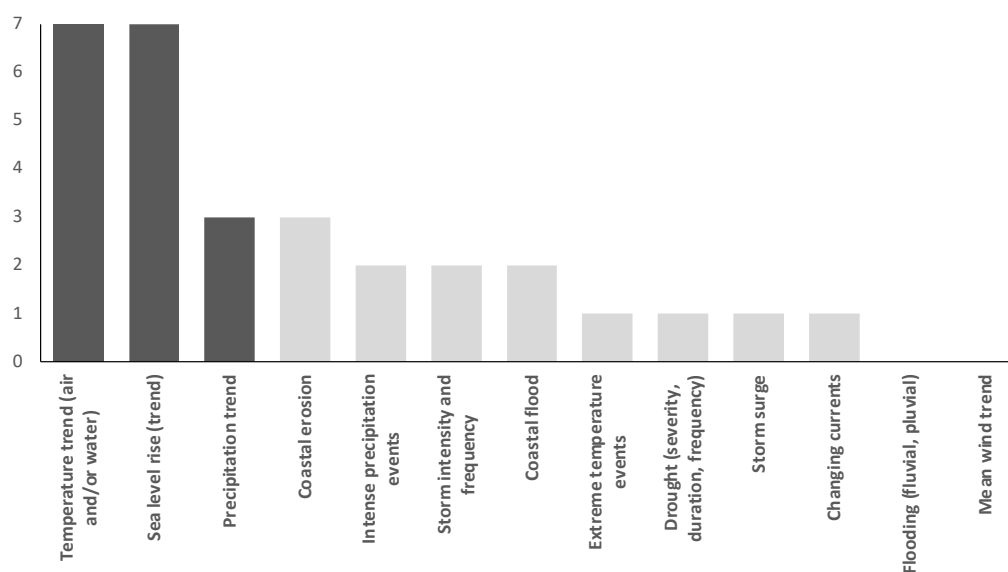


Figure 5.3 Histogram of the number of key values of OUV for Vega for which each of 15 climate stressors were among the top three likely to cause impacts (ca. 2050, high-emissions scenario).

5.4 OUV Vulnerability

Assessments of **exposure** and **sensitivity** of the OUV system to each of the identified three key climate stressors were undertaken using a five-point categorical scale, adapted from categories used by IPCC and IUCN analyses (see Day et al. 2020 for details). Modifiers were applied to the initial assessments to include effects of temporal scale and trend (for exposure), and spatial scale and compounding factors (for sensitivity).

The compounding factors were considered to be many. Participants determined that the three key stressors would interact with each other, as well as with other stressors, to increase risk of impacts and lead to unforeseen consequences. Examples of this include increased risk of rot in built heritage (TT, SLR, PT), including through longer wet periods reducing time to apply protective paint; and coastal exposure (SLR and storm surge). Species complexity is also likely to be influenced by climate-related invasive species (TT) but also changes in marine harvesting (including new species). Increased temperature (TT) may increase season for sheep grazing, while salt intrusions (SLR) may lead to a reduction in grass-land due to salt intrusion; however, access to fresh water (PT) was described as the factor to which sheep grazing is most sensitive. Removal of trees, particularly in the hills, may increase the loss of soil (and therefore grazing lands) with extreme precipitation (PT). It was also noted that less occurrence of winter frost (TT) may allow more growth that stabilises the ground; however, this absence of winter conditions may also lead to changes in the hydrological cycle that are currently unknown. Across all this, the dynamics of increased tourism are also relevant – tourist numbers have increased tenfold since inscription and this increases risk of damage from footfall, particularly in wet conditions (PT). However, wetter conditions may reduce tourist visitation (though warming may encourage more).

Results from exposure and sensitivity assessments undertaken in breakout groups were synthesised in plenary. After including modifiers, the Exposure was determined as very likely (>90%, highest category; Table 5.2) for each of the three key stressors. Sensitivity of OUV to Temperature trend and Sea level rise was determined as high (second highest category), indicating potential for some loss of some of key WH values, whilst the sensitivity to Precipitation trend was moderate (middle category), indicating loss or alteration of few key WH values will occur. Notably, the application of modifiers incremented the assessed Sensitivity with respect to Sea level rise and Precipitation trend (from moderate and low/moderate, respectively). The **potential impact**, derived from exposure and sensitivity, was determined as extreme (highest on a four-point scale, low to extreme) for Temperature trend and Sea level rise; and high (second highest) for Precipitation trend (Table 5.2).

Table 5.2 Rapid assessment of OUV Vulnerability to identified three key climate stressors. Assessed values of exposure, sensitivity and adaptive capacity contribute to derived outcomes for potential impact and OUV Vulnerability. Colours refer to the elements of the CVI framework (Figure 5.1)

Key Climate Stressors:	Temperature trend (air and/or water)	Sea level rise (trend)	Precipitation trend
Exposure	Likely/Very likely	Likely/Very likely	Very likely
Temporal scale	On-going	On-going	On-going
Trend	Moderate increase	Moderate increase	Slow/Moderate increase
Exposure	Very likely	Very likely	Very likely
Sensitivity	High	Moderate	Low/Moderate
Spatial scale	Widespread	Localised	Localised
Compounding factors	High probability	Medium probability	Medium probability
Sensitivity	High	High	Moderate
Potential impact	Extreme	Extreme	High
Local management response	Low	Moderate	Moderate
Scientific/technical support	Low	Low	Moderate
Effectiveness	Low	Low/Moderate	Moderate
Adaptive capacity	Low	Moderate	Moderate
OUV Vulnerability	High	Moderate	Moderate
Combined OUV Vulnerability	Moderate		

The **adaptive capacity** of a system to respond to stress can reduce the potential impacts. Adaptive capacity of the OUV system was assessed for each key climate stressor by considering the levels of local management response and scientific/ technical support (four-point scale), as well as the effectiveness of these to address impacts from each stressor (four-point scale). Workshop participants brainstormed adaptive capacity options (Table 5.3), from which a subset (bold) was selected to provide focus for the assessments.

The adaptive capacity was determined to be low (second lowest on a four-point scale, very low to high) with respect to Temperature trend and moderate (second highest) for Sea level rise and Precipitation trend.

OUV Vulnerability (three-point scale, low to high) was determined to be high for Temperature trend and moderate for Sea level rise and Precipitation trend. The combined **OUV Vulnerability** for the Vega Archipelago was determined as **Moderate** (Table 5.2).

Table 5.3 Strategies for adaptive capacity brainstormed during the workshop, with those prioritised for the assessment shown in bold.

Key climate stressors	Possible adaptive capacities
Temperature trend (TT)	<ul style="list-style-type: none"> • Return to traditional maintenance of built heritage, including reinstating "tranmaling" (the use of cod liver oil-based paint) • Sea urchin control • Prevent rot (also PT)
Sea level rise (SLR)	<ul style="list-style-type: none"> • Gradual retreat of eider duck houses to match SLR • Move the eider duck nests out of range from storm flooding • Regulations for new buildings near sea level • Raising built heritage along the current edge of the sea
Precipitation trend (PT)	<ul style="list-style-type: none"> • New or more solid eider duck houses • Consider drainage in nesting areas to mitigate increased rain • Prevent rot (also TT) • Selective use of plants to strengthen the roots, and protection of plants to ensure that soil stability • adaptive management of the cultural landscape (grazing) • Using "old" knowledge (water collection) regarding built heritage
General	<ul style="list-style-type: none"> • Increase monitoring to facilitate responsive measures/ monitoring - both sea and land • Use high quality materials to restorations, and avoid things like Sitka pine • Increased mapping and research, especially on the interactions of ecosystems, climate and OUV • Increased protection measures (nature reservations etc) • Recruiting of personnel • Strengthen regulations and practice on stressors; e.g., Cutting of seaweed, stop oil-spills • Decrease global warming • tow iceberg to cool off ocean

5.5 Community Vulnerability

The assessment of Community Vulnerability considers the economic, social, and cultural (ESC) aspects of the community associated with the property using two metrics. **Dependency** reflects the extent to which the loss of WH values will affect ESC indicators in the future. These effects can be positive or negative. Separate assessments for economic, social and cultural dependency are combined to give an overall ESC dependency. **Adaptive capacity** reflects the current level of capacity within each component to adapt in the face of loss of WH values due to key climate stressors, and only has a positive directionality. As for dependency, separate assessments for economic, social and cultural adaptive capacity are combined to give an overall ESC adaptive capacity. Assessments were undertaken in small breakout groups, which again resulted in a spectrum of responses for each that was resolved in plenary.

