OSLO FORUM 2021

Cultural Heritage in a Changing Climate

OSLO FORUM 2021
CULTURAL HERITAGE IN A CHANGING CLIMATE
28.–30. September

The Norwegian Directorate for Cultural Heritage and Arts Council Norway hosted the 7th forum of the Baltic Region Heritage Committee (BRHC). The digital conference was broadcasted from Oslo Maritime Museum, Norway.

All the articles in this publication are a result of talks at the forum. The talks are available at the BRHC webpage.

Baltic Region Heritage Committee:
www.baltic-heritage.eu

Arts Council Norway:
www.kulturradet.no

The Directorate for Cultural Heritage:
www.riksantikvaren.no

Directorate for Cultural Heritage, March 2022

Directorate for Cultural Heritage
Post-box 1483 Vika, 0116 Oslo
Visiting address / Dronningens gate 13
Phone / +47 22 94 04 00
Email address / postmottak@ra.no

www.riksantikvaren.no

Design / fetetyper.no
Cover illustration / Gina Gylver

Contents

Introduction

Ole Jakob Furset
Head of the Museums and Cultural Heritage Section of Arts Council Norway and BRHC Chair 2021–2022, Norway

Climate Change is a Threat to Cultural Heritage

Climate change is a threat to cultural heritage. We live in a time of rapid changes – both environmentally and politically. All the countries in the Baltic Sea Region have signed the Paris Agreement and committed to the UN Sustainable Development Goals. This commitment means that we must act immediately to reduce greenhouse gas emissions by 50 percent by 2030. Our aim for the Baltic Region Heritage Forum 2021 is to mobilise the cultural heritage sector to action.

The impact of climate change on cultural heritage is already visible on landmarks, historic buildings, and archaeological sites – and it poses challenges for the preservation, dissemination and research on our common legacy. The cultural heritage sector can also raise awareness about these challenges, as well as take measures to reduce our own emissions. The strength of the Baltic Sea Region lies in the relationships that exist between participating countries, organisations, and individuals throughout the region.

This is key for our regions' ability to solve the challenges posed by climate change. These challenges may seem daunting and present a huge task for each individual country – and that is precisely why it is important that we act together.

We hope that this publication from the Baltic Region Heritage Committee will play its part – and inspire you to go from plans and strategies – to action in facing the climate challenge. ■

Our aim for the Baltic Region Heritage Forum 2021 is to mobilise the cultural heritage sector to action.

Raymond Johansen
Governing Mayor of Oslo, Norway

How Can We Protect Cultural Heritage Around the World in a Changing Climate?

In Oslo, we are putting climate first when making decisions. What we do to become a zero emission society will also give us a greener city, less pollution and better city life.

Oslo has a climate strategy for 2030, where we aim to reduce emissions by 95 percent. At the same time, an important part of our climate strategy is to increase our resilience against climate change.

Preservation of nature, forests and parks in and around the city is key to climate resilience and is a preservation of our cultural environment. The fjord, waterways and the forests surrounding our city are very important for the identity and history of our city.

Preserving cultural heritage can also contribute to cutting emissions. We must preserve and reuse more – for the environment and for our cultural heritage.

The corona crisis has shown that there is an enormous potential for change in our society. We must learn from the corona response in order to handle the climate crisis. We must work together, across borders and sectors, to find new solutions. ■

The climate strategy for Oslo towards 2030 was adopted by the City Council in 2020. The main objective is for Oslo to have close to zero emissions. Read more about the strategy here: https://www.klimaoslo.no/2020/06/10/oslos-new-climate-strategy/

General Overview – In It for the Action

Gina Gylver
Moderator of Oslo Forum and leader of Nature and Youth, Norway

In It for the Action

My name is Gina. I am 20 years old and a climate activist, and before I move on to one of the topics for the conference, I will tell you a bit about my education. On paper, it looks quite impressive, with three completed years of upper secondary school. However, it's not the formal education I use the most in what I do. Facing the climate crisis, I think we must really educate ourselves in new ways.

I have been through what you do in debates when your opponent discredits you because you are young and because you are a girl.

I have learned how you access the public calendar of national politicians in order to follow them around and organise small protests at every meeting they are attending to make your voice heard.

From the age of 13, I have practiced how you make yourself as heavy as possible when police carry you away after civil disobedience actions, both to ensure everyone's safety and to make it really hard for them to remove you

I have learned how you build up a local group of environmental activists, how you organise a protest, how you sue a government.

I have learned how I find the motivation to keep going and continue working with these issues when we have just lost a case that we have been putting our hearts into for the past 5 years.

In order to handle the overwhelming challenges of today, we must return to our roots.

As activists, there is a lot of stuff we don't know, lots of things that politicians and professors and different sectors can teach us. But the education you get in an environmental organisation, the things you learn as an activist makes you ready for at least one thing: to be in it for the action. "In it for the action". That was the first topic of the conference. The second one was "mitigation".

Mitigation in this context was a very difficult concept for me to learn. When I started as a climate activist, I was 12 years old and I really thought that our goal was to stop climate change, to prevent it from happening. I thought that this was a battle we could win. It didn't take more than a couple of meetings in Nature and Youth before I understood that there is no winner in this war. Climate change is already happening. Scientists say that we might be losing 100,000 species every year, right now. That is more than 10 species every hour, try to wrap your head around that. Last year, more than 30 million people had to flee because of natural disasters, and that was 3 times as many as the people fleeing from war and conflict. The increase in temperature has already reached 1.1 degrees. The Greenland ice sheet has already reached a tipping point and will probably disappear even if we manage to stop the temperature rise. That means that the world's second largest body of ice will melt into the ocean and contribute to the fatal rise in sea level.

However, the fact that we have already reached some tipping points, that we have already lost lives, species and landscapes forever, is not and will never be a reason to give up. It didn't take me a long time to accept that my future is already irreversibly changed by the emissions of others. That I will spend my life watching forests and coral reefs and glaciers disappear, that extreme weather and natural disasters will become an increasing problem, that the world must handle millions upon millions of refugees, and that a world in a state of crisis might be the new normal also for us in Norway. Our job is now mitigation. To reduce the rise in temperature and the consequences of it. Our effort will save human lives and nature, it will change the course of history. We are all responsible for doing our part and a little bit more.

We are entering a future where the world will look very different from what it did before. Where the climate crisis is affecting all aspects of society, and is something that every family and every sector must deal with. It is already too late to stop some big changes from happening, and we must adapt to a different climate.

We need radical adaptation ideas and efforts, but what is the role of cultural heritage in this radical change?

I love the word radical. Many associate it with new ideas and politics, more extreme than before. But the word radical comes from the Greek word radix, which means roots. In order to handle the overwhelming challenges of today, we must return to our roots and work on the foundation that already exists, learn from our mistakes and history. Here, our heritage is key. It carries so much essential knowledge, and a lot of it has survived more than we can imagine. However, our heritage is also facing many difficulties in terms of preservation, and like the rest of our society, strong measures are needed.

We must be radical in all senses of that word. ■

Andrew Potts
Climate Heritage Network Secretariat.
ICOMOS Climate Change and Heritage Working Group,
United Kingdom

The Future of Our Pasts – Engaging Cultural Heritage in Climate Action

Climate science has made clear that nothing short of rapid, far-reaching transitions to low-carbon, climate resilient futures will allow us to avoid the worst impacts of climate change on the planet, its peoples and their cultures and heritage. To date, however, the world remains dangerously off course in the work to achieve these transformations. What hasn't been tried? What's been missing from climate planning? One answer is the cultural dimension – and that must change.

In 2019, the International Council on Monuments and Sites (ICOMOS) issued a groundbreaking report entitled *The Future of Our Pasts: Engaging Cultural Heritage in Climate Action.*[1] A key premise of this report is that cultural heritage is not only useful but necessary in tackling climate change, both in terms of responding to climate hazards and helping to drive climate action. As the planetary emergency worsens, it is more important than ever that climate and culture leaders alike learn these lessons, build upon them – and act.

THE PLANETARY EMERGENCY

The term 'planetary emergency' as used here refers to a combination of threats that together are imperilling the well-being of human communities and of all life on Earth. These threats result from a succession of related stresses including rapid urbanisation, wealth inequality, globalisation, excessive and insensitive development, and unsustainable consumption and production patterns.

One threat is of course the climate emergency. Increasing concentrations of Greenhouse Gases (GHGs) in the atmosphere, driven by human activities such as burning of fossil fuels and deforestation, are warming the planet, changing the climate, and increasing hazards. At the same time, the ecosystems that underpin our well-being are collapsing. Species are becoming extinct at an unprecedented rate. This is a second but related great threat: the biodiversity crisis.

In these twin threats, we see that the fate of humans and human culture and the rest of nature are intertwined. At the heart of all of this is the clash of immediate human needs with their long-term impacts on the planet's capacity to support life.

SAFEGUARDING CULTURAL HERITAGE IN THE FACE OF PLANETARY EMERGENCY REQUIRES TRANSFORMATIVE CLIMATE ACTION

Earlier this year, the Intergovernmental Panel on Climate Change (IPCC) released its new report entitled 'Climate Change 2021: the Physical Science Basis.'[2] In it, the IPCC found that human activities since the start of the industrial revolution have already warmed the planet about 1.1°C. This warming has already changed the climate. The resulting impacts are currently

impacting biodiversity, displacing populations, and damaging cultural heritage. And so, we have to plan for the climate change we have already caused. We have to adapt to it and this adaptation will be challenging.

At the same time, humans are still emitting the greenhouse gases that cause climate change. We are on track to warm the planet even more than we already have. IPCC reports establish that every additional increment of warming is of consequence.[3] While 1.5°C of global warming will severely damage our natural and cultural heritage, the impacts of 2°C warming will be significantly worse.

There is a limit to the adaptive capacity of every system, and we know that many places, sites, monuments and communities will not be able to adapt their way out of the impacts that will be caused by 3 or even 2 degrees of warming. For these places, holding global warming to 1.5°C is the most effective thing we can do to support the in situ conservation of cultural heritage.

Around the world, people, many of them young, have been striking on Fridays. Led by Greta Thunberg and others, they are demanding that we urgently accelerate decarbonisation efforts in order to hold warming to 1.5°C. This makes those striking kids cultural heritage conservators. Indeed, cultural heritage heroes – and there is much that the rest of us in cultural heritage need to learn from them.

TRANSFORMATIVE ACTION REQUIRES CULTURE AND HERITAGE

Holding warming to 1.5°C is going to be incredibly difficult. Not only does it require far reaching ecological change in the way we build cities, grow food, and more, but these changes are needed rapidly, like in this decade. The window of opportunity to hold warming to 1.5°C is closing. This systems transition on a nearly unprecedented scale will be disruptive and messy. Difficult trade-offs between competing societal aims will be required.

Done right, we can not only reduce emissions but advance sustainable development goals like reducing poverty and inequality and promoting health and well-being.

The cultural dimensions of these shifts will be huge. And here's where cultural heritage experts, practitioners and advocates are crucial. Cultural heritage offers immense potential to support transformative action and just transitions by communities towards low carbon, climate resilient futures.

Anthropogenic problems need human solutions and what is cultural heritage if not a great accumulation of human experience and solutions?

- Guiding transformative change requires understanding how humans relate to places and things. It benefits from knowing how humans have responded to past social and environmental change.
- Addressing climate change calls for planning with a multi-generational time horizon – an approach that is almost uniquely at the core of cultural heritage institutions.
- It demands circular economy approaches that promote the reuse and conservation of resources.
- It demands knowledge, information, creativity and cultural capital
- It requires social cohesion, a shared love of place, inclusive approaches – all of which are prerequisites for common climate action.

MOBILISING CULTURAL HERITAGE FOR CLIMATE ACTION

Currently, we still have too many cultural institutions, too many libraries, archives, museums and heritage sites that are doing business as usual. In other words – we are not currently realising our full potential to contribute to tackling the planetary emergency

How do we shift this paradigm ? How do we increase the ambition of the arts, culture and heritage to contribute to the work of addressing

climate change? How do we convince others about the relevance of culture and heritage to climate action and science?

Increasingly, the frameworks are there. *The Future of Our Past* is a helpful guide. In the European Union, there is the European Green Deal, which is one of the most ambitious plans in the world to put societies on the path to holding warming to 1.5 degrees. Earlier this year, Europa Nostra in partnership with ICOMOS and with the support of the European Investment Bank Institute released the *European Cultural Heritage Green Paper*.[4] This Paper scopes almost 100 ways in which cultural heritage supports achieving the aims of the European Green Deal, from circular economy and buildings to agriculture, education to research and development.

But to make full use of these frameworks, we cultural actors must open our eyes to the magnitude of the emergency. We need to become more confident and knowledgeable about how the work we do contributes to climate action. We need to learn a little climate change vocabulary and a bit of climate science, and we have to be prepared to adjust our priorities.

What does the work of cultural heritage look like when it rejects business as usual and orientates itself to be a part of the climate

change solution? In a foreword to The Future of Our Pasts, the former president of ICOMOS Toshiyuki Kono wrote:

> It would be foolish to imagine the practice of heritage remaining static while the world goes through the rapid and far-reaching transitions discussed in the IPCC's recent Special Report on Global Warming of 1.5°C. Responding requires adjustments in the aims and methodologies of heritage practice.

This is a vision of cultural heritage that is rooted in climate science, that connects to the goals of the climate movement while emphasising the special contribution of culture, and that is interdisciplinary – making common cause with climate scientists and activists, ministries of the environment and other sectors.

CONCLUSION

I recently heard a speech by Tunç Soyer, the mayor of Izmir, Turkey, in which he articulated a new paradigm to address the planetary emergency, one which he calls 'Circular Culture.' In his talk, Mayor Soyer made an extraordinary statement: he said that economy without culture is what has given us the climate crisis.[5]

If economy without culture is what has given us the climate crisis, then should we be surprised if climate planning without culture fails to fix the crisis? Yet this is largely the climate planning that we have, and we are currently on track for 2°C or more of warming by the end of the century.[6] That means a world without Venice or coral reefs. This is simply not an outcome anyone can or should accept, least of all anyone committed to safeguarding cultural heritage.