A specific scenario was provided to participants to guide assessment of likely climate change impacts on the economic, social and cultural aspects. The selected scenario elements, based on climate projections for ca. 2050 (Section 3), were: (i) Temperature trend: a 2°C increase in air temperature from present conditions; (ii) Sea level rise: 15-20 cm increase; and (iii) Precipitation trend: an 8-9% increase in annual-average rainfall, with a greater increase in summer than in winter.

The economic component considers the economic effects on economic activities/business types that are directly associated with the WH property. In preparation for the workshop, the Steering Committee developed a list of eight activities:

- Eider traditional activities;
- Restoration (not eider houses) and Construction;
- Landowner management of the cultural landscape;
- Government employment (local, regional, national);
- Tourism;
- Farming;
- Fishing; and
- Aquaculture.

Workshop participants suggested the inclusion of three further activities and these were adopted: Retail, Arts & crafts and Transportation (Construction was discussed and incorporated with Restoration).

During the assessment, workshop participants determined that Eider traditional activities, Landowner management of the cultural landscape, Farming and Fishing to be the most important activities. As such, these were given additional consideration in making the final assessments. Participants noted the complex interactions of future climate conditions with respect to economic effects. For example, the potential benefit to Farming of a longer growing season was countered by projected increases in precipitation that would limit the use of machinery; while for Tourism the threat of climate impacts could promote visitation (last-chance tourism) or reduce visitor numbers (due to a decline in WH values). Economic dependency was assessed as moderate-negative (i.e., a negative impact at a moderate level), whilst the adaptive capacity was also moderate (Table 5.4).

Social indicators used to inform the assessments were considered within four categories: Human capital; Social capital; Natural capital; and Built capital (after Costanza et al. 2007). Locals were determined by the workshop to be the most important group upon which the social assessments should be focused and this was taken into consideration for the final assessments. Discussion amongst participants included whether the definition of 'locals' should include summer house owners, with the resolution that because the community considers them as such, so should the analysis process (also noting that there are many types of 'locals'). Social dependency was assessed as moderate-negative, whilst the adaptive capacity was moderate (Table 5.4).

Table 5.4 Rapid assessment of Community Vulnerability to identified three key climate stressors. Assessed values of economic, social and cultural (ESC) dependency (sensitivity, ranging from negative to positive) and adaptive capacity contribute to derived outcomes for ESC potential impact and Community Vulnerability.

Economic	Moderate-negative
Social	Moderate-negative
Cultural	Moderate-negative
ESC dependency	[-] Moderate-negative [+]
ESC potential impact	Moderate
Economic	Moderate
Social	Moderate
Cultural	Moderate
ESC adaptive capacity	Moderate
Community Vulnerability	Moderate

Cultural indicators were also considered within four categories pertaining to: Self; People; Environment; and Pleasure (after Marshall et al. 2019). Cultural connections of locals were also considered by the workshop to be of greatest importance and this was taken into consideration for the final assessment. Participants reported the concept of cultural adaptive capacity was variable across and time and space scales; and was difficult to address due to conflicting desires (e.g., for WH values and aquaculture at a local scale) and the myriad alternative WH properties available to the global community. Cultural dependency was assessed as moderate-negative, whilst the adaptive capacity was moderate (Table 5.4).

Combining the three components, the overall ESC dependency was determined as moderate-negative, which, combined with the OUV Vulnerability (as the exposure term), resulted in the ESC potential impact being assessed as moderate (three-point scale, low to high; Table 5.4). The combined ESC adaptive capacity was assessed as moderate (three-point scale, low to high). These outcomes determined the **Community Vulnerability** as **Moderate** (three-point scale, low to high; Table 5.4).

5.6 Complexities for assessing climate vulnerability in a cultural landscape

Cultural landscapes express a long and intimate relationship between people and their natural environment. The Vega Archipelago is a complex cultural landscape, spanning a wide range of natural and cultural values. The natural environment in Vega Archipelago provides the foundation for the traditional way of life based on fishing, farming, sustainable land management techniques (Figure 5.4) and the harvesting of down. Traditional forms of land and sea use can enhance natural values in the landscape and the protection of cultural landscapes can contribute to maintaining ecosystems. The importance of traditional management in the maintenance of the terrestrial and marine environment in Vega underpins the cultural identity and traditional ways of life and cannot be understated. Moreover, a focus on reducing impacts upon the community would likely incorporate benefit to the WH values.

The complexity of the cultural landscape of the Vega Archipelago and the high reliability on natural values entail that climate change is affecting and will affect the World Heritage values at very different scales. Increasing sea temperature will, for instance, have broad-scale impact on the



Figure 5.4 Some of the islands are covered with a thin layer of soil, as here in Lånán. Traditional land management with mowing and grazing provides vegetation cover that is resistant to erosion (upper panel). Without grazing, the overgrown landscape loosens soil resulting in wind erosion and loss of biodiversity (lower panel).

marine biological resources with downstream effects on the coastal landscape and seascape. The impact on these values will likely happen at a much larger and even irreversible scale, with a limited capacity to adapt to loss of natural attributes (e.g., decline in seabird population). In contrast, impacts on cultural attributes (such as wood rot in buildings, due to increased precipitation and warming air temperature) have a much smaller scale and there is typically a higher level of adaptive capacity, including through traditional techniques (e.g., for wood rot, the use of specific ingredients for protective paint).

5.7 Summary

Temperature trend (air and/or water), Sea level rise and Precipitation trend were identified as the three climate stressors likely to most impact the WH values of the Vega Archipelago. Potential impact from each of these key stressors was scored in the high or extreme categories, with adaptive capacity to mitigate impacts from each being assessed as low or moderate. As a result, the **OUV Vulnerability** was determined to be in the middle category (**Moderate**). Impacts from the key climate stressors were judged as likely to lead to a negative future impact at a moderate level on the economic, social and cultural aspects of the Vega community. As the adaptive capacity of the community to the climate stressors was determined to be at a moderate level, the overall **Community Vulnerability** was assessed to be in the middle category (**Moderate**). The workshop results indicate the changes that might be expected over the next 30 years (ca. 2050 scenario) are anticipated to have significant effects on the values that comprise the OUV of the property and upon the Vega community (economy, society and culture).

NEXT STEPS



Traditional and sustainable farming

SECTION 6: NEXT STEPS

6.1 Recommendations in a changing climate

Climate projections for Vega to 2050 confirm that rising temperatures, rainfall changes and sea level rise will have a significant impact on the cultural landscape. The CVI process has further shown that the natural environment and the local community are vulnerable to the effects of expected climate change and that the ability to adapt to climate change is limited. Impacts on heritage buildings (wood rot and paint types) have been studied but there may be other factors that will affect built heritage. There are potential cultural and natural based adaptation lessons from past climate adaptation. No positive effects of climate change for Vega were revealed through the analysis. Heritage impact assessments should be undertaken for adaptive measures being considered to avoid unintended consequences. The identified key values (and other SPVs; Appendix 3) should be included to ensure such impact assessments are comprehensive.

The CVI process has resulted in the following suggestions for further investigation:

Need for research and monitoring

- National research efforts to better predict and understand changes in the marine ecosystem and how Vegaøyen is affected
- Research with particular local relevance:
 - Effect of ocean acidification on shellfish (food for eider ducks)
 - The effect of sea level rise on the coastal zone in Vega
 - Effect of sea temperature rise on biodiversity
 - The effect of microplastics on WH values
- Environmental monitoring, especially in the marine environment (e.g., is there a food shortage?)
- Strengthened follow-up research to assess the effect of management measures such as population regulation (crows, otters, etc.)