The world needs culture and heritage in order to tackle the planetary emergency, and tackling the planetary emergency is crucial to safeguarding cultural heritage. When it comes to building resilience and tackling the planetary emergency – the world must: count cultural heritage in. ■

REFERENCES

1. ICOMOS Climate Change and Cultural Heritage Working Group. 2019. The Future of Our Pasts: Engaging Cultural Heritage in Climate Action, July 1, 2019. Paris: ICOMOS.
2. See IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press.
3. IPCC, 2018: Summary for Policymakers. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. World Meteorological Organization, Geneva, Switzerland, 32 pp.
4. https://issuu.com/europanostra/docs/20210322-european_cultural_heritage_green_paper_fu.
5. https://agenda21culture.net/sites/default/files/speech_izmircultsum2021_tuncsoyer_en.pdf.
6. United Nations Environment Programme (2021). Emissions Gap Report 2021: The Heat Is On – A World of Climate Promises Not Yet Delivered – Executive Summary. Nairobi.

When you look around now, you would never guess that this used to be a renaissance harbour.

Marja-Liisa Petrelius Grue,
Norwegian Maritime Museum

All photos: Black Film AS

Below the Surface

Oslo's waterfront is changing. What was once dominated by an active seaport and the main highway into the city – has been transformed over the last 10 years into sprawling new districts with homes, offices, bars and restaurants. Marja-Leena and her fellow archaeologists have surveyed all the plots in this new development. Everything they have discovered will be documented and artefacts moved to the Norwegian Maritime Museum. The remaining port structures yield way to new high-rise structures lining the harbour. Bispekilen is different. Everything underground here will be preserved for future generations, giving them the opportunity to explore Oslo's past with their own methods in the future. ■

Reduction of Climate Change – How Cultural Heritage Can Be Part of the Solution

Henry McGhie
United Kingdom

Museums and the Sustainable Development Goals: our blueprint for mitigation and adaptation actions

Discussions of the relationship between climate change, culture and heritage typically fall into two categories. Firstly, that culture and heritage are greatly threatened by climate change. Secondly, that culture and heritage can contribute greatly to climate action.

Both of these are true, but so also is a third assertion: that culture and heritage contribute negatively, often very negatively, to climate change. Culture and heritage make both positive and negative impacts on climate change: it is how we manage these positive and negative impacts that is the measure of successful climate action. In this article I will explore how we can use sustainable development approaches, notably Agenda 2030 and the Sustainable Development Goals and their targets. I will focus on climate mitigation, but much of what is said will also relate to climate adaptation, as the two are closely related, and action for one should aim to also be action for the other. It is worth saying that in terms of climate action, mitigation has a very particular usage, meaning the reduction of greenhouse gases (not only carbon dioxide) and also the strengthening of greenhouse gas removal methods, whether nature-based, technology-based, or hybrid methods.

THE PROBLEM OF SCOPE 3 EMISSIONS

Greenhouse gas emissions are measured in three Scopes: Scope 1 relating to emissions generated on-site from burning of fossil fuels; Scope 2 from emissions generated elsewhere in the production of energy used by an organisation; and Scope 3 from emissions indirectly generated but related to an organisation's activities. These are a big problem, as they are hard to measure, hard to control (as they are someone else's emission), but they are also typically 70% or more of an organisation's emissions. In terms of the cultural and heritage sectors, Scope 3 emissions are a major consideration, as they include the emissions associated with visitor travel to and from sites, and also from the waste generated as a result of activities (for example conservation treatments, old exhibition materials, and many more).

SOME ISSUES FACING THE CULTURAL AND HERITAGE SECTORS

While culture and heritage are associated with people's basic rights, going back to the Universal Declaration of Human Rights, there is no grand plan of what institutions or organisations are needed where. There has been a doubling in the number of museums in the last 30 or so years, for example, but these are not evenly distributed. Cultural institutions and heritage sites are often used to drive economic growth, but this 'development' (in the old sense), is not necessarily sustainable development. In fact, the way development and sustainable development are so often confused and talked about as if they are the same thing is one of the biggest challenges to true sustainable development.

Cultural institutions often suffer from a 'bigger is better' mindset, which only creates a yearning for endless growth, of a form that is disconnected from sustainable development. These faulty ideas mean that the growth of institutions is a kind of unsustainable production and consumption of cultural and heritage-based activities. To take an example, a museum spends a lot of money to create a big exhibition to attract people, who travel long distances, and may be international tourists. The exhibition generates lots of waste. Poorer people, both locals and those farther away, are priced-out of visiting the exhibition, as the museum charges a high figure to cover the cost of the resources involved in the exhibition's creation; high consumers are encouraged so consume more. The cultural and heritage sectors have their own cultures, and they too need to change in order to be in keeping with the realities of climate change and required action. We can say that this high consumption-high waste-drive for greater international travel is in fact an irresponsible consumption and production, that the culture and heritage sectors should address, and address as a matter of urgency.

TOWARDS A RIGHTS-RESPECTING CULTURAL AND HERITAGE SECTOR

Human rights are the rights that everyone has just for being human: they apply to everyone equally, but they are hardly talked about. Rights can be used as a North Star to help us secure a more sustainable future. Climate mitigation, and adaptation, are closely linked to rights, as climate change threatens many rights, in deeply unequal ways, with those who contributed least to the problem suffering most, and as climate action has to be taken in ways that respect rights. The main agenda to support rights and a sustainable future is Agenda 2030, adopted in 2015 by the world's governments. While commonly understood or talked about as 'the SDGs', they are not the whole story, and they have to be understood in the context of Agenda 2030. The Agenda is grounded in existing human rights and international agreements (the UNFCCC, Paris Agreement, and many more), and aims to help more people gain their rights; it applies everywhere; it pledges to 'leave no-one behind'; it is rooted in the principles of sustainability and sustainable development; it emphasises the importance of partnerships of all kinds; and it applies across all of society and in all sectors, it is not only an Agenda for governments but for all of us.

The shorthand mnemonic for Agenda 2030 is the '5 Ps', a modification of the traditional view of sustainability as made up of social, environmental and economic aspects (pillars or dimensions).

THE 5 PS, FROM AGENDA 2030

People: to end poverty and hunger, in all their forms and dimensions, and to ensure that all human beings can fulfil their potential in dignity and equality and in a healthy environment.

Planet: to protect the planet from degradation, including through sustainable consumption and production, sustainably managing its natural resources and taking urgent action on climate change, so that it can support the needs of the present and future generations.

Prosperity: to ensure that all human beings can enjoy prosperous and fulfilling lives and that economic, social, and technological progress occurs in harmony with nature.

Peace: to foster peaceful, just and inclusive societies which are free from fear and violence. There can be no sustainable development without peace and no peace without sustainable development.

Partnership: to mobilize the means required to implement the 2030 Agenda through a revitalised Global Partnership for Sustainable Development, based on a spirit of strengthened global solidarity, focused in particular on the needs of the poorest and most vulnerable and with the participation of all countries, all stakeholders and all people.

← An exhibit from the Reimagining Museums for Climate Action exhibition at Glasgow Science Centre, looking across to the venue of COP26.

The 17 Sustainable Development Goals, with their 169 targets, are the results framework of Agenda 2030. They are not a 'bingo list' that people choose one or two that they are already good at (although that can be tempting, especially when people are starting out with them). Before using the goals and targets, people should understand the aim of the Agenda, with its inspiring vision, principles and call for partnership, recognise that the goals are an interconnected set that we have to work out like a giant puzzle, and also that sustainable development activity involves all of understanding your positive and negative impacts, increasing positive impacts and also reducing negative impacts.

In 'Museums and the Sustainable Development Goals' (2019), I proposed a framework of seven key activities that museums (and similar institutions and organisations) can use as their own blueprint that contributes to Agenda 2030 and the SDGs. You can use the framework to understand which goals and targets are relevant to museum activities, or use the framework as a shorthand way to contribute to these: the framework relates to roughly 1/3 of all 169 SDG targets. There are many benefits to be gained by using the SDGs in museums: they help plan, deliver, monitor and communicate activity that is meaningful; they help them put their unique resources to good use, they help museums address multiple sustainable agendas simultaneously, avoiding trade-offs; they help build partnerships and collaborations, especially with other sectors; and they help them demonstrate their value to society. Museums can give Agenda 2030 and the SDGs *reach*, while Agenda 2030 & the SDGs can help give museums *purpose*.

So how can the even key activities contribute to climate mitigation?

1. Protect and safeguard cultural and natural heritage

Museums must be as concerned about the heritage outside institutions as the heritage inside them; they can adjust professional standards and

practices to meet the realities of climate action. Professional practices that preserve particular artefacts, at the cost of wider cultural and natural heritage, result in a zero-sum game.

2. Support learning opportunities for climate mitigation, adaptation and rights-based climate action

They can make use of Education for Sustainable Development and Global Citizenship Education approaches and resources, which are well-developed approaches that are supported by many excellent resources. They can apply these approaches to staff, trainees and professional practice, as well as in programmes for the public.

3. Promote cultural participation for all

Everyone has the right to participate in cultural life; however, cultural institutions are disproportionately visited by middle classes and high consumers, as a reflection of the services they provide. Museums and similar institutions can focus more on providing services for less affluent people, adopting the principle of 'leave no-one behind' from Agenda 2030. In terms of climate mitigation, high consumers will need to be encouraged and empowered to reduce their consumption; under-privileged people are more likely to need information and skills to challenge authority, and to be able to face climate impacts, that is, climate adaptation.

4. Support sustainable and responsible tourism

A shockingly large proportion of global greenhouse gas emissions come from tourism, around 8 %, and the figure is growing. Museums, cultural institutions and heritage sites can work to ensure they are not supporting – in many cases even encouraging – unsustainable tourism. People can be empowered to be 'good tourists' before, during and after they travel. The culture and heritage sectors can make sure they recognise and factor the emissions from visitor travel as part of their own carbon footprint, and make all efforts to reduce it in line with the needs of climate action. A focus on localism may be far preferable to supporting unsustainable international tourism.

5. Support research that supports mitigation and adaptation

Everyone has the right to benefit from scientific advancement, as included in the Universal Declaration of Human Rights. Collections are knowledge-resources that can support both mitigation and adaptation. They need to be research-ready, useful and usable. They need to be discoverable, for example in online aggregators such as GBIF, which also helps to ensure that collections can be made use of in countries from which they originated. The results of research should be shared widely, and freely: it seems difficult to justify how tax-payer funded research is locked away behind journal pay-walls, or in expensive publications. The cultural and heritage sectors can foster the development of a research-informed society.

6. Ensure internal leadership, management and operations contribute to mitigation and adaptation

Every single decision, every day, results in more-or-less greenhouse gas emissions. Cultural and heritage-based organisations can ask how fast they are reducing their own emissions, whether from staff work activities, heating, travel, procurement, waste, food, or many other activities. They can also ask themselves how prepared they really are for climate impacts, both now, in the short-term, and what their plans are for long-term climate impacts, notably extreme impacts.

7. Direct external leadership, collaboration and partnerships to sustainable development, including climate mitigation and adaptation

Finally, cultural- and heritage-based organisations can familiarise themselves with both the public-facing parts of the Paris Agreement, and incorporate Agenda 2030 and the SDGs into their ways of working. There are abundant opportunities for these organisations to support people and to participate in sustainable development agendas and initiatives, for example the 2021-30- Decade of Ecosystem Restoration, 2021-30- Decade of Ocean Science for Sustainable Development, and 2021–30 programme for Education for Sustainable Development (ESD2030). People have a right to know about these initiatives, and to have opportunities to contribute to them: the culture and heritage sectors have obligations to provide these opportunities.

CURRENT PROJECTS THAT CAN SUPPORT MITIGATION IN AND WITH MUSEUMS AND OTHER CULTURAL INSTITUTIONS

To conclude, there are a number of projects underway that aim to support museums and their partners to accelerate their contribution to climate mitigation. The first of these is ICCROM's Our Collections Matter initiative, which aims to support 'tools, training and transformation' through collections-based institutions. An online toolkit helps align existing tools from diverse sources with the SDGs and targets.

Secondly, Reimagining Museums for Climate Action is a project funded by the UK Arts and Humanities Research Council, aiming to inspire radical climate action in and with museums before, during and after COP26, held in Glasgow in November 2021. The project generated a design and ideas competition, an exhibition, a website including a digital version of the exhibition, as well as a book and practical toolbox of ideas for climate mitigation, adaptation and rights- based climate action.

I have also written a new guide in the Curating Tomorrow series, building on 'Museums and the Sustainable Development Goals': 'Mainstreaming the Sustainable Development Goals: a results framework for galleries, libraries, archives and museums' aims to go farther, helping these institutions make concrete commitments and plans that contribute to the SDGs and their targets, and to the overall 2030 Agenda. These are only three projects that aim to strengthen the contribution museums make to climate mitigation, and to ensure that they, and those touched by their work, play their part in the required transformation. We need many more, to make climate mitigation everyone's business, every day, everywhere, and every how. ■

Henry McGhie
United Kingdom

Workshop:
How can we accelerate support for climate action in the cultural and heritage sectors?

This short workshop, only one hour, asked a series of questions, anonymously, to a group of Oslo Forum participants. Their responses give us valuable insights in the 'state of the sector' and also point to some directions for what additional support is needed from agencies and policy makers.

WHICH ASPECT OF ACTION FOR CLIMATE EMPOWERMENT DID PARTICIPANTS WORK WITH MOST CLOSELY? (47 RESPONSES)

informal name given to activity that supports article 6 of the UNFCCC and 12 of the Paris Agreement. Of the six elements, participants worked most closely with co-operation (38%), public awareness of climate change (28%) and public education (15%). Only small numbers of participants worked closely with training of staff on climate change matters, public participation in climate action and access to information on climate change (6% in all three cases).

WHAT WORKS WELL? (45 RESPONSES FROM 27 PARTICIPANTS)

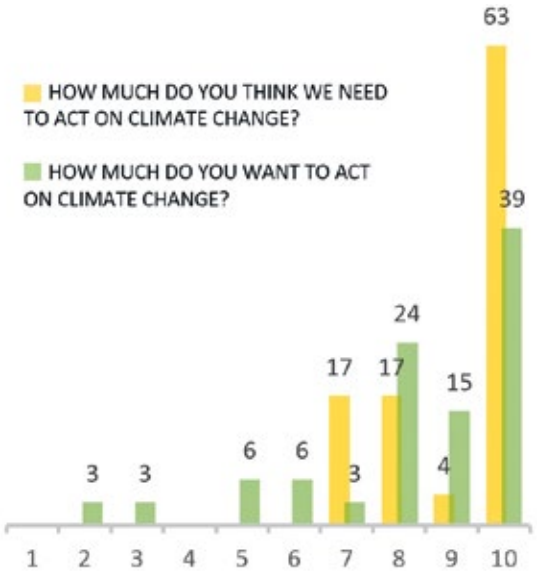
Participants were asked to share their lessons learnt and good practices, to help support other participants. The results provide a rich list of suggestions, of which a few are included here:

- The growing public conversation about climate change and the need for action makes other actions easier to take.
- Co-operation and networking at different scales and levels, and among different sectors.
- Bottom-up initiatives over top-down initiatives (although policies and support are also important).
- Dialogue with decision-makers, including politicians.
- Sharing knowledge, know-how and experience, from diverse sources and including from research, and including concrete examples
- Growing use of digitalisation as a result of the COVID-19 pandemic.
- Regular, informal meet-ups promoted via Facebook that are focused on small actions.
- Including marginalised sectors and voices in decision making, and drawing on local knowledge.
- Programmes involving young people and local communities.
- Including the Sustainable Development Goals (SDGs) in team meetings and sharing experiences of contributing towards them.
- Daring to initiate projects with stakeholders that are not obvious
- Practical toolboxes of specific measures to reduce greenhouse gas emissions
- Using culture and heritage to have discussions about sustainable and unsustainable practices and techniques.
- Being explicit about organisations' concerns and actions to address sustainability challenges.

WHAT SHOULD PEOPLE AVOID OR USE CAREFULLY? (42 RESPONSES FROM 24 PARTICIPANTS)

Participants were asked what activities and approaches get in the way of climate action, and that should be used with care.

- Make sure any statements on sustainability are credible and not 'green wash'
- Negativism and blaming others, whether individuals or organisations, for not acting sustainably in the absence of sustainable solutions.
- Plans should take account of local circumstances, context and challenges.
- Focusing on small but trivial contributions to sustainable development: focus on the challenges that make a difference.
- Making plans or commitments that are only pipedreams.
- Growth mentality of cultural institutions: bigger is not necessarily better.
- Too much talk, not enough action. Subsidising climate-damaging activities.
- Stop ignoring the climate crisis and act in ways that really address it.
- Simplistic discussion of 'solutions' rather than responses and processes.
- Wastefulness of all kinds.
- Unsustainable practices, such as flying, as much as possible.
- Use of social media.



HOW MUCH DO YOU THINK WE NEED TO ACT ON CLIMATE CHANGE? (24 RESPONSES)

This question was asked in an abstract way to gauge participants sense of, generally, how much they think someone needs to act on climate change. On a scale of 1–10, with 10 being the highest, 63% of participants scored 10/10, 4% 9/10, 17% 8/10 and 17% 7/10. These show that participants were unanimous in that climate change needs action.

HOW MUCH DO YOU WANT TO ACT ON CLIMATE CHANGE? (33 RESPONSES)

This question aimed to explore the personal motivations of participants, and revealed a very different picture to the previous question. Note, the extent to which someone wants to act on climate change is not the same as the extent to which they might or already are acting on climate change: it is possible for people to act on it, even when they do not wish to, although it is more likely that those who want to act will act. Again, the question used a scale of 1–10, with 10 being the highest. The scores were as follows: 39% voted 10/10, 15% 9/10, 24% 8/10, 3% 7/10, 6% 6/10, 6% 5/10, 3% 3/10, and 3% 2/10. Notwithstanding the wider spread of results, most people (78%) scored 8 or more.

WHICH OF THESE SDGS ARE YOU ABLE TO SUPPORT REALLY WELL THROUGH YOUR WORK? (29 PARTICIPANTS)

This question allowed for multiple responses. By far the strongest response was for SDG 11, sustainable cities and communities (79%), closely followed by SDG 17, partnerships for the goals (69%). Roughly half of participants thought their work could support responsible consumption and production (SDG 12, 52%), and climate action (45%). Smaller numbers of respondents thought their work could support most of the remaining SDGs, except No poverty (SDG 1) and Zero hunger (SDG 2), which no participants thought their work could support. Note, these responses are only participants' perception of the extent to which their work could support particular SDGs, and perceptions can be wrong.

Consumption and production (SDG 12), energy use (SDG 7) and climate change (SDG 13) are the scary monsters that we have to face and kill off. How can we get better at addressing these challenges? (21 responses from 18 participants)

In developed countries, SDGs 7, 12 and 13 are typically among the greatest challenges: inaction there has negative impacts elsewhere.

- Make exhibitions more sustainable through reducing the use of materials and increasing reuse.
- Use cultural heritage as an educational and information resource on sustainable practices, technologies and methods.
- Increase education and engagement activities on climate change and sustainability in cultural institutions, both for staff and for the public.
- Educate high consumers in developed countries on the impacts of their over-consumption.
- Normalise low consumption lifestyles and activities in cultural institutions.
- Ensure cultural institutions provide useful and locally relevant information on the challenges of climate change, and what steps everyone can take to contribute to climate action.
- Give a platform to organisations that are leading the way with sustainable innovations.
- Promote repair and reuse.
- Climate friendly products and energy should be the new normal and possible for all, through procurement, management and other decision-making.

WHAT DO THE HERITAGE AGENCIES NEED TO DO TO SUPPORT YOU IN DOING THIS? (26 RESPONSES FROM 17 PARTICIPANTS)

This question aimed to help inform the heritage agencies of what activities culture and heritage workers need from them. Some common threads could be found among the responses:

- Greater and more effective work between different heritage agencies with other sectors, and with the involvement of the public in decision making.
- Support training events and sharing of good and best practices that are helping foster sustainable development through organisations and in projects.
- Provide ready access to information such as toolkits and to research or high-level or collaborative initiatives that members can take part in.
- Mainstream culture and heritage in policies outside the sector.
- As a matter of urgency, incorporate sustainability considerations concretely in policies, funding schemes and selection processes, notably any projects drawing on public funding.
- Provide economic incentives (carrots and sticks) for public-funded institutions to adopt more sustainable practices and contributions to the SDGs.
- Factor climate mitigation, adaptation and climate justice into culture and heritage sector policies and decisions. Have robust plans in place.
- Greater co-operation in person-to-person terms, to support collaboration.

These lists of responses were generated in the course of a one-hour online workshop, showing the great level of depth and detail that can be collected in just a short time. The next challenge is for people, organisations and sectors to ask themselves how they can make use of this intelligence, to provide better, more effective, more efficient, and more transformative services and actions to meet the necessities of climate action. These ideas are here for anyone and everyone to use. If you have a better idea, please share it, and of course, act on it. Good luck! ■

Valdur Lahtvee
Policy Officer for Priority Area Sustainable & Prosperous Region CBSS, Estonia

The Council of the Baltic Sea States' Tools for Tackling Climate Change

Cultural heritage is part of our Baltic Sea region identity and is, as communities, infrastructure and the ecosystems, vulnerable to negative impacts of the emerging climate change. The recent IPCC 6th Assessment Report is a dire warning that extreme weather events will increase in coming decades despite efforts to reduce the emission of greenhouse gases.

The focus of the Baltic Sea Region cooperation and macro-region stakeholders to achieve the EU climate and energy policy should be on the areas where national efforts and progress have been lacking and where there is lack of implementation capacity. The CBSS Climate Policy Dialogue Platform stakeholders have found that the focus of capacity building must be shifted from national to local level as climate change affects mostly local communities.

The Vilnius II Declaration of CBSS Foreign Ministers from June 2021 emphasises that "Cultural networks and tourism, devoted to fostering and nurturing regional identity, tightly link the Baltic Sea regions, municipalities and cities. They strive to support initiatives that enhance bottom-up community-based activities and encourage citizens' participation at all levels."

When translating policies into practice, everyone has a role. Without hesitation, all cultural heritage site operators could start to measure their carbon footprint, assess vulnerability to climate change and prepare a plan of action to mitigate and adapt to climate change. To do that, the CBSS initiated CASCADE project tools and CAMS project guidelines for climate proofing of buildings could be useful. ■

When translating policies into practice, everyone has a role.

Peter Debrine
Destination Advisor and UNESCO Sustainable Tourism Expert,
UNESCO World Heritage and Sustainable Tourism Programme,
France

Managing Heritage and Tourism in the Face of Disruptive Global Events

SUMMARY
The COVID-19 crisis has completely disrupted the travel and tourism economy, along with the heritage and creative sectors. Although the full consequences for the tourism and culture sectors are not yet clear, the emerging consensus amongst policy makers and the tourism industry is a return to 'business as usual' is unlikely and undesirable. Tourism and heritage management authorities will therefore need to work together and learn from the COVID-19 crisis to build a stronger, more resilient global tourism economy for the future. Capacity development for improving management systems, new product development and interpretation will be key.

UNESCO WORLD HERITAGE COVID-19 SURVEY
Earlier in 2021, UNESCO conducted a survey to better understand the impact of the COVID-19 pandemic on tourism and World Heritage sites. While the results provide a snapshot of the situation at that specific point in time, they can be instructive for the future. The COVID-19 pandemic has continued to have a negative impact on tourism in 2021, and for many destinations 2021 will be another challenging year as vaccination roll-outs have been slower than expected and renewed waves of infection have taken hold in different parts of the world. The survey found that many respondents expect the effects of the crisis on World Heritage properties to continue in the months, if not years, to come.

At the height of the crisis, it was reported that 90% of countries with World Heritage properties had closed or partially closed them and respondents to this survey still reported an average figure of 71% closure of sites in February 2021.

Visitors to World Heritage sites dropped by 66% in 2020 according to respondents and at sites where staff redundancies were reported (13% of sites in the survey), an average of 40% of permanent staff and 53% of temporary staff were made redundant at those sites.

Respondents overwhelmingly reported large impacts on local communities, especially from the loss of revenue due to huge reductions in visitors to World Heritage sites and grave concerns about the future.

← Solvorn, Norway. Photo: Cecilie Smith-Christensen

Some respondents recommended a recovery process that includes measures to support the tourism sector and communities and to safeguard livelihoods in the transition towards more versatile and resilient World Heritage site management. The uncertainty surrounding the current crisis has suggested a policy of re-alignment of properties towards domestic tourism for many stakeholders in the short-term, providing, however, the equally important opportunity to "Build Back Better".

What the pandemic has underscored is the inextricable link between tourism and heritage as we anticipate future disruptions, both are highly vulnerable to climate change. The tourism industry relies on coasts and other areas of natural beauty, it is becoming increasingly vulnerable to climate impacts, like sea level rise, glacier melt or extreme weather resulting in increased fires and flooding seen this summer in Europe. Low- lying island nations are losing their beaches to sea level rise and their coral reefs to increased ocean temperatures. In the Himalayas, snow and glacier melt is making the mountains more hazardous and destroying the ecosystem's natural beauty. In the Caribbean, where tourism makes up 20–30% of GDP in many countries, research by the World Travel and Tourism Council (WTTC) has found that the unusually strong 2017 Atlantic hurricane season cost the region 826,100 visitors, who would have generated $741 million. The storms triggered hikes in insurance premiums of up to 40%, increasing a key cost for the area's hotels.

For the Nordic/Baltic region, the scientific research is telling us that in southern Norway and Europe, the temperature on hot days will increase twice as much as general global warming, while in the Arctic, even on the cold days, the temperature will rise as much as three times higher than the global increase. This could have a profound impact on tourism, exposing climate vulnerabilities on key tourism seasons.

POTENTIAL LINES OF ACTION

According to a growing consensus from UN agencies and other organisations, capitalising on the new services that tourism businesses and creative industries have been providing to destinations in times of crisis brings an opportunity to create stronger ties with local

communities, integrate local wisdom and enhance local satisfaction with tourism. Communities may need business mentorship for their local entrepreneurship ventures to improve their supply chain inclusion. Furthermore, stronger local value chains bring social and economic benefits to local communities, reduce dependence on foreign suppliers while supporting the circularity of tourism operations.

Nature-based solutions have potential to drive innovation in tourism towards sustainability and, besides mitigating the environmental impacts of tourism activity, result in better management of scarce natural resources such as water, coral reefs, wetlands, mangroves, coastlines and foster disaster resilience both in urban and natural environments. Investments in nature-based solutions also respond well to the expectations of a growing demand for experiences in nature.

Enhancing mitigation efforts in the tourism sector, including through investments to develop low carbon transportation options and greener infrastructure, is key to resilience. It shall also be seen as a competitive advantage as the cost of inaction with regards to climate will be in the long run larger than the cost of any other crisis. Additionally, a growing number of consumers are demanding that the tourism sector takes responsibility for its CO_2 emissions and would like to take part in these efforts. It is important to note that technical and financial support will be needed to accomplish such transition.

Supporting the integration of circular economy processes in tourism can promote innovation, the creation of new sustainable business models, added value for customers and local economic development. The efficient use of energy and water are essential measures. The decarbonisation of tourism will have to happen, which in turn will have profound impacts on how we approach visitor management.

By introducing a comprehensive place-based approach for tourism, we can develop tourism experiences based on the uniqueness of destinations across different fields including cultural heritage, gastronomy, local cultural expressions and better involve local creators, heritage practitioners and inhabitants in the shaping of tourism policies and practices.

We should strive to develop community-centred tourism initiatives that actively engage practitioners of local and traditional knowledge to strengthen systems for transmitting heritage to future generations through sustainable tourism and exploring how heritage in tourism can improve the livelihoods of communities and practitioners, while safeguarding the social functions and cultural meanings of that heritage.

UNESCO TOOLS FOR SUSTAINABLE TOURISM DEVELOPMENT

For the past ten years, the UNESCO World Heritage and Sustainable Tourism programme has been providing practical tools, guidance and policy advocacy for World Heritage and destination managers.

IN 2016, together with the United Nations Environment Program (UNEP) and the Union of Concerned Scientists (UCS), UNESCO released a report that lists 31 natural and cultural World Heritage sites in 29 countries that are already being impacted by climate change and are vulnerable to increasing temperatures, melting glaciers, rising seas, intensifying weather events, worsening droughts, and longer and more intense wildfire and seasons. The report highlights the urgent need to:

- Identify the World Heritage sites that are most vulnerable to climate change and implement policies and provide resources to increase resilience at those sites
- Ensure that the threat of climate impacts is taken into account in the nomination and listing process for new World Heritage sites
- Engage the tourism sector in efforts to manage and protect vulnerable sites in the face of climate change and educate visitors about climate threats

- Increase global efforts to meet the Paris Agreement climate change pledges in order to preserve World Heritage sites for future generations

UNESCO SUSTAINABLE TRAVEL PLEDGE

In 2019, UNESCO and Expedia Group launched a partnership focused on promoting sustainable tourism and heritage conservation through a Sustainable Travel Pledge. The pledge takes an industry-first approach to environmental and cultural protection, requiring hotel operators to introduce firm measures to eliminate single-use plastics and promote local culture.