Precautionary approach and knowledge gaps

- Activities where there may be a need for further research include:
 - kelp trawling
 - fishing for copepods
 - aquaculture
 - kelp cultivation
 - cutting seaweed
- Consideration of the laws and regulations to implement climate measures (mitigation and adaptation) must include:
 - Clarification of what the toolbox (the legal framework) contains
 - Use of area planning (municipal plan / zoning plan)
 - Enforcement of local regulations to prevent unwanted activities
 - Adherence to the Marine Resources Act and the Biodiversity Act (specifically for protected areas, prior usage, etc.)
 - Management planning

Other (non-research) knowledge development – not research

- Document built heritage on islands (needs updating) and related climate impacts and mitigation (e.g., use of traditional cod liver paint)

- Prioritise possible adaptation for investment (e.g., through listing options available for key values and the community)
- Undertake a full economic value assessment to provide a more comprehensive overall assessment of the significance of values (far more than just the market value)

The Nature Index for Norway¹⁴ shows that climate change will have a significant impact on the biological diversity in the sea. The Vega Archipelago WH property and the local community are closely linked to the state of the marine environment. The specific extent of the effects of climate change is uncertain. It is therefore important to avoid measures that add further stress to the natural environment. This is especially true of activities that might amplify the negative effects of climate change. A precautionary approach must be the rule and new activities must not be implemented before we have sufficient knowledge of potential impact.

Areas not part of the nature reserve at Vega Archipelago may be considered for designation as marine protected areas (MPAs), enabled within the Nature Diversity Act¹⁵. The purpose of MPAs is to care for and secure the natural values. Coastal fishing, tourism and other industries can be conducted, provided they do not conflict with conservation objectives. Establishing one or more MPAs at Vega would likely benefit the World Heritage values by securing the nutritional basis for the eider ducks. Instituting a sustainable coastal fishery would secure the livelihood for those on Vega using the same type of resources that has been harvested for thousands of years.

Banning fishing in some areas and limiting exploitation elsewhere can benefit conservation, while also enhancing fisheries. For example, trawling is prohibited on two-thirds of the Great Barrier Reef, Australia, to limit damage to benthic fauna and habitats. Furthermore, half of that area is also zoned as no-take marine reserves, within which the number and size of reef fish species have been observed to be consistently greater than on fished reefs. One consequence of this is an observed spillover of adults and larvae from the reserves into adjacent (fished) areas (Emslie et al. 2015).

Alongside MPAs, a recently published report¹⁶ has identified especially valuable and vulnerable areas ("Særlig Verdifulle og Sårbare Områder", SVOs) documented in the Norwegian Management Plans for the Barents Sea, Norwegian Sea, and North Sea and Skagerrak. SVOs are sea areas of significant importance for biological diversity and production within, and often also outside, the area. Vega is within an area that recognises seabirds, such as the eider, as vulnerable species. A White Paper based on this report will be presented to the Norwegian Parliament in 2024.

Revision of the Vega Management Plan in the coming years may benefit from consideration of other available tools, such as in the Cultural Heritage Act¹⁷ which make it possible to protect an area around a listed monument or site (Paragraph 19).

6.2 Management Implications – international, national and local

Through the CVI process, Norway now has a basis for reporting to UNESCO on the status of climate vulnerability for one World Heritage property (via Periodic Reporting). This will contribute to the mobilisation of global efforts on climate action and the role of the World Heritage Convention in climate mitigation and adaptation efforts.

The results from the Vega CVI workshop are important for the review of the Management Plan starting approximately in two years' time. The Management Plan must ensure that addressing

¹⁴ <https://naturindeks.no/home>

¹⁵ <https://www.regjeringen.no/en/dokumenter/nature-diversity-act/id570549/>

¹⁶ <https://www.hi.no/templates/reporteditor/report-pdf?id=45755&86117849>

¹⁷ <https://www.regjeringen.no/en/dokumenter/cultural-heritage-act/id173106/>

climate change mitigation and adaptation is a theme that runs throughout the whole Plan rather than being a stand-alone objective.

Research should be better linked to management needs. Conservation decisions that respond to the threats of climate change begin with understanding the key areas of climate vulnerability. The research opportunities identified through the CVI process are a starting point and these will require appropriate resourcing, as will the management activities informed by research outcomes. Continuing to link research with management-relevant outcomes is essential.

There is a need for better liaising between managers and experts/researchers (e.g., universities and research agencies) for monitoring and research. This begins with identifying current research activities needed (see Section 6.1). The current Heritage Impact Assessment¹⁸ indicates a lack of understanding of what is required or of highest priority. One possible model to enable these is that of Australia's Cooperative Research Centres¹⁹. Effective and ongoing communication with researchers regarding the prioritised list of research activities to support management will be pivotal.

Other opportunities identified through the workshop included:

- The need to identify key strategies for adaptation of the key values and of the community
- That existing resources could be used to respond to identified issues; e.g., through citizen science – either observation is undertaken locally but access to these records is needed.

It is important to recognise the context for management activities of the political systems and regulations in Norway (Section 3.1). These may help inform and prioritise actions at different levels.

6.3 Lessons for other Norwegian World Heritage properties

All the Norwegian WH properties were represented at the Vega workshop. This was to promote the workshop as an arena for learning and exchange of knowledge and experience. The representatives were encouraged to take the knowledge to their properties and focus, even more, on climate change and the special challenges faced by each property. Several have started or will soon start to renew their Management Plan, which provides a good opportunity to focus on climate change and adaptive capacity at the specific site. Applying the CVI process, together with related and subsequent interdisciplinary discussions, will raise awareness on how climate change effects cultural and natural heritage. Potential deterioration of WH values from climate change will likely have an effect for the society. Reflections on this perspective brought new ways of thinking and recognitions into the management for the properties, which need to be translated into management and action plans.

Bringing researchers from different and relevant fields together with people from the local community, site managers, and stakeholders at local, regional and national levels broadened perspectives in the discussions and was vital for the outcomes of the workshop. Experience-based and traditional knowledge is foundational for adapting to climate change and the impacts on the society.

Participants agreed that Norwegian World Heritage would benefit from a monitoring program that can incorporate the specific needs for each property. This is considered an essential tool for increasing the knowledge about effects of climate change and as a basis for planning and assessing possible response measures.

¹⁸ https://www.vega.kommune.no/f/p1/if5d6fc4e-897b-45e2-9352-9a04f7e58693/vegaarchipelago_supp-assessment_insteadheritage-31aug2022.pdf

¹⁹ <https://cooperativeresearch.org.au>

One suggestion was to consider whether the public event could have been brought forward in the workshop schedule. Involving the local community earlier may enable more of the local perspectives and knowledge into the workshop or provide different perspectives on the issues. A revised workshop schedule could begin with participants receiving foundational information on the process and undertaking a familiarisation visit to the site and then holding the public event prior to the analyses or between the two phases (assessing OUV and Community Vulnerability). This would preclude the sharing of outcomes with the community as part of that event, which would need to be undertaken by other means.

The presentation of the climate analysis for Vega led to a collaboration between the Norwegian Meteorological Institute, the Rock Art of Alta WH property (in Finnmark) and the Norwegian Water Resources and Energy Directorate (NVE) to develop a similar analysis for that property. This was expanded to include all WH properties in Norway and is now available²⁰.

From the experience of the CVI Vega, it is recommended that all Norwegian WH properties undertake a climate vulnerability assessment. The CVI is currently resource consuming and is heavily dependent on the supervising by the experts that developed it. To be able to apply the CVI method in all properties, we therefore recommend that the tool be further developed so that it can be made available and that local facilitators receive training in the methodology, leading to a network of accredited facilitators in each continent. There might also be potential to apply the method for other protected areas, such as national parks and listed cultural landscapes.

6.4 Revisiting the CVI process in the Vega Archipelago and other Norwegian properties

The review of the Management Plan will start in approximately two years' time. The outcomes from the CVI workshop are very important for this and will inform the review process of the Management Plan. The Management Plan must ensure that addressing climate change mitigation and adaptation is a theme that runs throughout the whole Plan rather than being a standalone objective.

The CVI analysis for Vega is timely considering the World Heritage Periodic Reporting for Europe and North America, starting in 2022 ending July 2023. The CVI outcomes will also give important knowledge to several plans under the Planning and Building Act, including for the Municipal Master Plan²¹. The CVI outcomes should be reflected in the updating of the Coastal Plan for Vega municipality.

We recommend that the CVI process is repeated on a 6-yearly cycle, aligned with (and in advance of) Periodic Reporting, to assess system changes as well as effectiveness of management responses. This may involve one of the shorter delivery modes (Snapshot, Consult) rather than repeating the full Workshop mode, and with local facilitation. In order to ensure that trends and results are easily comparable, we propose that the next CVI workshop apply the same methodology, beginning with a systematic review of the 2021-2022 workshop assumptions.

²⁰ https://klimaservicesenter.no/kss/rapporter/klimarapport_verdensarvsteder

²¹ <https://www.dinordbok.no/engelsk-norsk/?q=the+municipal+master+plan>

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APPENDICES



Boatshed at Muddvær

APPENDIX 1: STATEMENT OF OUTSTANDING UNIVERSAL VALUE FOR THE WORLD HERITAGE-LISTED 'VEGA ARCHIPELAGO CULTURAL LANDSCAPE'

Statement of OUV: Vegaøyen – The Vega Archipelago

A cluster of dozens of islands centred on Vega, just south of the Arctic Circle, forms a cultural landscape of 107,294 ha, of which 6,881 ha is land. The islands bear testimony to a distinctive frugal way of life based on fishing and the harvesting of the down of eider ducks, in an inhospitable environment. There are fishing villages, quays, warehouses, eider houses (built for eider ducks to nest in), farming landscapes, lighthouses and beacons. There is evidence of human settlement from the Stone Age onwards. By the 9th century, the islands had become an important centre for the supply of down, which appears to have accounted for around a third of the islanders' income. The Vega Archipelago reflects the way fishermen/farmers have, over the past 1,500 years, maintained a sustainable living and the contribution of women to eiderdown harvesting.

Outstanding Universal Value

Brief synthesis

The Vega Archipelago is just south of the Arctic Circle, on the west coast of Norway – an open seascape and coastal landscape made up of a myriad of islands, islets and skerries. A cluster of low islands centred on the more mountainous islands of Vega and Sjøla bear testimony of how people developed a distinctive, frugal way of life centred around fishing, farming and the harvesting of eider down (the down of the eider duck) in an extremely exposed seascape. The property covers a cultural landscape of 107,294 ha, of which 6,881 ha is land.

Fishermen and hunters have lived on the islands of Vega and Sjøla, where peaks tower to nearly 800 m, for more than 10,000 years. As numerous new islands gradually rose from the sea, the characteristic landscape became shaped by the interaction between fishermen-farmers and the bountiful nature in this exposed area. The Vega Archipelago now stands as a testimony to people who have developed unique, simple ways to live in and interact with nature.

They lived as fishermen-farmers, making the tending of eider ducks the centre of their way of life. The local peoples also built shelters and nests for the wild eiders that came to the islands each spring. The birds were protected from any unnecessary disturbance throughout the breeding season. In return, the people could gather the valuable eider down when the birds left their nests with their chicks. As early as the 9th century, tending eiders was reported to be a way for people in Norway to make a living, and the Vega Archipelago was the core area for this tradition. Women played a key role in this lifestyle, and the World Heritage property of the Vega Archipelago also celebrates their contribution to the tending of eider ducks. The tradition remains alive today, albeit to a smaller extent.

The islands and islets are either in groups or isolated, spread across the 50 km broad strandflat that stretches from the mainland to the edge of the continental shelf. The outermost islands are barren and have just a thin, patchy soil cover, whereas those closer to the mainland feature more nutrient-rich bedrock, are greener and show a farming-related biodiversity, linked to centuries of grazing and haymaking.

The rich maritime resources of the Vega Archipelago not only benefited local peoples, but also as many as 228 species of birds that can be observed in the archipelago, considered as the most important wintering area for seabirds in the Nordic region.

Criterion (v): The Vega archipelago reflects the way generations of fishermen-farmers have, over the past 1500 years, maintained a sustainable living in an inhospitable seascape near the Arctic Circle,

based on the now unique practice of eider down harvesting, and it also celebrates women's contribution to the eider down process.

Integrity

The boundaries of the World Heritage property encompass 6,500 islands, islets and skerries, as well as the waters north and west of Vega and parts of that main island and its coastal strip. The rest of the island of Vega forms part of the buffer zone of the World Heritage property.

The World Heritage property showcases the diversity and interaction of the natural features and cultural heritage of the Vega Archipelago, forming a unique cultural landscape. This diversity ranges from the islets where down was gathered to the fishing settlements and traditional farming complexes with characteristic field patterns, forming a mosaic in the landscape. Most of the old buildings are intact, from dwellings to boathouses, warehouses and sheds, beacons and lights; most of them have been renovated, making the area as a whole representative of settlements on the strandflat. Within the boundaries of the property, the interaction between characteristic natural and cultural elements of the cultural landscape allow for the long-term conservation of the area's Outstanding Universal Value.

In areas where grazing and haymaking are no longer practiced and where no appropriate management strategies are in place, some of the cultural landscape is becoming overgrown or eroded. The bird life in the area is vulnerable to human disturbance in the breeding season, and the landscape may show signs of wear and tear if too many people visit the area. The large radio mast on Vega Island also has an impact on the main perspectives to and from the property.

Authenticity

The cultural landscape of the Vega Archipelago continues to be managed in a traditional manner, using time-honoured management techniques. The down tradition and the cultural landscape are taken care of by landowners and the local community in cooperation with the Vega Archipelago World Heritage Foundation and the management authorities. Bird tenders maintain the more than 1,000-year-old tradition of making houses and nests for the eiders on several of the down islets, protecting the birds through the breeding season, gathering the down and making the traditional eider downs.

Protection and management requirements

The management of the Vega Archipelago benefits from a variety of safeguarding measures. 22% of the land surface in the World Heritage property is designated for special nature protection under the Nature Diversity Act of 2009. Five nature reserves, four bird sanctuaries and one protected landscape area have been designated by Royal decrees.

All pre-Reformation (pre-1537) archaeological and historical monuments and sites are protected by the Cultural Heritage Act of 1978. In addition, special protection orders for later cultural heritage have been issued for 29 buildings at Skjærvær and for Bremstein Lighthouse.

The Municipal Plan for Vega contains a strategic part and part relating to land use, in order to monitor any development in other parts of the property and its buffer zone and to safeguard the Outstanding Universal Value of the property.

A Management plan for the property has been drawn up based on the careful documentation of ancient practices and the mapping of the existing biological diversity. Landowners, authorized users, Vega Borough Council, the County Council and national Government authorities work closely together in order to preserve the cultural landscape of the Vega Archipelago. The Vega Archipelago World Heritage Foundation was set up to promote the World Heritage and coordinate the local World Heritage effort. Representatives of management authorities, the Norwegian Nature

Inspectorate, the regional museum and the local World Heritage coordinator work jointly to ensure a good follow-up of the Management Plan for the World Heritage property. The Government allocates funds annually to carry out management, dissemination, restoration and local value creation efforts in the Vega Archipelago World Heritage property.

An inventory of the duck nesting houses on the islands has been completed as part of the conservation of these unique structures.

Increasing numbers of grazing livestock and growing haymaking activities in several areas help to restore the overgrown landscape and safeguard the mosaic aspects of the landscape.

The attributes of the property that convey its values are documented and passed on to the local community and visitors by teaching children and young people through “hands-on” projects, research, guided excursions and information via the Internet, brochures and the like. A local “Society of Friends of the World Heritage Area” is helping to pass on traditional knowledge gained by experience.

Solutions are sought to minimise the visual impact of the radio mast, and challenges related to the number of visitors are followed up through the Norwegian Nature Inspectorate with targeted management of protected areas and by providing information on the values of the area. A vulnerability analysis of traffic in the area has been performed, and there is a separate strategy for tourism and a pilot project for sustainable tourism.