The pilot phase of the project was launched in 2019 in Thailand in collaboration with the Tourism Authority of Thailand (TAT), with 600 hotels signing the pledge to date. The pledge is now expanding globally with Accor signing on in March, Banyan Tree and most recently Iberostar. A new global website will be unveiled in October. With the support from the German Development Cooperation (BMZ) efforts are underway for the global expansion of the pledge in seven countries including Cambodia, Vietnam, Indonesia, Kenya, Namibia, Bosnia and Herzegovina and Georgia. It is the first collaboration between UNESCO and a global online travel agency.

HOW TO GUIDES

These easily accessible "How To" guides are focused on best practice approaches to sustainable economic development through tourism. The first of their kind, the 'How To' resources offer direction and guidance to managers of World Heritage tourism destinations and other stakeholders to help identify the most suitable solutions for circumstances in their local environments and aid in developing general know-how for the management of each destination.

The guides have been structured as a step-by-step process for site managers.

VISITOR MANAGEMENT ASSESSMENT & STRATEGY TOOL (VMAST)

The Visitor Management Assessment & Strategy Tool (VMAST) has been specifically developed to help site management and destination authorities manage visitation and tourism for the protection of heritage values while contributing to local sustainable development and adaptive and resilient communities by creating a baseline for sustainable tourism according to a set of indicators.

The tool is intended as an ongoing practice and effort to improve visitor management and in that sense can be used to develop forward thinking strategies using the other guidance tools at UNESCO. The tool was made possible with the support from the Norwegian Ministry of Climate and Environment.

The tool has been implemented in several regions of the world including through a current project of the Organization of World Heritage Cities in collaboration with ICOMOS. It will eventually be piloted in Sweden and now, through a recent report, promoted through the Swedish National Heritage Board and Swedish Agency for Economic and Regional Growth. The tool is hosted and supported through Zegeba and World Heritage Catalysis in Norway.

We are faced with many challenges and opportunities for heritage sites and communities that rely on tourism in the face of disruptive events such global pandemics and climate change. They underscore the need to ensure that when tourism rebounds, it spurs innovation and tests new approaches to support communities in their recovery. It also transforms destinations away from outdated and unsustainable models and toward a strategic approach for tourism that rejuvenates communities, protects heritage and harnesses cultural values and builds community resiliency to help buffer communities from future disruptions such as climate change. ■

Photo: Morten Brun

Hanna Geiran
Director General, Norwegian Directorate for Cultural Heritage, Norway

We must not be restricted by national borders. Most challenges and problems related to climate change are global.

A Strategy Towards Climate Action

Climate change is the major challenge of our time. All sectors are affected by this challenge, and the heritage sector is no exception. Our field must contribute to achieving the goals of the Paris Agreement. We must reduce greenhouse gas emissions and minimise the negative effects that climate change has on cultural heritage.

At the Norwegian Directorate for Cultural Heritage (Riksantikvaren), we have been talking about cultural heritage and the impact of climate change for several years, and we have gathered knowledge and experience through various studies and reports. However, for a more integral approach, we have developed a climate strategy for cultural environment management. The strategy has two parts, and we encourage anyone managing a cultural monument or site to make use of the strategy as a tool. The first part deals with the cultural heritage sector's contribution to reducing greenhouse gas emissions. The second part deals with how the cultural heritage sector can adapt to and manage the impacts of climate change.
The strategy is translated into English and available on our webpage: www.ra.no/en.

The cultural heritage sector is not alone in this endeavour. We depend upon a broad team of engaged participants, both inside and outside the cultural heritage sector, who recognise and use cultural heritage as a resource towards reaching the goals of the Paris Agreement. And we must not be restricted by national borders. Most of the challenges and problems related to climate change are global, and important synergies must be achieved through international cooperation, research, and the exchange of knowledge. The Baltic Region Heritage Committee is a great example of such international cooperation, and the Oslo Forum was a good starting point for further cooperation on cultural heritage and climate change in the Baltic Sea Region.

I look forward to putting our words into action. Strategies and forums are not enough; our work has just begun. ■

Selamawit Mamo Fufa
Senior Research Scientist, SINTEF, Norway (1)
Cecilie Flyen
Senior Research Scientist, SINTEF, Norway (2)


1.


2.

GHG Emission Calculations – Reuse of Old Buildings Versus Building New Ones

INTRODUCTION

The construction industry is responsible for about 35% of global energy use and 38% of greenhouse gas (GHG) emissions[1]. Of these emissions, the indirect (19%) and direct (9%) energy related emissions from buildings represent 28%, and the production, transport, and use of construction products represent 10% of the total global GHG emissions. This demonstrates the significance of embodied emissions and the importance of extending the service life of buildings.

The construction industry is also responsible for 25–30% of the total waste generated in the EU, which is equivalent to 40% raw material extraction[2], adding to a major global resource consumption and associated GHG emissions throughout the building life cycle. This indicates the need to get an overview of the material flows and consideration of circular economy measures (prioritisation of regenerative resources, service life extension, use waste as a resource[3]).

A larger proportion of EU's existing building stock (85–95%) is expected to still be standing in 2050, whilst the majority of existing buildings are energy inefficient (ca. 75%). The potential of total energy consumption and GHG emissions reduction from rehabilitation of existing buildings is estimated to be about 5–6% and 5%, respectively[4]. Thus, rehabilitation and adaptive reuse of existing buildings can enable immediate actions, and thus play a major role in achieving regional, national, and international environmental goals.

EU's revised version of the Energy Performance of Building Directive (EPBD) aims to speed up rehabilitation rates by setting measures enabling to improve energy efficiency of existing buildings[5]. As part of the EU green deal, *"renovation wave" targeted to doubling the current lower rehabilitation rate (ca. < 1%) in the next 10 years*. Evaluation of the environmental performance of energy efficiency measures in existing buildings from a life cycle perspective, using transparent and harmonised methods, is essential to evaluate possibilities of different measures and make informed decisions.

REHABILITATION OF EXISTING BUILDINGS

With increased focus towards energy efficient and zero emission buildings, the proportion

of embodied energy and associated life cycle embodied GHG emissions (from production, transportation, construction, maintenance, replacement, refurbishment, and end of life activities) of buildings becomes very significant compared to emissions from the operational phase. Energy efficient rehabilitation of existing buildings can reduce embodied GHG emissions through reuse and extension of the building service life. Considering the impacts from operational energy only, which is the common practice, might lead to underestimating the significant embodied impact from new buildings and the benefits from rehabilitation of existing buildings.

The results from life cycle assessment studies identified ca. 4–74% environmental impact reduction from rehabilitation of existing buildings compared to demolition and building new[6,7]. For new and energy efficient buildings (with up to 30% more energy efficient than an average performing existing building), it is estimated to take 10–80 years to overcome the negative environmental impacts created during the construction period[8,9]. On the other hand, rehabilitation of existing buildings with an average energy performance offers immediate, short, and medium climate change impact reduction targets.

Life cycle approach and energy efficiency measures in historic/heritage buildings are relatively unexplored areas but are increasingly gaining grounds. Even though considerations must be taken to attend to older construction methods, detail solutions, and materials, many actions can be implemented to increase the energy efficiency of built heritage.

LESSONS FROM NORWEGIAN CASE STUDIES

In line with the Paris Agreement, Norway targeted reducing up to 55% GHG emissions by 2030 compared to 1990 levels, and aims to become a low emission society by 2050. The Norwegian construction sector is an important part of the economy with a share of ca. 14% of GDP. The industry is also responsible for about 15% of the national direct GHG emissions[10] and ca. 25% of waste generation. Unlike most other European countries, the GHG emissions from Norwegian construction industry is mostly from direct emissions associated with production of materials, construction site activities and transport. This is due to a high share of renewable energy. The industry, however, is seen as one of the main resource utilisers, pointing out the need for transition and implementation of circular building principles and models[11]. The presentation of existing building stock and rehabilitation rate in Norway follows the same trend, representing more than 80% of the nation's building stock, with less than 1% rehabilitation rate.

As part of a study conducted to get an overall picture of the environmental significance of rehabilitation of existing buildings, a meta-analysis of life cycle assessments of Norwegian case studies was conducted based on previously completed research projects. The findings from evaluation of LCA of Norwegian case studies identified that the GHG emissions from rehabilitation of existing buildings is estimated to be up to 50% lower than demolition and building new[12,13]. This is mainly due to a large reduction in embodied GHG emissions from rehabilitation of existing buildings. The results also show that rehabilitation of existing buildings will be beneficial in a short and medium term, and thus they are the way forward to achieve the 2030 and 2050 environmental goals.

Reductions in the environmental impacts depend on various case specific factors. In addition, differences in the scope of the LCA study (e.g., lack of full LCA study), rehabilitation measures considered, methodological choices (e.g., time aspects) and background data used (e.g., emission factors) makes it very challenging in utilisation of existing limited LCA studies. There is also lack of economic (at macro level) and social

aspects in existing LCA studies. This shows the importance of conducting a whole LCA, using harmonised LCA methodologies to evaluate and transparently present the environmental performance of existing buildings, including socio-cultural values of heritage buildings. Increasing the energy efficiency of existing and heritage buildings through adaptive reuse, and thus preserving heritage buildings, is sustainable seen from both environmental and cultural heritage points of view.

CONCLUSIONS AND THE WAY FORWARD

With a growing population, a need for space and urbanisation, there is an increase in the need of building stock. Since the existing building stock represents a majority of built-up area in 2050, development and implementation of low carbon rehabilitation strategies will play a major role towards sustainable transitions in the years to come. Decisions whether to keep existing buildings or demolish and build new should be based on thorough and holistic life cycle analyses. When environmentally sound rehabilitation measures are being assessed, the cultural and historical heritage value should also be considered.

FACT SHEET

This study is based on the findings from *"Green isn't just a colour: Sustainable buildings already exist"* funded through the Norwegian Directorate for Cultural Heritage in the project CLIMAP-X and published in 2020. ■

REFERENCES

1. UNEP, 2020. 2020 Global Status Report for Buildings and Construction: Towards a Zero-emission, Efficient and Resilient Buildings and Construction Sector. United Nations Environment Programme. Nairobi, Kenya
2. IRP, 2020. Resource Efficiency and Climate Change. Material Efficiency Strategies for a Low-Carbon Future. Hertwich, E., Lifset, R., Pauliuk, S., Heeren, N. A report of the International Resource Panel. United Nations Environment Programme, Nairobi, Kenya
3. Circle Economy, 2021. Key Element of the Circular Economy. Draft v.1 February 2021. Available at: https://assets.website-files.com/5d26d80e8836af2d12ed1269/601d3f846c512412fff633af_Key%20Elements%20-%20Draft%20Literature%20Review%20.pdf
4. BUILD UP, 2019. OVERVIEW | Energy Efficiency in Historic Buildings: A State of the Art. Available at: https://www.buildup.eu/en/news/overview-energy-efficiency-historic-buildings-state-art
5. https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive_en
6. Assefa, G., Ambler, C., 2017. To demolish or not to demolish: Life cycle consideration of repurposing buildings. Sustainable Cities and Society 28, 146–153. https://doi.org/10.1016/j.scs.2016.09.011
7. Hasik, V., Escott, E., Bates, R., Carlisle, S., Faircloth, B., Bilec, M.M., 2019. Comparative whole-building life cycle assessment of renovation and new construction. Building and Environment 161, 106218. https://doi.org/10.1016/j.buildenv.2019.106218
8. Preservation Green Lab, 2011. The Greenest Building: Quantifying the Environmental Value of Building Reuse. https://living-future.org/wp-content/uploads/2016/11/The_Greenest_Building.pdf
9. Duffy, A., Nerguti, A., Purcell, C.E., Cox, P., 2019. Historic London. Understanding carbon in the historic environment. Scoping study. CARRIG conservation international. 79
10. Larsen, H.N., 2019. Bygg- og anleggssektorens klimagasstutslipp. En oversikt over klimagassutslipp som kan tilskrives bygg, anlegg og eiendomssektoren (BAE) i Norge. Oslo: Asplan viak.
11. Circle Economy, Circular Norway, 2020. The circularity gap report: Norway. Amsterdam: Circle Economy. Available at: https://www.circularity-gap.world/norway.
12. Fufa, S.M., Flyen, C., Venås, C., 2020. Grønt er ikke bare en farge: Bærekraftige bygninger eksisterer allerede. SINTEF Fag 68. ISBN: 978-82-536-1669-8. (No. SINTEF Fag 68. ISBN: 978-82-536-1669-8.)
13. Fufa, S.M., Flyen, C., Flyen, A.-C., 2021. How Can Existing Buildings with Historic Values Contribute to Achieving Emission Reduction Ambitions? Applied Sciences 11, 5978. https://doi.org/10.3390/app11135978

Photo: Black Film AS

It was a very elegant building – it still is.

Olaf Steen, The Norwegian Directorate for Cultural Heritage

A Monument to Friendship

The United States embassy in Norway was considered an architectural masterpiece and a monument of the friendship between Norway and the U.S. when it opened in 1959. The triangular building was designed by renowned Finnish-American architect Eero Saarinen who is well known for his Neo-Futuristic style. The building has stood empty since 2017 when the embassy moved to a more modern location. Now, new life is breathed into the former embassy by Fredensborg. Reuse and repurposing is the name of the game. Saarinen himself said that the embassy building should resemble 'a gentleman in formal attire'. When it reopens in 2022, it will again become available to the city's population – an open building with jobs, dining, culture and roof terrace. ■

Photo: Teigens Fotoatelier / DEXTRA Photo

Photo: Black Film AS

Olaf Steen, The Norwegian Directorate for Cultural Heritage.
Photo: Black Film AS

Adaptation to Climate Change

Ewan Hyslop
Head of Technical Research and Science, Historic Environment Scotland, United Kingdom

Evaluation of climate related risks to cultural heritage – examples from Scotland

INTRODUCTION

This article describes some of the approaches to evaluating climate risks at heritage sites in the care of Historic Environment Scotland (HES) and demonstrates how these are being used to guide management to address the impacts of climate change at heritage sites in Scotland. This work, based on research and development of new methodologies, is also used to provide advice and guidance to others for managing the historic environment beyond the sites in the care of HES.

Like other places, Scotland's climate is changing. A series of gradual changes over the last 50 years or so are now accelerating, and in particular more severe extreme weather events in terms of both intensity and frequency. Since the 1960s temperatures have increased, the growing season is over a month longer, and it is warmer and wetter with both summers and winters having over 10% more rainfall. Extreme heavy rainfall events in some areas now contain 36% more rainfall than in previous decades. Sea level is rising at around 3 mm per year and accelerating. These trends are set to continue, with temperatures continuing to increase through this century, but with a shift to drier summers but wetter winters. The slow increase in sea level rise is set to accelerate dramatically over the next few decades at current global emissions levels, with the potential for up to 1 metre of sea level rise by the end of this century around the Scottish coast.

Cultural heritage in Scotland has already been impacted by climate change, due to these progressive changes in weather patterns over the last 50 years. In areas of the north and west of Scotland, winter rainfall levels are now double what they were in the 1960s.

Increasing rainfall has caused penetration of high level masonry in ruinous and unroofed structures, in places washing out wall cores and increasing structural instability. The combination of increased rainfall with higher temperatures has increased the amount of biological growth on historic masonry, resulting in further damage. Coastal erosion is directly affecting heritage sites, in particular storm events which remove areas of soft coast that have provided natural protection for heritage structures. At some sites, c.40cm of coast is being lost each year.

A key objective for HES has been to better understand the environmental stressors affecting our sites and to generate information to identify key sites at risk in order to prioritise action and site management. Our Climate Change Risk Assessment project involved the developement of a methodology based on six different environmental hazards for which high resolution spatial data was available. Working with the Scottish Environmental Protection Agency and the British Geological Survey, datasets were obtained for 6 natural hazards: coastal erosion, ground stability and 4 different types of flooding (fluvial, pluvial, groundwater and coastal flooding).

A desk-based GIS exercise overlaid heritage site boundaries with maps for each of the 6 hazards. Using an automated process, GIS queries were created to generate a hazard profile for each site, and assign a 'likelihood' score to each property for each hazard. A set of 'Likelihood' maps were then generated which provided detailed spatial data to show where hazards were most likely to occur within particular sites.

The risks were developed in order to be mainstreamed within a corporate risk register. Using a standard risk matrix approach, the 'Likelihood' score was multiplied with an 'Impact' score. However, generating an impact score was challenging because the same hazard can impact different heritage sites very differently – for example, an occupied building might be affected by a flooding event very differently to a standing stone or a field monument.

In order to address this issue, pre-existing categories were used which had been developed to categorise the range of properties that are managed by HES. The sites were divided into 6 typologies – roofed monuments (occupied and unoccupied); unroofed monuments with high masonry walls; and low masonry monuments; standing stones; and field monuments and carved stones. An impact score was assigned to each monument category (or type) for each hazard. For example, each monument category was assigned as equally affected by a landslide or by coastal erosion; whereas for flooding, an occupied roofed building was determined to be more seriously impacted than, for example, a standing stone.

The results showed that of the 352 sites investigated, 71% had one or more hazards at 90% of sites had an 'unacceptable' level of risk. However, this uncontrolled risk ('Inherent Risk') does not take account of any mitigating factors such as site management practices which reduce the impact of hazards. For example, risk may be considered lower at a staffed site compared to a remote site which is rarely visited, or at a site where specific or intensive maintenance is carried out. Using these factors, a 'Residual Risk' was calculated which reflects the effective risk remaining when site management factors are considered. This concluded that 53% of sites carry an unacceptable level of risk.

← Danger: Erosion and falling rocks. Photo: freeimages.co.uk

The data was analysed further in order to prioritise sites for action. For example, of the 352 sites, only 28 record 'Very High' risk levels for one or more of the hazards and, of these, just 9 record 'Very High' levels for more than one of the hazards. In this way, it is possible to prioritise which sites require urgent attention and to therefore focus site management resources accordingly.

The results of this project have helped us to better understand the environmental risks to our sites, and has led to specific actions at priority sites. For example, at the 18th century Fort George in northeast Scotland, rapid erosion has removed the natural protective beach deposits and vegetation exposing the historic walls. The hazard maps have identified specific areas at high risk of coastal flooding, and here preventative action has been taken to protect the walls with a temporary rock armour barrier until more substantial repairs can be carried out.

At Duff House in Aberdeenshire, built in the 1740s, the site has high risk of fluvial flooding from a nearby river. In order to protect the building and its contents, a programme of emergency salvage training has been undertaken in partnership the National Galleries of Scotland and the Scottish Fire and Rescue service, and a new salvage plan developed.

In other locations, more simple solutions have been created such as the adaptation of footpaths to provide safe access to heritage sites in areas at high risk from rainfall and flooding. In many cases subsequent flood events have demonstrated the value of the approach and accuracy of the data.

The existence of accurate environmental data for our sites has allowed development of a number of other initiatives to further support site management, giving a more detailed understanding of the impacts of climate change. For example, in 2019 we trialed the application of the Climate Vulnerability Index (CVI), working with an international team at the Heart of Neolithic Orkney World Heritage Site in the Orkney Islands on the north coast of Scotland. The CVI process quantifies the vulnerability of the Outstanding Universal Value of the site (OUV) to physical hazards; but it goes beyond the physical vulnerability to also assess the impact of climate stressors on the Economic, Social and Cultural Values of the site (ESC), to produce a 'Community Vulnerability' score. The results from the Orkney CVI project are helping to inform a new Site Management Plan, taking into account the impacts of climate change, not only on the physical aspects of the site, but also on these other dependencies. The availability of data from the Climate Change Risk Assessment has provided a sound basis for the CVI work and increased the value of the results.

Our work to evaluate climate related risks has shown that a sound understanding of environmental impacts at heritage sites is key to making informed decisions for site management. An evidenced-based approach ensures that preventative actions can be prioritised and focused at sites in greatest need. The publication of these results and the methodologies are intended to support others to adopt a similar approach. ■

REFERENCES

1. Historic Environment Scotland. 2018. Screening for natural hazards to inform a Climate Change Risk Assessment of the Properties in Care of Historic Environment Scotland. Available at https://www.historicenvironment.scot/
2. Day, J.C., Heron, S.F., Markham, A., Downes, J., Gibson, J., Hyslop, E., Jones, R.H. & Lyall, A. 2019. Climate Risk Assessment for the Heart of Neolithic Orkney World Heritage property: an application of the Climate Vulnerability Index. Historic Environment Scotland, Edinburgh. Available at https://www.historicenvironment.scot/
3. Historic Environment Scotland. 2019. A guide to climate change impacts on Scotland's historic environment. Available at https://www.historicenvironment.scot/

Gro Sandkjær Hanssen
Researcher, Oslo Metropolitan University, Norway

Adaptation to Climate Change:
About Consequences of More Densely Populated Areas

Climate change might challenge cultural heritage concerns in urban planning. However, there are a lot of examples that climate mitigation and climate adaptation can contribute to strengthen the role of cultural heritage in local planning, if they are integrated into municipal plans.

Norway has a decentralised land-use planning system, giving local authorities the role as the main land-use authority with strong juridical instruments. The Norwegian Planning and Building Act (2008) establishes local planning as the main coordination arena of different societal concerns (Holth and Winge 2019, Hanssen and Aarsæther 2018). The cultural heritage concerns of the Cultural Heritage Act, the health promotion concerns of the Public Health Act, the biodiversity concerns of the Biodiversity Act, as well as local development and growth concerns – they all meet in the land-use planning processes.

Often, these are conflicting concerns. An example are concerns of climate mitigation and climate adaptation, which might represent potential challenges for valuable cultural heritage sites and the environment. Climate mitigation concerns are often ensured by local densification policies, with high density projects around public transport hubs. This often represents a threat to the existing buildings in these areas, of high cultural heritage values. Much densification is made possible by removing the existing buildings and construction, and thereby valuable cultural heritage environments risk being torn down to give way for high density development projects

Climate adaptation policies and measures might also challenge cultural heritage concerns. More precipitation, flooding, avalanches and sea-level rise challenge cultural heritage buildings and sites, and so do some of the measures taken to hinder natural hazards and damage to buildings. Establishing magazines that delay water in the city centre, constructions that protect buildings from storm flooding and rain channels are measures that need space in dense areas. As a result, the existing buildings might have to give way to such measures.

However, there many examples that developing policies for climate mitigation and climate adaptation can contribute to strengthen the role of cultural heritage in local planning, if

they have a comprehensive approach and are integrated into municipal plans (overall plans, thematic plans, detailed plans):

Firstly, when it comes to climate mitigation, national policies now have well-established principles of transport-hub-densification, and the strengthening of city-centres. These principles are primarily justified by climate green mobility concerns, but also result in strengthening the role of the historic centres of cities and towns. Secondly, densification in city- and city-district centres are often achieved by transforming old industrial and production buildings. Below, a good example is presented, the old wine bottlery at Hasle in Oslo, which recently has been transformed into new dwellings, cafes, and shops on the first floor.

Thirdly, in Norway, densification of city centres also imply privately funded transformation, as the municipalities build very few housing projects themselves. Hence, municipalities can use their extensive land-use authority to ask developers and property owners to preserve and transform cultural heritage sites (of high cultural heritage value). If the buildings do not have the characteristics of being a cultural heritage site, for example due to age, the local authorities can use other means (as they will not have the same juridical instruments). For example, we see that city authorities often cooperate with private property owners, and are able to convince them of the identity-building function of these sites, and how they can contribute to place-making, stimulating social cohesion etc. Thereby, densification of city centres and old industrial sites also contribute to the preservation of buildings that are not protected by the Cultural Heritage Act.

However, municipalities are increasingly asking for stronger planning tools, to avoid climate mitigation from construction sites and new materials (especially concrete), but also to protect buildings that are not protected by the Cultural Heritage Act. They are often production buildings or office buildings from the 1930–1960s, and many are now at risk of disappearing. An example is the old office building at Økern in Oslo, built in 1969 by Håkon Mjelva and Per Norseng.

↑ Vinmonopolet's bottlery, Haslevangen 16. Photo: Unknown /Oslo museum

Hence, the next step is to amend the law, to give local authorities stronger tools. A law amendment can give the municipalities authority to ask for reuse of buildings and materials in private development projects, and give them veto-power when private property owners want to demolish buildings or constructions. This will be important in avoiding mitigation and protecting (newer) cultural heritage environments, but it will also contribute to local identity-building and place-making.

In addition, there is a need for a law amendment to integrate a nature accounting system in the Norwegian planning system. A climate-, nature value-, and ecosystem services accounting system would have shown how nature contributes to climate mitigation and climate adaptation services. Especially the role of (urban) nature in absorbing surplus water from heavy precipitation is an important service that contributes to protecting cultural heritage sites and cultural heritage environments. An example of some ecosystem services is illustrated below in the figure from SEEA-UN.

From: https://seea.un.org/ecosystem-accounting

In summary, climate change challenges cultural heritage sites in many ways. However, if we are able to adjust the rules, regulations and planning system, local policies for climate mitigation and climate adaptation can contribute to strengthen the role of cultural heritage values in urban development. ■

LITERATURE

1. Hanssen, Gro Sandkjær og Nils Aarsæther (red.) (2018a) *Plan- og bygningsloven. Fungerer loven etter intensjonene?* Oslo: Universitetsforlaget.
2. Holth, Fredrik and Winge, Nikolai (2019). *Plan- og bygningsloven. Kort forklart.* Oslo: Universitetsforlaget.

↑ The transformation project "Vinslottet" at Hasle in Oslo, an old wine bottlery transformed by Kristin Jarmund Architects. Photo: Øivind Aamodt, the Planning and Building Agency of the City of Oslo

A Library for the Future

The new Deichman library is Oslo's main public library. Placed between the central station and the famous Oslo Opera House, the new library offers more than books, and is anything but quiet. Social sustainability means an open and inviting structure. Just as fitting for escaping in a book as for computer games or a sewing class with friends. The project is one of several showcases for FutureBuilt – an innovation Programme in the Oslo area where architects, contractors and municipalities are working together to promote sustainable and green architecture. Erlend Seilskjær is one of the architects making the case for future-conscious projects like the Deichman public library. Other examples include residential compounds and reusing building materials in new developments.

All photos: Black Film AS

We often think about sustainability in terms of ecology or economy – but there is also a social factor that we should take into consideration.

Erlend Seilskjær, FutureBuilt

Kristin Danielsen
Executive Director, Arts Council Norway

Choosing a More Sustainable Cultural Sector

No country, no political force, can expect to be taken seriously unless combating climate change is part of their agenda

Climate change has been felt and observed for decades. However, the recent UN report tells us in no uncertain terms that we as a society have not done enough to combat this crisis. Temperatures will continue to rise, and the weather will be warmer, wetter and more unpredictable.

The changing climate will certainly shape our future. But it may also have a profound effect on how we preserve our past. In Norway alone, more than half of all cultural heritage buildings owned by our museums are in need of restoration. These buildings hold vital pieces of information about who we are, who we once were, and the communities we once came from.

Still, there are several reasons to be optimistic. The recent Oslo Forum Conference is one of them. The sharing of knowledge, ideas and best practices are vital to meeting the challenges ahead. This is not one nation's problems, and I believe we have a responsibility to help meet these challenges worldwide.

Another reason is the fact that governments and decision makers are now seeing the challenges facing our shared heritage. We need to ensure that these initiatives, and not least the necessary funding, are prioritised in the time to come.

There is also now a growing awareness of climate change. We see it in businesses, government agencies and throughout the general public. No country, no political force, can expect to be taken seriously unless combating climate change is part of their agenda.

That goes for us as well. We now have the choice to build a cultural sector that is more sustainable, more diverse and even more creative than the one we had. I for one believe the future is full of possibilities – especially when it comes to preserving our past. ■

Lucyna Nyka – Professor (1), **Jakub Szczepański** – Professor (2) and **Justyna Borucka** – Assistant Professor (3), Faculty of Architecture, Gdańsk University of Technology, Poland


1.


2.


3.

Vulnerability of Heritage Waterfront Areas in the City of Gdańsk: Challenges, Conflicts and Concepts

In many places in the world, rising sea levels, heavy storms and flash floods engender pressure for developing sustainable adaptation strategies to protect both people and the built environment. Creating more water-resilient cities leads to rethinking urban territories in terms of their capacity to absorb water, effectively respond and easily recover from any sudden climate-related events. In the development of different concepts of water sensitive urban planning and design, an important group of issues emerged that relate to the vulnerability of heritage buildings and landscapes. As a result of the analysis of numerous case studies, a particular research topic took precedence. Specifically, the question appeared, how the various contemporary climate change adaptation schemes for urban areas may contribute not only to the protection but also to strengthening relations between historical buildings and urban surroundings. In addition, how may these adaptations lead to a better exposition of the cultural heritage and increase the quality of urban space? For the last decade, this issue has been explored within the framework of several research projects carried out at the Gdańsk University of Technology, most recently as one of the topics of the H2020 'SOS Climate Waterfront' international research project*.