APPENDIX 2: KEY VALUES AND ATTRIBUTES DERIVED FROM THE SOUV FOR VEGA ARCHIPELAGO CULTURAL LANDSCAPE (taken from the Statement of OUV)

Key values	Excerpts taken directly from Statement of OUV	Attributes (at the level at which management is undertaken) for each key value
<p>Unique cultural landscape</p>	<p>A cluster of dozens of islands centred on Vega.... forms a cultural landscape of 107,294 ha, of which 6,881 ha is land.</p>	<p><i>Tangible attributes</i></p> <ul style="list-style-type: none"> • characteristic field patterns • haymaking techniques • farming techniques <p><i>Intangible attributes</i></p> <ul style="list-style-type: none"> • a unique cultural context • a Nordic perspective • a frugal way of life • interaction between natural & cultural elements
	<p>... bear testimony of how people developed a distinctive, frugal way of life centred around fishing, farming</p>	
	<p>the characteristic landscape became shaped by the interaction between fishermen-farmers and the bountiful nature in this exposed area.</p>	
	<p>The Vega Archipelago now stands as a testimony to people who have developed unique, simple ways to live in and interact with nature.</p>	
	<p>show a farming-related biodiversity, linked to centuries of grazing and haymaking.</p>	
	<p>The Vega archipelago reflects the way generations of fishermen-farmers have, over the past 1500 years, maintained a sustainable living in an inhospitable seascape</p>	
	<p>... property showcases the diversity and interaction of the natural features and cultural heritage of the Vega Archipelago, forming a unique cultural landscape. This diversity ranges from the islets where down was gathered to the fishing settlements and traditional farming complexes with characteristic field patterns, forming a mosaic in the landscape</p>	
	<p>the interaction between characteristic natural and cultural elements of the cultural landscape allow for the long-term conservation of the area's Outstanding Universal Value.</p>	
<p>Distinctive coastal landscape and open seascape</p>	<p>The Vega Archipelago is a just south of the Arctic Circle, on the west coast of Norway – an open seascape and coastal landscape made up of a myriad of islands, islets and skerries. A cluster of low islands centred on the more mountainous islands of Vega and Sjøla</p>	<p><i>Tangible attributes</i></p> <ul style="list-style-type: none"> • islands • islets • skerries • strandflat • heathland <p><i>Intangible attributes</i></p> <ul style="list-style-type: none"> • A distinct seascape • unique geo-diversity • seasonal variation
	<p>where peaks tower to nearly 800 m ... numerous new islands gradually rose from the sea</p>	
	<p>The islands and islets are either in groups or isolated, spread across the 50 km broad strandflat that stretches from the mainland to the edge of the continental shelf.</p>	
	<p>The outermost islands are barren and have just a thin, patchy soil cover, whereas those closer to the mainland feature more nutrient-rich bedrock, are greener</p>	
	<p>The boundaries of the World Heritage property encompass 6,500 islands, islets and skerries, as well as the waters north and west of Vega and parts of that main island and its coastal strip</p>	

Key values	Excerpts taken directly from Statement of OUV	Attributes (<i>at the level at which management is undertaken</i>) for each key value
<div style="border: 1px solid blue; padding: 2px; text-align: center;">Marine biological resources</div>	The rich maritime resources of the Vega Archipelago not only benefited local peoples...	<p><i>Tangible attributes</i></p> <ul style="list-style-type: none"> • seabirds, ducks, geese, waders • over-wintering areas • rich fish stocks • kelp forests • seaweed • [marine mammals (otters, seals)] • [clean water with good visibility] <p><i>Intangible attributes</i></p> <ul style="list-style-type: none"> • biodiversity • ocean currents
	also as many as 228 species of birds that can be observed in the archipelago, considered as the most important wintering area for seabirds in the Nordic region	
	The bird life in the area is vulnerable to human disturbance in the breeding season	
	Five nature reserves, four bird sanctuaries and one protected landscape area have been designated by Royal decrees	
	existing biological diversity	
<div style="border: 1px solid orange; padding: 2px; text-align: center;">Eider ducks</div>	By the 9th century, the islands had become an important centre for the supply of down, which appears to have accounted for around a third of the islanders' income.;	<p><i>Tangible attributes</i></p> <ul style="list-style-type: none"> • bird houses/nests • down harvesting • 'eider farming' <p><i>Intangible attributes</i></p> <ul style="list-style-type: none"> • local's relationship with the wild "tame ducks", • women's role in eider down process
	contribution of women to eiderdown harvesting	
	the harvesting of eider down (the down of the eider duck) in an extremely exposed seascape	
	making the tending of eider ducks the centre of their way of life. The local peoples also built shelters and nests for the wild eiders that came to the islands each spring. The birds were protected from any unnecessary disturbance throughout the breeding season. In return, the people could gather the valuable eider down when the birds left their nests with their chicks.	
	As early as the 9th century, tending eiders was reported to be a way for people in Norway to make a living, and the Vega Archipelago was the core area for this tradition	
	Women played a key role in this lifestyle, and the World Heritage property of the Vega Archipelago also celebrates their contribution to the tending of eider ducks. The tradition remains alive today, albeit to a smaller extent.	
	based on the now unique practice of eider down harvesting, and it also celebrates women's contribution to the eider down process	
	Bird tenders maintain the more than 1,000-year-old tradition of making houses and nests for the eiders on several of the down islets, protecting the birds through the breeding season, gathering the down and making the traditional eider downs.	

Key values	Excerpts taken directly from Statement of OUV	Attributes (at the level at which management is undertaken) for each key value
Traditional management	islands bear testimony to a distinctive frugal way of life based on fishing and the harvesting of the down of eider ducks, in an inhospitable environment	<p><i>Tangible attributes</i></p> <ul style="list-style-type: none"> • livestock grazing • haymaking • traditional farming techniques • traditional fishing techniques • [seaweed cutting] • [museum/exhibitions] <p><i>Intangible attributes</i></p> <ul style="list-style-type: none"> • eiderdown tradition • traditional knowledge • unique cultural traditions • [dialect names] • [superstitions]
	The Vega Archipelago reflects the way fishermen/farmers have, over the past 1,500 years, maintained a sustainable living	
	They lived as fishermen-farmers- down harvesters	
	where grazing and haymaking are no longer practiced and where no appropriate management strategies are in place, some of the cultural landscape is becoming overgrown or eroded	
	and the landscape may show signs of wear and tear if too many people visit the area	
	cultural landscape of the Vega Archipelago continues to be managed in a traditional manner, using time-honoured management techniques	
	The down tradition and the cultural landscape are taken care of by landowners and the local community in cooperation with the Vega Archipelago World Heritage Foundation and the management authorities	
	A Management plan for the property has been drawn up based on the careful documentation of ancient practices	
	Increasing numbers of grazing livestock and growing haymaking activities in several areas help to restore the overgrown landscape and safeguard the mosaic aspects of the landscape	
	The attributes of the property that convey its values are documented and passed on to the local community and visitors by teaching children and young people through “hands-on” projects, research, guided excursions and information via the Internet, brochures and the like. A local “Society of Friends of the World Heritage Area” is helping to pass on traditional knowledge gained by experience.	