According to the flood projections, the city of Gdańsk is one of the most vulnerable places in Europe. Founded on islands and clumps among swamps and backwaters of the Motlawa and Vistula rivers, close to the outlet of the Vistula River to the Baltic Sea – the city is under the constant threat of coastal, riverine and flash floods. The urban areas of Gdańsk partly overlap with former marshlands and oxbow lakes. On the east side, the city is encompassed by geographical depressions, transformed through centuries into the anthropogenic landscape of polders. For ages, riparian territories were periodically flooded. An immense urban pressure observed in the last century resulted in landscape alterations. In effect, today, one-third of the urban area in Gdańsk is located so low that it remains dry only because of the constant pumping action. With climate change, lowland territories are even more prone to flooding by heavy rains and storms.

The flood impacts, calculated on numerous sea-level rise models, demonstrate that in the coming decades the large part of the city of Gdańsk and the Vistula Delta could be found below annual flood levels (Climate Central, 2021; EEA Indicator Assessment, 2021). The flood risk maps, constructed on a basis of the seawater level rise scenarios for Polish IT System of the Country Protection against extraordinary threats (ISOK), show inundation of waterfronts along the Vistula and Motlawa rivers. Nowadays, the most visible effects of climate-related changes include the increasingly repetitive flash floods, groundwater inundations and storm surges that push water back from the sea.

The heritage areas and objects that are located along the riverfronts are most vulnerable to climate change consequences. This includes the whole structure of the historic city centre with fragments of medieval city walls, a network of streets perpendicular to the Motlawa Canal, each of them ends with a water gate, and remnants of the medieval port with the iconic Crane construction. Their waterfront location is not coincidental – it is rooted in the urban development of Gdańsk where water always played a key role. Natural and artificial reservoirs and watercourses defended the city as moats. All the city's defensive structures, erected from the Middle Ages to the 17th century, were located by the water. The economy of Gdańsk was based on maritime trade, so warehouse buildings were also erected at the quays. Energy used by Gdańsk production plants until the beginning of the 19th century was generated by the wheels of water mills moved by the waters of the canal network. In effect, all the districts of the historic centre lie by the water and in the floodplains: the Main Town, the Old Town, the Old Suburb, Long Gardens, the Granary Island, the Ołowianka Island and the Lower Town. The latter district requires continuous operation of the pumps to maintain a sufficiently low water level.

While the heritage value of these neighbourhoods is commonly recognised by the urban community, the value of the buildings and structures located north of the historic centre, along the Vistula River up to its mouth, is less obvious to the residents. Whereas large complexes of former shipyards, including the Imperial Shipyard, and other production plants from the 19th and early 20th centuries are spectacular examples of industrial architecture. Further north there are port facilities built between the 18th and 20th centuries. They include port canals and wharves, warehouses, cranes, administrative buildings and the monumental post office building. Closer to the seashore, there are fortifications: Wisłoujście Fortress, Beach Battery, Harbour Battery, Village Battery, Seagull Lair and other smaller defensive structures. Among undervalued objects of the industrial heritage are the 19th and 20th-century storage buildings with precious examples of industrial infrastructure – embankments with lines of rails and constructions used for loading and unloading ships. These heritage objects are at the forefront of a vast range of threats caused by climate change.

The European Environment Agency stipulates that adaptation to climate change demands a vast range of measures and actions (EEA Report, 2012, EEA Report, 2017,). Traditional 'hard' defensive measures that include the introduction of build-up engineering constructions such as floodgates are often combined with 'soft' approaches focused on nature-based solutions and ecosystem-based adaptations (Kabisch et. al, 2017). Such integration is often referred to as 'mixed'. In Gdańsk, the 'mixed' model for flood prevention is adopted, however, the 'hard' approach seems to prevail. Additionally, the flood defensive strategies provided by the main waterfront operators, such as the Port Authority, as well as other institutions responsible for inland waters lead to the unification of embankments and loss of heritage value of quays' composition

← Fig. 1. The north-east part of the historic centre of Gdańsk. Historical buildings on the background of the water layout: 1807, 2020 and research proposal to restore canals as stormwater reservoirs and a new blue-green core for the slaughterhouses historic area. Concept and graphics: M. Płotka, K. Kosińska, D. Glugla, T. Sorgi, J. Szczepański, L. Nyka

and infrastructure. At the same time, it is increasingly evident that the strategy of raising the embankments and speeding up the pace of pumping out water not always offers the best protection against inundation. Such strategies and methods are economically, socially, culturally and environmentally questionable in many locations, particularly in low lying areas where the groundwater level is high. Moreover, designing for densely built urban structures poses additional challenges, such as how to intertwine stormwater 'hard' and 'soft' solutions into an existing urban structure.

In response to these challenges, historical hydrography studies and research by design method were used to develop alternative design scenarios. As part of the research, the analyses of historical and contemporary water systems were carried out on the area of the former slaughterhouses and warehouses on the eastern bank of the Motława River, in the northern part of the Gdańsk historic centre. The result of the research was the study on the possibility of recovering the fragments of historical canals that would intertwine with the urban structure (Fig.1). Canals will not only increase rainwater storage capacity in a dense urban environment and improve the structure of public spaces but also create a new attractive, water-related urban context for the historical buildings.

In order to propose new approaches for low lying, climate-change sensitive territories in Letniewo district, the international 'SOS Climate Waterfront' workshop was conducted. The area became a laboratory field for innovative climate adaptation concepts. The aim of the project was to propose solutions that will decrease the number of flooding events and span a gap between flood prevention strategies and the provision of other benefits such as ecological, social and cultural. The introductory analysis revealed that numerous alterations introduced in the 19th and 20th century decreased the capacity of this territory to accommodate the stormwater overflow. Additionally, Letniewo area, as located just above the current sea level, is prone to groundwater inundations. Once again the question was explored about the potential role of historical hydrographies as a guiding agent in developing flood resilient urban morphologies and flood adaptation schemes.

In effect, in the design concept for the Letniewo district, even more space was given for water. In the project proposal, selected areas were designated for inundation to follow the cartographic history of the former marshlands and oxbow lakes, some other areas were developed into green spaces – to accommodate water overflow and support vulnerable ecosystems. The proposed extensive water reservoir offers a chance to develop an alternative landscape structure for the whole territory, based on systems of floodplains, interconnected green and public spaces. The proposed new network of canals and water

basins inspired by historical cartography studies would not only make the territory more resilient and flood-proof, but also significantly improve the exposition of historical granaries. The boundary between the land and river, transformed throughout the 20th century into the univocal sharp line of the embankment, was re-thought as an area of ecological and urban mediation, to facilitate public access to the river and to reduce the speed of riverine waters.

As research studies demonstrate, historical hydrographies could be effectively explored as guiding agents in urban climate adaptation schemes. Questioning the land–water dichotomy and proposing alternative and more fluid boundaries allows for developing new innovative topographies of urban areas. This, in turn, allows for making them more resilient and enabling a better exposition of historical objects and structures. The combination of flood protection measures with ecosystem services, public space values, and the exposition of historical buildings differs from the standard land-use and flood prevention proposals for Gdańsk, which are predominantly function-oriented. The cooperation between academic institutions and local planning agencies as project partners in the H2020 'SOS Climate Waterfront' projects has already resulted in collaborative and fruitful debate and should produce, in a longer-term, a change in urban thinking and practice. ■

REFERENCES

1. Climate Central. Leading Consensus, Intergovernmental Panel on Climate Change (IPCC), 2021, https://coastal.climatecentral.org [accessed: 30.09.2021].
2. EEA Report No 1/2017 Climate change, impacts and vulnerability in Europe 2016. An indicator-based report. https://www.eea.europa.eu/publications/climate-change-impacts-and-vulnerability-2016 [accessed 01.08.2021].
3. EEA Report No 2/2012 on Urban Adaptation to Climate change in Europe 2012.
4. Kabisch, N., Korn, H., Stadler, J., Bonn, A. (Eds.) (2017), Nature-based Solutions to Climate Change Adaptation in Urban Areas, Theory and Practice of Urban Sustainability Transitions. Springer.
5. EEA Indicator Assessment. Global and European sea level rise. https://www.eea.europa.eu/data-and-maps/indicators/sea-level-rise-7 [accessed: 30.09.2021]

* This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Maria Skłodowska-Curie grant agreement No. 823901

Karen O'Brien
Professor, Department of Sociology and Human Geography,
University of Oslo, Norway

Looking into the Crystal Ball: What does the Future Hold for Cultural Environments?

Looking into a metaphorical crystal ball, what does the future hold for cultural environments? Within the context of human-induced climate change, the outlook is worrisome. Changes in temperatures, rainfall patterns, sea levels, and extreme weather events will have profound impacts on both cultures and cultural heritage sites, including the places, spaces, and processes that have meaning or are considered culturally significant. Climate change is already impacting the things that people value and consider to be part of shared identities, and it is very likely that society will experience increasing losses as the climate changes. For example, consider Bryggen in Bergen – a series of old wood buildings on the waterfront of Norway's second largest city. This is a significant cultural heritage site that is important to the people of Bergen and beyond. These vulnerable wooden buildings are threatened by sea level rise with floods happening with increasing frequencies.

Yet the crystal ball also reminds us that the future is a choice. Although it is easy to extrapolate future conditions from past and present situations and trends, this could easily lead to the conclusion that there is little hope for protecting what is considered culturally valuable and meaningful to us. The future also depends on the decisions and actions that we take today. The Intergovernmental Panel on Climate Change (IPCC) has emphasised that there is a significant difference between scenarios associated with an average global warming of 1.5°C and scenarios of 2, 3, or 4°C warming.

It should be crystal clear that the choices we make today will influence the types and qualities of cultural environments and practices that are experienced for generations to come. The outlook, of course, depends on what we do to mitigate climate change, on how we adapt to climate variability and change, and on the extent to which we can rapidly move society onto an equitable and sustainable trajectory. In the absence of transformative change, the risks of severe, widespread, and irreversible impacts by the end of this century are high. Scientists, policy makers, activists, young people, and political and business leaders remind us every day that we are in the decade for action, and that what we do -- or do not do -- really matters. In fact, the quality and diversity of cultural heritage that we bequeath to the future very much depends on whether humans can collectively create a culture of sustainability.

To avoid the most severe impacts of climate change on cultural environments, culture itself has a key role to play in transformative change. As Adger et al. (2012, p. 5) note, "if the cultural dimensions of climate change are ignored, it is

likely that both adaptation and mitigation will fail to be effective because they simply do not connect with what matters to individuals and communities." When it comes to addressing climate change, it is important for people to recognise that what they think and do influences physical, social, and cultural environments, both now and in the future. The current narrative on climate change does little to engage and empower people to take actions to protect cultural environments. Climate change is often discussed and presented as a technical problem that can be diagnosed and solved by applying or improving knowledge, know-how, and expertise. As a technical problem, it is left to "experts" and "leaders" to address through techno-managerial solutions, leaving most people's input limited to behavioral or lifestyle changes (O'Brien and Selboe 2015). Techno-managerial approaches are important, yet they do little to unleash the powerful human potential to transform cultures and systems towards an equitable and sustainable world. In overlooking humans as solutions to climate change, the current narrative fails to ignite the sense of individual and collective agency needed to transform cultures and societies along equitable and sustainable trajectories

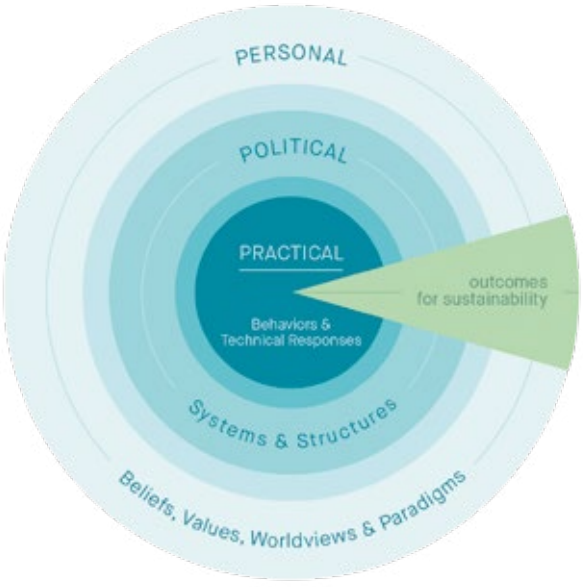
The narratives and stories we tell are essential, and as humans are inherent storytellers, stories are a part of our shared cultural practice as a species. With respect to addressing climate change, they are vital as they activate the neural pathways in our brains that lay the groundwork for our actions (Gordon & Laer, 2017). Many of the stories told about climate change so far have not inspired action. Instead, they have led to apathy, fear, and hopelessness (Moser, 2016). And hopelessness often leads to passivity and reduction in goal- oriented behaviour (Haeffel et al., 2017). Take for example the focus on carbon footprints, or the marks each individual or organisation leaves on the world in terms of greenhouse gas emissions. This story is about reducing, sacrificing, giving up, and letting go of things, behaviours, and practices that are considered harmful. This is necessary, and we must reduce our carbon footprints, but what if we also focused on what we can create with our hands and minds that can help tackle climate change? In other words, what each of us can contribute with our skills, tools, values, and creativity. Such stories can help fill what has been called the "myth gap" (Evans, 2017) and help us create a better future through using the cultural practice of storytelling.

Climate change responses need to connect with what matters to people, but people must also feel that they themselves matter. Although a core message is that humans do matter when it comes to climate change, many people feel that they do not really matter when it comes to transforming systems and cultures in an equitable and sustainable manner. This "paradox of mattering" compels us to engage with new ways of thinking, being, and doing, and to

↑ Lens ball – Musée du Louvre. Photo: Margot Richter/ Unsplash

explore new approaches to cultural change and new paradigms for social change (O'Brien 2021). New paradigms offer new possibilities for engaging with transformative changes that are both equitable and sustainable.

Transformations to sustainability involve significant physical and/or qualitative changes in form, structure, and meaning making. In other words, they involve simultaneously engaging with the practical, political, and personal spheres of transformation (see Figure 1) (O'Brien 2018). Most efforts to address climate change and cultural heritage are currently focused on the practical dimensions of the problem, working for results that can be observed and measured. Protecting sites from moisture, restoring damaged materials, and retrofitting buildings with renewable energy are just some of the efforts being made in the cultural heritage sector. Yet despite attention to an abundance of practical solutions, we are still failing to create the results that are needed to meet the ambitious commitments of the Paris Agreement and the Sustainable Development Goals, while also preserving important sites, practices, and experiences for current and future generations.



↑ Figure 1: Three Spheres of Transformation. (O'Brien 2018)

Efforts to protect cultural environments and practices seldom address the political sphere of transformation. The political sphere, which includes changes in cultural norms, rules, regulations, institutions, and social practices, influences how society is organised, what is prioritised, and how changes are implemented. The political sphere also reflects powerful interests, including questions of who decides on strategies and actions, and whose values count in prioritising some goals and outcomes over others. Political solutions are often approached in a fragmented manner, often contributing to conflicts, polarisation, and paralysis. This can hinder or impede practical actions, rather than promote and facilitate them.

Practical and political solutions are unlikely to yield measurable results without attention to the personal sphere of transformation. The personal sphere includes the individual and shared beliefs, values, worldviews, and paradigms that influence how systems are viewed, what is considered to be of value, and how people relate to each other, to nature, and to the future. It represents and reflects the mindsets and paradigms, or "thought patterns" that influence politics and practices. Beliefs, for example, play an important role in how current problems are perceived, including the types of solutions that are prioritised, and for whom. If we believe that little can be done to protect cultural heritage sites or to preserve cultural environments and practices, it is unlikely that effective actions will be taken, including through rapid reductions in greenhouse gas emissions.

The metaphors and meanings of concepts drawn from quantum physics, such as entanglement, complementarity, and potentiality, are increasingly explored in quantum social science, adding new insights to perspectives from the environmental humanities that focus on relationships between

humans and the environment and nature and culture. More than merely a metaphor, entanglement refers to non- local relationships being correlated (or "co-related") rather than causal (O'Brien 2021). We are entangled through language, meaning, and shared contexts, and our connections or correlations have implications for how we relate to nature, culture, and climate change. Paradigms have power and can open us to creative possibilities for responding to climate change (Figure 2).

A key point is that outcomes for the future are not exclusively dictated by past patterns; instead, they are influenced by shared beliefs, values, and worldviews that influence how we politically organise society and the practical solutions that we prioritise and invest in. Transformations involve shifting perspectives, including mindsets and shared meanings about roles and relationships. This does not, however, imply "changing people" and what is important to them, but rather it is about activating people's deeper values, especially those that apply universally to all people, species, and generations. Paradigms that acknowledge lived experiences, embodied meanings, subjectivity, consciousness, and "aliveness" are more likely to activate a sense of agency in individuals and communities to protect their cultural heritage for future generations. To maintain the integrity of cultural environments within the context of climate change, cultures themselves will have to transform. Recognising that the past, present, and future are entangled through shared values, meaning, and language, people are likely to take care and be aware that their fingerprints "matter" when they touch the metaphorical crystal ball that gives us a glimpse into our collective future. ■

↑ Figure 2: Entanglement by Tone Bjordam

REFERENCES

1. Adger, W. N., Barnett, J., Brown, K., Marshall, N. and O'Brien, K. (2013). Cultural dimensions of climate change impacts and adaptation. Nature Climate Change, 3: 112–117.
2. Evans, A. (2017). The Myth Gap. Eden Project Imprints. https://www.penguin.co.uk/books/1113478/the-myth-gap/9781909513112
3. Gordon, R., & Laer, T. van. (2017). How telling the right stories can make people act on climate change. The Conversation. http://theconversation.com/how-telling-the-right-stories-can-make-people-act-on-climate-change-83320
4. Haeffel, G. J., Hershenberg, R., Goodson, J. T., Hein, S., Square, A., Grigorenko, E. L., & Chapman, J. (2017). The Hopelessness Theory of Depression: Clinical Utility and Generalizability. Cognitive Therapy and Research, 41(4), 543–555. https://doi.org/10.1007/s10608-017-9833-1
5. Moser, S. C. (2016). Reflections on climate change communication research and practice in the second decade of the 21st century: What more is there to say?: Climate change communication research and practice. Wiley Interdisciplinary Reviews: Climate Change, 7(3), 345–369. https://doi.org/10.1002/wcc.403
6. O'Brien, K.L. and E. Selboe (eds). 2015. The Adaptive Challenge of Climate Change. Cambridge: Cambridge University Press.
7. O'Brien, K. (2018). Is the 1.5°C Target Possible? Exploring the Three Spheres of Transformation. Current Opinion in Sustainability 31: 153-160.
8. O'Brien, K. L. (2021). You Matter More Than You Think: Quantum Social Change for a Thriving World. Oslo: cCHANGE Press

Thematic Session I: Coastal Heritage and Climate Change

Hannu Matikka
Senior Researcher, Finnish Heritage Agency, and Chair of the working group Coastal Heritage, Finland

Perhaps the most important thing that this cooperation has taught us, is that the greatest potential is formed by the people.

Coastal Heritage and Climate Change

The working group (WG) Coastal Heritage is one of the four original WG´s in the Baltic Region Heritage Committee network, established by the mandate given by the Ministers of Culture of the Baltic Sea States in 1997. The WG started its work in 2001. The first big effort was to organise the 1st Heritage Forum in Gdańsk in 2003, under the title "Baltic Sea Identity". Since then, over 20 national and regional heritage agencies, institutions, and museums have been willing to use their resources and appoint their own member into this WG. Some actors have been involved continuously since the beginning, some have only participated in selected projects.

During these years, the WG has collected and shared information in posters, publications, workshops, forums and movies on lighthouses, historic harbours, old ships and boats – and on herring, which really has had an enormous economic, social and cultural impact on the whole Baltic Sea Region for centuries.

What, you may ask, do we mean by the consept "coastal heritage"? Briefly and in a broad sense, coastal heritage mirrors the entire range of maritime landscape, the economies and topography of the whole waterfront area. Moreover, coastal heritage does not end at visual objects, but it also includes traces of intangible heritage, inherited from the past. In other words, coastal heritage is the total assemblage of things that human beings have done to alter the interface and relationship between land and water. Evidence of these actions can be submerged, in the water, buried, or located on land, still in use or disused.

Perhaps the most important thing that this cooperation has taught us, is that the greatest potential is formed by the people. Objects and places are not, in themselves, what is important. They are important because of the meanings and uses that people attach to them, and the values they represent. ■

Gunnar Ellingsen
Director, Norwegian Fisheries Museum, Norway

Saving Bryggen

WHAT IS THE CULTURAL SIGNIFICANCE OF BRYGGEN?

Bryggen is an historic harbour district in Bergen, an iconic building structure with its characteristic row of pointed gables. These were the store houses and offices of merchants that based their trade on linking the enormous fisheries in Northern Norway with markets in the Baltic Sea Region and Northern Europe. The most important product exported from Norway was stockfish.

Stock fish was Norway's first mass-produced export article. It is solid, it needs no packaging and yet its shelf life is practically unlimited. Stockfish is a product very suitable for trade and export.

Bergen developed to be a node for the trade of stockfish with grain, wine and other products coming from Europe in return. From the 13th to the 18th century, the Hanseatic League developed this trade to be Norway's largest. Fishermen from Northern Norway brought their products to Bergen, and the Hanseatic merchants exported them. In the 16th century, between 9 and 23 million stockfish passed through Bergen each year. Huge amounts of goods were stored in Bergen while they changed owners. During this change of ownership, great value was added to the goods. Under the gables of Bryggen, great wealth and power was accumulated throughout the centuries. For a long period, Bergen was the largest city in the Nordic Region.

Bryggen was badly damaged by fire several times, the most famous fire being the one in 1702, which destroyed most of the harbour district. In the following few years, Bryggen was rebuilt, and because of the intricate pattern of multiownership, it was rebuilt exactly as it had been before the fire.

In a manner of speaking, the world heritage building complex at Bryggen is a 300 year-old copy of yet another 300 year old building complex. This complex was specifically developed for Hanseatic trade since the merchants arrived in Bergen in the 14th century.

Finnegaarden, the main building of the Hanseatic Museum and Schøtstuene and the first gable in the row, was completed in 1704. All the other narrow, wooden buildings with narrow passages between them were rebuilt in the same manner, as copies of the building

← Bryggen, September 2021. A wide range of activities as well as the iconic, pointed gables are shown. Photo: Gunnar Ellingen.

→ Bryggen, 1866. As a centre for the trade between Northern Norway and Northern Europe, great wealth was accumulated at Bryggen. The first gable in the row is Finnegaarden. Photo: Knud Knudsen / marcus.uib.no

that had burnt down. The remaining Bryggen buildings today consist of 7 units (gårder) with 11 gables, and 63 buildings.

Bryggen was among the first world heritage sites in Norway, declared in 1979. Its universal value is that it reflects a lost trade culture, and that it "bears the traces of social organisation and illustrates the use of space in a quarter of Hanseatic merchants that dates back to the 14th century".

PRESERVING BRYGGEN – WHAT ARE THE CHALLENGES AND THREATS?

The Bryggen buildings have a long and troubled history of survival. As I mentioned, fires have damaged them many times through the centuries, which is why the Hanseatic bachelor merchants living there were not allowed to make fires in the buildings.

The 19th and 20th centuries made way for another great peril to Bryggen – neglect. Especially after the Second World War, German cultural heritage stood in low esteem. After two devastating fires in the 1950s, plans were made to tear the rest of Bryggen down and build modern apartment buildings. But the archaeological excavation on the fire plot and the effort of enthusiastic individuals managed to save Bryggen.

Today, fires and neglect are threats that are very much dealt with. As world heritage, Bryggen is one of five main targets in the cultural heritage strategy of Bergen.

The buildings at Bryggen were initially constructed for a rough, moisty and windy climate. Extreme weather, with more and heavier rain and wind, and more frequent floods, will it itself be a quantitative change of the threats that have been there for hundreds of years. However, these factors are connected to another problem: the ground water level.

The present Bryggen building complex stands on a thick layer of waste from the historic activity at Bryggen. Through centuries, the buildings have been extended towards the sea

as new layers of waste have accumulated, and as the old buildings have burnt down. The 14th century sealine was about 120 metres further inland. These layers are cultural layers and part of the world heritage. They also contain important remains from human activity. For example, in this layer, the world's largest collection of rune sticks was found in the excavation following the fire in 1955.

The cultural layers have been effectively conserved by the ground water pool that has reached a level right under the buildings. Constantly soaked in fresh water, these muddy cultural layers have been anaerobically preserved through centuries. However, after modern building activity and archaeological excavations, the ground water pool is leaking, and has been partly drained, leaving the cultural layers frequently exposed to air. As a result, the organic material in the layers has started decaying, and the whole set of layers that is the fundament of Bryggen shrinks in size. The buildings on top of it sink into the ground.

Rainwater is a crucial source of inflow to the pool. Extreme weather will give more rain and more heavy rain on Bryggen. Precipitation in Norway has increased by 20% since 1896. In a way, this could be partly good news for the ground water pool.

However, modern street and roof surfaces and water drainage systems are often constructed in such a way that they reduce the natural inflow to the pool, which leads the water more directly into the sea. Leakage from the pool is a constant matter of concern in basements, sub-level car parks and street maintenance projects in the area. Not to mention building a light rail route in front of Bryggen, which has been debated for years, and is still a hot topic. Getting control of the ground water pool is crucial to conserving Bryggen's world heritage, both above and below the surface.

In Bergen, the sea level is expected to rise between 20 and 80 centimetres by the end of the 21st century. The flooding that regularly occur

along the western coast of Norway will reach higher and be more frequent. In the restoration of Finnegaarden and Murtasken, lifting the buildings 1 metre is an important means to meet this threat.

What is being done at Finnegaarden and Murtasken? At the Hanseatic Museum and Schøtstuene, Finnegaarden is the most important building and object in the collection. Finnegaarden is a notch timber building that has been covered with wooden planks. The adjoining building Murtasken, made of brick, is also a part of the world heritage.

As other Bryggen buildings, Finnegaarden and Murtasken have sunk due to the decaying fundament, also giving internal damage to the buildings. In addition, the quay level in front of the building was lifted in the 19th century when the new and taller steam ships came more frequently. The present street level is therefore considerably higher than the floor level in Finnegaarden.

In 2018, Bergen Municipality started a project to save Finnegaarden and Murtasken. Closing the buildings and museum for 6 years, Finnegaarden and Murtasken were to be lifted approximately 1 meter and set on a new fundament.

Finnegaarden is lifted with hand-operated jacks. An iron frame or grid has been constructed through the building, in order to get an optimal "grip" on it. This makes it possible not only to lift the building, but also to split it "locally" in the different stores of the building so that damaged logs in the notch timberwork can be replaced, repaired or repositioned.

Lifting Finnegaarden also makes it possible to investigate the ground below it and make a new fundament. This new fundament will consist of cross-laid layers of piles, as a raft. This is done with traditional materials, equipment and methods.

The raft will rest upon a layer of brick rubble that is submerged in a new, locally controlled compartment of the ground water pool. Together, this will conserve not only the building, but also the methods and principles behind them.

Visits to Finnegaarden will be restricted to certain pathways to protect the building from wear and tear. Murtasken will contain new exhibition areas, and opportunities to observe the interiors of Finnegaarden.

Before it was closed in 2018, the Hanseatic Museum and Schøtstuene had more than one hundred thousand visitors each year. It was the most visited museum in the city centre. Positioned close by the heart of Bergen, and being world heritage, it is both ideally located and a reason for tourists to visit.

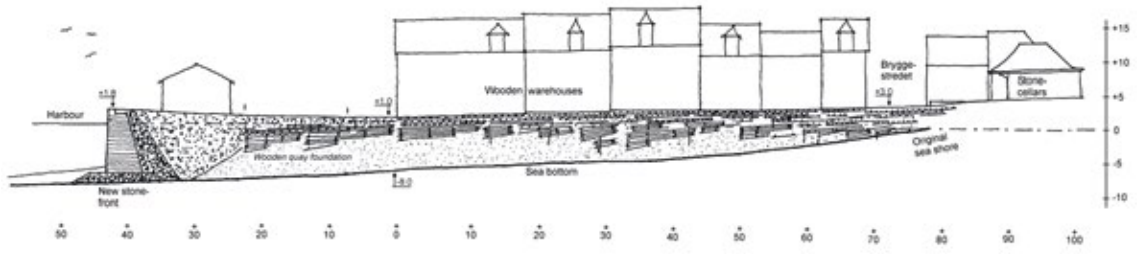
Since the restoration project started in 2018 and the buildings were closed, the museum has focused on conservation of cultural heritage as a topic. The aim has been to mobilise a feeling of ownership of our past. Our experience is that the history of Hanseatic merchants in Bergen is owned by everyone from the local inhabitants to the international tourists.