Key values	Excerpts taken directly from Statement of OUV	Attributes (<i>at the level at which management is undertaken</i>) for each key value
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> Distinctive built heritage </div>	Fishing villages, quays, warehouses, eider houses (built for eider ducks to nest in), farming landscapes, lighthouses and beacons	<p><i>Tangible attributes</i></p> <ul style="list-style-type: none"> • quays • farmhouses • warehouses • boathouses/slipways • eider houses • beacons/lights • [use of flotsam & jetsam for building] <p><i>Intangible attributes</i></p> <ul style="list-style-type: none"> • form & function of buildings • special protection orders
	Most of the old buildings are intact, from dwellings to boathouses, warehouses and sheds, beacons and lights; most of them have been renovated, making the area as a whole representative of settlements on the strandflat	
	special protection orders ... have been issued for 29 buildings at Skjærvær and for Bremstein Lighthouse.	
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> Archaeological heritage </div>	evidence of human settlement from the Stone Age onwards	<p><i>Tangible attributes</i></p> <ul style="list-style-type: none"> • archaeological remains • Stone Age habitation sites (dwellings; stone rings) • Stone age implements/ artefacts/ flakes • [historic monuments] • [shipwrecks] <p><i>Intangible attributes</i></p> <ul style="list-style-type: none"> • cultural heritage • special protection orders
	Fishermen and hunters have lived on the islands of Vega and Sjøla... for more than 10,000 years	
	All pre-Reformation (pre-1537) archaeological and historical monuments and sites are protected by the Cultural Heritage Act of 1978	

APPENDIX 3: LIST OF SIGNIFICANT PROPERTY VALUES THAT ARE LOCALLY, REGIONALLY OR NATIONALLY SIGNIFICANT FOR VEGA ARCHIPELAGO

In 2013, Nordland County Council created a regional cultural heritage plan for Sør-Helgeland, the southern part of Nordland, with Vega as one of the municipalities. The overview below has been prepared and prioritised by Nordland County Municipality as the regional cultural heritage authority.

Vega has been inhabited for almost 11,000 years. There are traces of settlements and haunts from both the younger and older stone ages. The oldest remains can be found at Mohalsen and Åsgården. Around 5,000 years ago, the smaller islands around the main island began to rise from the sea and were gradually settled. They also contain traces of Iron Age settlement, including in the form of grave goods. Particularly characteristic of Vega are the many island weathers. Buildings are connected to fishing, eiders, agriculture and large and small livestock – dwellings, barns, boathouses and rowboats.

- Distinctive for the building stock are the many e-houses and e-lanes, as well as the location of the farm facilities in a row with equal orientation to the landscape. What was once the greatest of all rams is Bremstein. In 1925, Bremstein lighthouse was built on Geiterøya. The lighthouse station is today protected.
- The fishing village of Skjærvær was protected in 1994, a protection that includes the entire island of Skjærvær with 29 individual buildings.
- In Gladstad there is a building environment that tells about Gladstad's development as a settlement from the 19th century until today. Vega church is also located here, which is listed by the National Antiquities Agency.
- At Ylvingen there is a German fortification from the Second World War.
- Vega municipality consists of over 6,500 islands, islets and reefs, and many of these have been put to use. Parts of the municipality were inscribed on UNESCO's World Heritage List in 2004, as the first Norwegian cultural landscape area.

Items below are listed under one or more categories: Recent cultural monuments; Recent cultural heritage; Automatically protected cultural monuments; and War memorabilia.

Locations outside the WH property, on and around Vega island

Gladstad

Recent cultural monuments. In the center of Gladstad is a complex urban environment with cultural monuments that tell about Gladstad's development as an urban area from the 19th century to the present day. The older parts of the building environment consist of Vega rectory from 1886, now Vega village museum, Vega church with cemetery and Gladstad school from 1896. In the area there is also Vega municipal hall which was completed in 1960.

Rørøy dairy

Recent cultural heritage. The dairy at Rørøy was built in 1957 and was in use until 1973. The building served as a receiving station for the delivery of milk that was going on to Brønnøysund, in addition to selling dairy products.

Rørøy trading post

Recent cultural monuments. Rørøy trading post was established around 1700 and was probably originally a burgher's lease before it became a trading post in the 1770s. The building environment consists of a former shop with an associated wharf from 1730 and a main house, barn and earthen cellar from the end of the 19th century, a former boys' room and several larger residential buildings.

Rørøya, coastal environment

Recent cultural monuments. On Rørøya is a built environment consisting of several wharves and a boathouse.

Grimsøy Sound

Recent cultural monuments. On either side of Grimsøysundet are the remains of an old ferry berth. The remains of the ferry lay are traces of an important older road on Vega and tell of the island's infrastructure in earlier times.

Grimsøy

Recent cultural monuments. At Sjøhaugen is a farm environment from the end of the 19th century. The environment consists of a farmhouse, a barn, an outhouse, an earthen cellar and a ruin of a barn building. Grimsøy also has a farm environment from the 19th century. The environment consists of, among other things, a farmhouse that was built between 1830-50, an earthen cellar and barn building. This is an older and well-preserved farm environment that is surrounded by a well-maintained cultural landscape.

Vegstein

Recent cultural monuments. In Jansvika there is a cultural environment consisting of wharves, boathouses, sea houses and ruins after the quay. Vegstein has a long tradition associated with trade. Vegstein is today a well-preserved brewing environment associated with the region's coastal culture.

Vegstein nedre: On Vegstein there is also a farm environment consisting of a residential house, several outbuildings of unknown age, a shed from the end of the 19th century and a magnificent barn from around 1875.

Hongsetneset

Recent cultural monuments. On Hongsetneset is an older and complex farm and seahouse environment. The environment consists of a farmhouse from around 1875, a barn building from the 20th century and several wharves and boathouses of unknown age.

Nes, Neshåjen

Recent cultural monuments. On Neshåjen there are two distinctive farm environments. One environment consists of two farmhouses from the first half of the 18th century that have been remodeled in recent times, and a barn of unknown age. The two farmhouses are believed to be the remains of the oldest houses on Vega. Further to the south-east is a farm environment with farmhouses, cages and cellars from the 1870s, as well as barns.

Nes, Nesheian

Automatically protected and recent cultural monuments. At Nesheian there is a farm environment consisting of a farmhouse from the 18th century, a farmhouse from 1881, a Swiss-style farmhouse of unknown age, an original pier from the 18th century which is now used as an outbuilding, as well as barns and cages from the end of the 19th century. This is a valuable older and complex farm environment that has preserved a large degree of originality.

Nes and Husøya

Recent cultural monuments. On Nes and Husøya is a cultural environment with a number of wharves from the late 1800s and early 1900s. The other buildings consist of a boathouse from the end of the 19th century, a farmhouse with an older part from the 18th century, other docks and a boathouse from the end of the 19th century, as well as a farmhouse from around 1900. The built environment on Nes and Husøya is very complex both in terms of age and originality. Parts of the area are regulated as a special area with the purpose of conservation in the zoning plan for Nes-Kirkøy.

Kirkøy

Recent cultural monuments. Kirkøy is home to a cultural environment consisting of a fish reception, a shop and several boathouses and wharves from the 20th century. Kirkøy has a long history as an old fishing port. Kirkøy also has a history in connection with trading activities. The cultural

environment therefore has great value as a wharf and urban environment linked to the region's coastal culture and fishing history.

Holandsjøen

Recent cultural monuments. At Holandsjøen, there is a wharf and boathouse environment from the 19th century, with many buildings in a cluster-like structure. The building environment must be seen in connection with the other cultural environment on Kirkøy, and has great value linked to older and newer coastal culture.

Vallasjøen

Recent cultural monuments. By Lake Vallasjøen is a cultural environment consisting of several older and newer wharves and boathouses, as well as two farmhouses from around 1900. This type of seaside house building is typical for Vega.

Gullsvågsjøen

Recent cultural monuments. At Lake Gullsvågsjøen is a wharf and boathouse environment consisting of both standing buildings and ruins. The building environment is from the end of the 19th century. Vega has particularly many of this type of sea house development.

Åsgården and Porsmyrdalen

Automatically protected cultural monuments. The house foundations in Åsgården and Porsmyrdalen are from several periods in the Stone Age. Shoreline dating shows that the oldest are probably around 8-9,000 years old. The tufted areas are located in a landscape without marked modern interventions.

Færsethaugen, Ferset

Automatically protected and recent cultural monuments. The building environment has roots back to the 18th century and consists of residential houses, cages and earthen cellars, as well as a barn building from 1938. Cultural environment contains older buildings that have preserved a large degree of originality.

Middagskarheia

Automatically protected cultural monuments. In Middagskarheia, three house foundations from the Stone Age have been identified, located at different height levels in a valley depression. Based on shoreline dating and discoveries that have been made, the settlements are dated to be approximately 5,500, 8,500 and 9,600 years old. The area gives today's people a rare opportunity to experience cultural monuments without modern intervention.

Eidemsjøen

Recent cultural monuments. At Eidemsvågen lies an older boathouse and wharf environment from the 18th and 19th centuries. Several of the piers stand on foundations of wooden vessels. Some of the buildings have a large degree of originality and several older details. This is a valuable older coastal cultural environment with great experiential value.

Ylvingen/Sjøtomt

Recent cultural monuments. The cultural environment consists of older and newer boathouses and wharves, older and newer shops, fish reception and older farmhouses with earthen cellars. The built environment is well preserved.

Ylvingen

Recent cultural monuments. Ylvingen is home to a farm environment which, among other things, consists of an older farmhouse that may date from the 18th century. This house was built together with another farmhouse from 1885, so that it became an angular building. The farm environment is of older date and is very complex. The two residential buildings are out of use and bear the mark of that.

Ylvingen/Langåsheian

War memorabilia. At Langåsheian is a German fortification from the Second World War. The war memorial includes a command post, six gun emplacements, anti-aircraft emplacements, close defense emplacements, tufts for crew barracks and more. The fortress was built by Polish, Russian and Serbian prisoners of war.

Islands in the World Heritage property

Muddvær

Recent cultural monuments. The built environment at Muddvær consists of older and newer buildings. The settlement in Muddvær dates back to the 18th century. In 1900, around seven families with around 40 individuals lived on the island. The island was vacated in 1967-68 and is today used as holiday homes. Egrets were smoked during the breeding season.

Bremstein

Recent cultural monuments. Bremstein consists of three larger islands and several smaller islets and reefs. The building mass consists of, among other things, a wharf, several bunkhouses, and a state well. There is also an impressive breakwater that was built between 1908 and 1916. The cultural environment at Bremstein is distinctive and contains important traces that tell about the activities of earlier times.

Bremstein lighthouse

Recent cultural monuments. Bremstein lighthouse station was established in 1925 as a coastal lighthouse. The tower is 27 m high and has two lens devices on each gallery. The light station was automated and depopulated in 1980. Bremstein light station was protected as a cultural monument in 1999.

Skjærvær

Recent cultural monuments. Skjærvær is home to a comprehensive cultural environment consisting of older buildings and ruins. The built environment includes 29 buildings/units that were protected under the Cultural Heritage Act in 1994. Skjærvær is a distinctive weather with well-preserved buildings of various types, mainly from the end of the 19th century and the beginning of the 20th century.

Hysvær

Recent cultural monuments. The settlement at Hysvær dates back to the 16th century. Today there is no permanent settlement in the weather. The built environment at Hysvær is mainly from the 19th and 20th centuries and in different conditions, and consists of residential houses, boathouses and barns. Hysvær is a characteristic weather environment that is adjacent to a distinctive cultural landscape.

Islands with previous settlement and importance in Hysvær: Ytterøya, Nordøya, Stensholman, Sjørgården, Brattøya, Bjørnhammer

Lånan

Recent cultural monuments. The cultural environment at Lånan consists of older and newer farm buildings. The building environment is very characteristic with e-houses, wharves, outbuildings, barns and several residential buildings. The loan was vacated in 1980, but every spring people live here in connection with the eider business.

Flovær

Recent cultural monuments. The cultural environment at Flovær is rich and complex. In addition to the main house, the environment consists of barns, firehouses, cages, several bows, summer barns and boathouses, as well as a number of e-houses and ebans in connection with the other buildings and on the surrounding reefs and islets.

Omnøya

Recent cultural monuments. On Omnøya is a cultural environment consisting of two older farms, which originally had a common garden, and a brewery environment. The building stock is well preserved and the only permanent resident of Vegaøyane lives here.

Skogsholmen

Recent cultural monuments. The cultural environment at Skogsholmen consists of older and newer buildings connected to several farm facilities, as well as a wharf environment. The most dominant building on the islet is the boarding school, which was completed in 1940. The school was closed in 1973.

Kilvær

Recent cultural monuments. The cultural environment at Kilvær consists of older and newer buildings, as well as ruins. Particularly characteristic is the location of the farm facilities in a row with equal orientation along the ridge.

Tåvær

Recent cultural monuments. Today's cultural environment consists of a farmhouse from 1793, a farmhouse from 1875, a firehouse built around 1850, a wharf built in 1901, an older shop with post office and wharf, older barns, ruins of barns and earth cellars, and a newer farmhouse. From the second half of the 19th century, Tåvær developed into a center for Vesterøyane on Vega.

Kvalholmen

Recent cultural monuments. The cultural environment at Kvalholmen today consists of two older, undated farmhouses, as well as a boathouse of unknown age. In the cultural landscape, there are also ruins of former buildings, as well as a preserved stone fence that separated the infield from the outfield.

APPENDIX 4: CVI WORKSHOP SCHEDULES

Phase 1: 30 November – 03 December 2021 (online, half-day sessions)

Tuesday 30 November 2021

1. Welcome, overview of aims, logistics
2. Introductions of participants

AIM 1: Understand the Climate Vulnerability Index (CVI) framework and its application in the Vega Archipelago

3. Brief overview of the CVI process

AIM 2: Understand the significant values that comprise the OUV for the Vega Archipelago; and assess condition and trend. Discuss other significant values (i.e., Significant Property Values, SPVs).

4. Ensure all participants are aware of the Statement of OUV for the Vega Archipelago and how the table of key values and attributes were derived from the Statement of OUV
5. Undertake high-level assessment of current condition of key values and the recent trend in those values (i.e., since the date of inscription, 2004)
6. Discuss other values that are significant at a local/regional scale (i.e., other SPVs) but are not part of OUV.

AIM 3: Understand future climate change facing the Vega Archipelago

7. Provide overview of climate change projections for Vega, differences in projected impacts from projection scenarios including timescales, and geographically-specific projections.

Wednesday 01 December 2021

AIM 4: Assess the climate stressors impacting the values of the Vega Archipelago and select key climate stressors

8. Show list of climate stressors – check for (i) understanding? (ii) timescales? Agree upon the climate scenario and time scale for the assessment (e.g., Business-as-usual for 2050).
9. Using the list of climate stressors provided, small groups to brainstorm what are the top three climate stressors impacting the key values of OUV

10. Bring outputs from #9 back to plenary and ensure all participants agree on which climate change stressors are impacting the attributes of OUV (interactive session); compare with pre-workshop.

Thursday 02 December 2021

AIM 5: Evaluate vulnerability of OUV to key climate stressors, considering exposure, sensitivity and adaptive capacity for a selected climate scenario (e.g., 'Business as Usual' or 'Paris Agreement').

11. Recap of process for exposure, including detail of categories, and review modifiers
12. Participants in breakout groups assess the exposure term (and modifiers) for each of the three key climate stressors
13. Bring outputs from #13 back to plenary and discuss any variation in assessments of exposure
14. Recap of process for sensitivity (including categories; and modifiers)
15. Participants in breakout groups assess the sensitivity (and modifiers thus determining potential impact) for the key CC stressors
16. Bring outputs from #15 back to plenary and review the potential impact matrix that combines sensitivity with exposure. Discuss any variation in assessments of exposure or sensitivity

Friday 03 December 2021

17. Revisit process for adaptive capacity and review the OUV Vulnerability matrix that combines this with potential impact. Remind of climate scenario for analysis (e.g., BAU 2050)
18. Participants in breakout groups assess the adaptive capacity (thus determining OUV Vulnerability) for the key CC stressors.
19. Bring outputs from #18 back to plenary and discuss any variation in assessments of adaptive capacity, and any effect on OUV Vulnerability
20. Recap on those items that had been 'parked' during the workshop; introduce Community Vulnerability process for subsequent workshop.

Phase 2: 04–08 April 2022 (in-person, full-day sessions)

Monday 04 April 2022 (evening only)

1. Welcome, overview of aims, introductions

AIM 1: Understand the Climate Vulnerability Index (CVI) framework and reflect on the outcomes from the Phase 1 workshop for OUV Vulnerability

2. Brief overview of the CVI process and Phase 1 workshop outcomes

Tuesday 05 April 2022

AIM 2: Consider economic, social and cultural dependencies (sensitivity) and adaptive capacity, to determine Community Vulnerability

3. Introduce economic, social and cultural (ESC) dependency and adaptive capacity.
4. Background on economic aspects for Vega; discuss business types for analysis
5. Assess the economic dependency and adaptive capacity for Vega via breakout groups
6. Plenary synthesis of outputs from #5, including discussion of any variations
7. Field trip to familiarise with Vega property

Wednesday 06 April 2022

8. Introduce social assessments
9. Assess the social dependency and adaptive capacity for Vega via breakout groups
10. Plenary synthesis of outputs from #9, including discussion of any variations
11. Introduce cultural assessments
12. Assess the cultural dependency and adaptive capacity for Vega via breakout groups
13. Plenary synthesis of outputs from #12, including discussion of any variations

AIM 3: Summary, feedback and next steps

14. Summarise outcomes and present final analysis
15. Discussion of items 'parked' during the workshop and next steps.

Thursday 07 April 2022 (evening only)

Public event at Vega World Heritage Centre

APPENDIX 5: LIST OF WORKSHOP PARTICIPANTS

Name/Navn	Institution/Institusjon	Workshop/ Verksted
Hege Bakke-Alisøy	WH coordinator, Bryggen/ Verdensarvkoordinator, Bryggen i Bergen	2021, 2022
Katrin Blomvik	WH coordinator, West Norwegian Fjords/ Verdensarvkoordinator, Vestnorsk fjordlandskap	2021, 2022
Magnus Borgås	Røros Municipality/Byantikvar Røros kommune	2021, 2022
Marte Boro *	Directorate for Cultural Heritage/Riksantikvaren; Norwegian Institute for Cultural Heritage Research/NIKU	2021, 2022
Elin Dalen *	Riksantikvaren/Directorate for Cultural Heritage	2021, 2022
Jon Day *	CVI, James Cook University	2021, 2022
Gunvald Eilertsen	Vega community	2021, 2022
Arne Follestad	Norwegian Institute for Nature Research/NINA	2021, 2022
Bjørn Hansen	Fisherman, Vega/Fisker, Vega	2021
Eirik Haug Røe	WH coordinator Rock Art of Alta/ Verdensarvkoordinator Bergkunsten i Alta	2021, 2022
Eva Hauge Fontaine *	Norwegian Environment Agency/Miljødirektoratet	2021, 2022
Berit Haugen	Vega community	2021, 2022
Silje Helland Økland	Regional Cultural Heritage Management/Nordland fylkeskommune	2021, 2022
Scott Heron *	CVI, James Cook University	2021, 2022
Hans Olav Hygen	Metrologisk institutt/Norwegian Meteorological Institute	2021, 2022
Marius Jenssen	Vega community	2021, 2022
Rita Johansen *	WH coordinator, Vega Archipelago/ Verdensarvkoordinator, Vega Arcipelago	2021, 2022
Evelyn Johnsen	Rock Art of Alta/Bergkunsten i Alta	2021
Anders Karlsson	Vega Municipality/Vega kommune	2021, 2022
Sofie Klemetzen	WH coordinator, Urnes Stave Church/ Verdensarvkoordinator, Urnes stavkirke	2021, 2022

* Steering Committee/Styringsgruppe

Name/Navn	Institution/Institusjon	Workshop/ Verksted
Hanna Lønning Gjerdi	Directorate for Cultural Heritage/Riksantikvaren	2021
Adam Markham *	Union of Concerned Scientists and ICOMOS-USA	2021, 2022
Vibeke Martens	Norwegian Institute for Cultural Heritage Research/NIKU	2021, 2022
Berit Martinussen	Vega community	2021, 2022
Turid Næss	Farmer/Øybonde	2021
Per-Anton Nesjan	Cooperation Board for Vega WH/ Samarbeidsrådet for Vega	2021, 2022
Hildegunn Nordum	Bird tender, Vega/Fuglevokter, Vega	2022
Erling Oppheim	WH-coordinator, West Norwegian Fjords/ Verdensarvkoordinator, Vestnorsk fjordlandskap	2021
Magnus Pedersen	Community development, internationalization and climate, Vestfold and Telemark/Samfunnsutvikling, internasjonalisering og klima, Vestfold og Telemark	2021, 2022
Isa Skjelbostad	Protected area manager/Verneområdeforvalter	2021, 2022
Roar Skuterud	Miljødirektoratet/Norwegian Environment Agency	2021, 2022
Ole Søre Eriksen	Riksantikvaren/Directorate for Cultural Heritage	2021, 2022
Gaute Sønstebø *	Miljødirektoratet/Norwegian Environment Agency	2021, 2022
Vibeke Steinsholm	Bird tender, Vega/Fuglevokter, Vega	2021
Juliana Strogan	WH coordinator, Rjukan-Notodden Industrial Heritage Site/ Verdensarvkoordinator, Industrieren Rjukan-Notodden	2021, 2022
Svein Einar Stuen	County Governor/Statsforvalteren i Nordland	2021
Gerd Valen	WH-coordinator, Struve Geodetic Arc/ Verdensarvkoordinator, Struve Geodetic Arc	2021, 2022
Hilde Wika	Head of tourism, Vega Municipality/Reiselivssjef, Vega kommune	2021, 2022
Margrethe Wika	Vega Municipality/Vega kommune	2021, 2022

* *Steering Committee/Styringsgruppe*



Figure A6.1 Participants outside the Vega World Heritage Centre in April 2022. *Photo: C. Day*

APPENDIX 6: GLOSSARY AND ACRONYMS

Adaptive capacity	The ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.
Anthropogenic	Resulting from or produced by human activities.
Climate	The composite or generally prevailing weather conditions of a region, as temperature, air pressure, humidity, precipitation, sunshine, cloudiness, and winds, throughout the year, averaged over a series of years.
Climate change	A change in the pattern of weather, and related changes in oceans and land surfaces, occurring over time scales of decades or longer.
Climate projection	A projection of the response of the climate system to emission or concentration scenarios of greenhouse gases and aerosols, or radiative forcing scenarios, often based upon simulations by climate models. Projections from the Coupled Model Intercomparison Project Phase 6 (CMIP6) are referred to in this report.
Exposure	A measure of the contact between a system (whether physical or social) and a stressor.
Sensitivity	The degree to which a system is affected, either adversely or beneficially, by climate variability or change.
Extreme weather event	A weather event that is rare at a particular place and time of year. Definitions of 'rare' vary, but an extreme weather event would normally be as rare as or rarer than the 10th or 90th percentile of the observed probability.
Intergovernmental Panel on Climate Change (IPCC)	The United Nations body, established in 1988, for assessing the science related to climate change; it was created to provide policymakers with regular scientific assessments on climate change, its implications, and potential future risks, as well as to put forward adaptation and mitigation options. The IPCC is the most authoritative international body on climate science and is an essential component of the world's response to climate change.
Mitigation (of climate change)	A human intervention to reduce emissions or enhance the sinks of greenhouse gases (GHGs). Mitigation measures in climate policy are technologies, processes or practices that contribute to mitigation, for example renewable energy technologies, waste minimisation processes, public transport commuting practices, etc.
Restoration (in an environmental context)	Involves human interventions to assist the recovery of an ecosystem that has been previously degraded, damaged, or destroyed.
Weather	The state of the atmosphere – its temperature, humidity, wind, rainfall and so on – over hours to weeks.

CVI	Climate Vulnerability Index
ICOMOS	International Council on Monuments and Sites
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
NEA	Norwegian Environment Agency/Miljødirektoratet
NIKU	Norsk institutt for kulturminneforskning/ Norwegian Institute for Cultural Heritage Research
NINA	Norsk institutt for naturforskning/Norwegian Institute for Nature Research
OUV	Outstanding Universal Value
PT	Precipitation trend
SLR	Sea level rise
SOUV	Statement of Outstanding Universal Value
SPVs	(Other) Significant Property Values
TT	Temperature trend
WH	World Heritage



CVI



Norwegian
Environment
Agency

NIKU



Norwegian
Meteorological
Institute



**JAMES COOK
UNIVERSITY**
AUSTRALIA