Much effort has been put into designing the new interiors of the buildings for universal accessibility, so that everyone feels and experiences that the new museum is accessible

TO SUM UP:
The Bryggen heritage uniquely represents a Hanseatic culture of trade now lost. It also represents an important part of the role of Bergen as a centre of trade in Norway and Northern Europe.

Many of the threats to the preservation of this heritage are local problems created by humans long before climate change was a topic. Many of these old threats are now growing significantly because of climate change.

The Hanseatic Museum restoration project is a huge, complex and costly project funded by Bergen Municipality and aims to meet present and future threats to Bryggen. The project is also a spearhead in preserving Bryggen for a wetter, windier and more flooded future. ■



↑ Sketch illustrating a cross section of Bryggen. The cultural layers beneath the buildings are part of the world heritage.
Photo: By the courtesy of Einar Mørk

← The restoration and elevation of Finnegaarden and Murtasken is financed by Bergen Municipality, and concerns cultural heritage of international importance.
Photo: Gunnar Ellingsen.

Robert Domżał
Director, National Maritime Museum, Gdańsk, Poland

The Great Crane in Gdańsk

The Crane, a former port crane, is one of the most famous symbols of Gdańsk, especially if it comes to its maritime past and glory. For many decades, the National Maritime Museum in Gdańsk has taken care of this unique, registered building. Gradual deterioration of external and internal infrastructure forced us to look for some financial sources in order to carry on with the complex renovation project. Thanks to EEA grants and cooperation with Norwegian partners from Museum Vest and Lindesnes Lighthouse, our museum will start a very demanding project in 2021 to improve the situation of this building and to prepare a new permanent exhibition inside.

Today's crane, made of brick and wood, differs from the original wooden port crane built in the same place. The first mention of this building dates back to 1367. We also know that the crane burnt down in 1442. A new crane was built in the period of 1442–1444. It consisted of two brick towers which had the above-mentioned wooden lifting mechanism installed between them. The crane belonged to the town and was managed by a crane master. In the 19th century, the crane lost its importance as a port crane and was used mostly for setting masts on Vistula vessels. A century later, it had one more function: it was used for extracting the sterns of motor powered vessels from the water for the repair of helms and screws. The crane's last master died in 1858, and its towers were occupied by residents. A shoe manufacturing business, a hairdresser's salon as well as other local businesses were set up within its walls.

During World War II, the crane was partly destroyed – its wooden structure burnt down completely and only 60% of the brick part remained. Reconstruction documentation was prepared in 1956 and was followed by reconstruction works. In 1962, the crane was handed over to the Maritime Museum, which was granted the name of the Polish Maritime Museum in Gdańsk 10 years later, and the name of National Maritime Museum in Gdańsk on 10th December, 2013.

Medieval crane building in Gdańsk has always been directly by the waterfront. Floods and basements below water level cause a great challenge to keep infrastructure in good shape. It comes together with climate change, the rising water level of the Motlawa River, greater air humidity in the summer time. All mentioned

← View of the great crane in Gdańsk.
Photo: B. Gallus, archive of the NMM in Gdańsk

conditions determined a need to start an immediate renovation project, aimed at stopping the deterioration of lower parts of the unique building.

The Project entitled "Maintenance, renovation and modernisation of the Gdańsk Crane – a branch of the National Maritime Museum in Gdańsk with the creation of a new permanent exhibition" has been granted nearly 3.5 million Euros from the European Economic Area (EEA) Financial Mechanism 2014–2021 and funds from the Ministry of Culture, National Heritage and Sport. It is planned to be implemented in the period of October 2020 – December 2023 in the partnership with Stiftelsen Museum Vest and Stiftelsen Lindesnes Fyrmuseum.

The following partnership activities will take place within the Project:

1. study visit on the exchange of knowledge and experience in the carpentry and renovation of historical buildings;
2. construction of two models of the Crane walking wheels;
3. vocational training in carpentry and model making;
4. production of historical and educational films;
5. promotion of the project.

During conservation and construction works, the crane's sightseeing path will be modified. Exhibition rooms located on levels 0, 1, 2, 3 in both towers, and a lift in the central part, where the mechanisms of walking wheels (levels -1, 0, 1, 2) will be available for visitors. In addition, level 3 of the lift is planned as a closed viewing platform for the view of the city and port. In the northern tower at level 4, in the attic space, a room for educational activities was designed on the site of the current exhibit warehouse. In the southern tower, on level 4, a change of room layout is planned. There will be administrative and social rooms as well as server rooms. Technical rooms – ventilation rooms were designed on levels 5 of both towers. In the design, there are also planned construction works in the basement of the crane, involving deepening the rooms to adjust the height to applicable regulations, and securing partitions against the inflow of ground water. All technical rooms will be grouped in the basement of the northern tower. The basement of the southern tower will be entirely used for public toilets. For this, we plan replacement and modernisation of the installations (sanitary, water and sewage, heating, ventilation, electricity, fire prevention, ICT, facility security and protection of

← View of the great crane in Gdańsk.
Photo: B. Gallus, archive of the NMM in Gdańsk

collections). In addition, the use of solutions affecting energy efficiency (including thermal insulation of ceilings, external partitions, basement floors, thermal modernisation of internal walls, modernisation of the heat source, construction of heating and ventilation systems) will be applied. During conservation works, external parts of the building will also be renovated. Among them, maintenance of brick walls, removal of secondary wall layers and post-war repairs, brick repositioning, strengthening the structure of porous historical materials, replacement of the building band and window wells. Part of the roofing structure will be replaced.

The 2nd phase of the project focuses on the creation of a new permanent exhibition about the building and harbour life in Gdańsk. It not only includes exhibition space, but also all the infrastructure needs and internal installations.

A completely new permanent exhibition – located on levels 0 to 3 in both towers of the crane and in the crane part, i.e. on the so-called lift – will transport visitors to the 17th-century port in Gdańsk in a unique way. The modern concept of the exhibition narration is based on limiting written texts and replacing them with film. The narrator Hans Kross – a Gdańsk merchant and shipowner – will lead viewers along the route of the dangerous world of sea shipping and the intricate customs accompanying commercial transactions and the work of the then city officials. He will present ways of storing and reloading goods, as well as techniques of building and repairing ships. It will lead visitors to the burgher room and the port tavern. Complementary, innovative multimedia means, such as interactive stands, holograms and touch screens, will provide additional experiences and encourage people to get acquainted with the exhibition actively.

"New" Crane (in Polish – Żuraw) will have a diverse cultural and educational offer that will emphasise the historical, artistic and scientific value of the facility and will involve the local community and people belonging to groups at risk of social exclusion to actively participate in cultural life. The new educational programme will be aimed at a wide audience: schools, students, individuals, families with children and seniors. Particularly noteworthy are proposals prepared especially for people with disabilities. We hope to open the new exhibition and present results of this project by the end of 2023. ■

Mads Vestergaard Olesen
Managing Director, Stromma Denmark

Green Sightseeing by Boat in Copenhagen – A Change With Challenges

In a world where cities strive towards being CO_2-neutral and consumers are increasingly aware of their climate footprint, working with sightseeing by bus and boat demands an ambitious sustainability strategy. Stromma is ready to go green but are facing great challenges in this process, together with the rest of the industry.

STROMMA – A SHORT INTRODUCTION

Stromma is traditionally a fuel-oriented business, however, the group has some pretty aggressive sustainability targets. One of them is reducing CO_2-emmissions by 50% by 2030 and further reducing to zero emission or even to carbon negative in 2040. To understand the scope of this project, there follows a brief introduction to Stromma as a business.

Stromma is Northern Europe's leading producer and provider of sustainable tours and excursions. We operate in 18 destinations in 6 countries: Finland, Sweden, Norway, Denmark, Germany and The Netherlands. Our services are mainly focused on tourism and experiences with buses and boats. Hence, Stromma owns a fleet of buses and boats. Our bus fleet consists of approximately 100 open top double decker buses and approximately 125 boats. A large part of the boat fleet are original boats of historical interest. To name a few, we operate the boats on Göta Canal between Gothenburg and Stockholm, where several boats date back to the 1800s. The oldest of our ships, M/S Enköping, dates back to 1868 and represents historic and cultural value.

Converting all boats to electric drivelines is complicated, but the historic vessels even more so than the new ones. The following description of converting and refitting boats to electric drivelines, and the challenges we face in the process, is based on our modest experience in Copenhagen, where our fleet can be described as simple compared to the rest of our fleet. We currently operate two electric boats in Copenhagen, one refitted and one newly-built.

INFLUENCES ON THE WAY TO ZERO EMISSIONS

When planning for a future where we – an operator of buses and boats – will be carbon neutral or even better carbon negative, we face some serious challenges. We categorise these challenges into three different matters: technical considerations, external influences, and the overall economy. In the following, each of these matters will be examined.

↑ Canal Tours in Copenhagen, Denmark, have been operating since 1904. Here, Stromma's boat passes through colourful Nyhavn. Photo: Marius Dale

TECHNICAL CONSIDERATIONS

There are several technical issues to consider before you can start the work of converting a fuel-based boat to an electric driveline.

Refit or newly-built

You need to consider whether you will build a new boat from scratch, or whether you will refit an existing boat. Refitting is without question the most economical solution. Another plus with the refit solution is that we at Stromma will be able to use our current boats, which are often of historic value. These boats were not meant to carry big battery packages, which leads to the next issue.

Batteries

If we go with the refit solution, we will most likely have some serious issues concerning room for a full battery pack. In our latest newly-built boat, we have 180 batteries all the same size as a large, oversized briefcase weighing around 13 kilos each – totalling more than 2.3 tons. Today, the batteries will be even bigger due to new standards required from the national maritime authority. In a boat with a flat bottom, like the ones we have in Copenhagen, this results in quite a few challenges.

Depending on the operational pattern – how the boats sail during the day/night – various sizes of battery packs are needed. In Copenhagen, we prefer to charge overnight, and thereby not be dependent on charging during the day. This means our boats must carry a larger battery back that can run throughout the day. As things are now, charging during the day is not an option, as there are currently no charging points along the canals. Batteries are expensive, but charging points are even more expensive and require right of disposal of the public space for charging points.

If we scale up our issues in Copenhagen to include our historic fleet in, for example, Sweden, where boats sail from one destination

to another on trips of up to 6 days, we yet again face another issue. The battery pack will be extremely expensive (and big), if it is to be able to last for 4–6 days powering a very heavy vessel. Alternatively, we would have to charge along the way, which will require installment of charging points and changes to our tours and programs.

Suppliers and support

Then comes the question of suppliers. Who can handle our technical request? We need someone with knowledge of how to handle our conversion as well as future service and maintenance. From experience, we have learned that in the future we want to go with a more experienced and thereby more expensive supplier, who can assure us that they have the capability to keep us running and can provide the support we need.

Finally, there is the question of how much you can change a historic vessel and still call it historic. Is a vessel still historic when running on electric battery driven engines, or does the change leave us with a historic vessel where the history and feel are no longer the same?

EXTERNAL INFLUENCES

External influences involve both our guests, the inhabitants in the cities where we operate and local authorities and organisations.

Consumers and inhabitantsx

The modern consumer likes the good sustainability story but is not yet ready to pay for it. We do not see any willingness from our guests to pay more for an emission free service. However, we do believe that a city such as Copenhagen is receiving more visitors due to the good overall image of being an environmentally friendly city. Thus, we believe our contribution will in time support our business through the good story.

We are very alert to the influence from local society among the inhabitants of Copenhagen. The canal boats have been a part of the city since 1904, and many see them as cultural heritage. However, we do not take our presence for granted. We know that local society demands environmentally friendly solutions with less pollution and noise. This may be the influence that pushes us the most.

Local authorities

One of the greatest barriers for green transition is ironically the local authorities. We need to meet the regulations of the City of Copenhagen, which define local restrictions such as environmental zones. We also need to meet the specifications from the Danish Maritime Authority, and we need to do it within the limitations of our contract with the Port of Copenhagen (By & Havn).

The Danish Maritime Authority has the final word when it comes to our technical solution, both regarding safety and other regulations. The dispute arises when the once approved solutions are not valid for longer periods. Changing conditions and short-term plans are a serious barrier for green transition. As it is today, none of the solutions we use in our two electric boats will get approved in a new refit or new build. This makes it very complex to maintain knowledge and to benefit from large scale operations.

We know that local society demands environmentally friendly solutions with less pollution and noise.

↑ Some of Stromma's oldest ships sail on Göta Canal in Sweden. M/S Wilhelm Tham was launched in 1912. She was listed in 2004 by the National Maritime Museum, considering her historically important. M/S Juno is the world's oldest registered cruising ship and was launched in 1874. Photo: Marius Dale

All operators in the Copenhagen Harbor have a contract negotiated by the Port of Copenhagen. They are a business, and their task is to make a profit. Consequently, they are not (or at least were not) really interested in making contractual decisions in favor of emission free traffic. Stromma's contract runs until 2037, so the financial reality is under pressure until the contract is re-negotiated.

With all of these authorities not really cooperating or working towards the same goal, we do not have the right framework conditions for a green transition that demands a large investment. While at the same time not having customers willing to pay for the environmentally friendly offer versus a cheaper offer, we are in a tight corner. We need a safe environment for such large investments, where terms and conditions are stable, and the framework conditions match our engagement.

The green transition we aim for, should not become a competitive disadvantage. As we see it, there is a lack of political driving power to secure legislation that matches the political ambitions on the area. We and other operators should not be left with legislation, that prevents green transitions or puts us in a poorer position. As things are now, there is not a lot of business incentive to go green.

ECONOMY

Another considerable issue is of course the economy. Even before Covid-19 organizing an investment of this magnitude was a huge task. Following Covid-19 our bottom line has suffered substantially. Now, we need to find other ways to finance our investments than from our own money. This may be through power as a service, including the power train, battery pack etc. where the total investment is converted into a fixed rental agreement rather than leasing or own financial contribution.

We also need to consider our timing. The later we start the better and cheaper solutions. An example from the bus business is the cost of refit solutions that drop by 30% from year to year. But a late start will cost us the first mover advantage. Also, our process could possibly last several years if not decades. Will we be in time for when the governments/cities ban regular diesel engines?

ONE SIZE DOES NOT FIT ALL

The challenges we face in Copenhagen are not few nor easy to solve. Stromma's sustainability targets involve all our destinations and our entire fleet. The solution we end up with in Copenhagen will most likely not fit the demands, regulations, and rules in other countries. Each national maritime authority will not have the same standards for what they allow. We may see one interpretation in Denmark and a different one in Sweden. So, all the knowledge and know-how we collect in Denmark may not be usable at other destinations. Each destination needs to take up the fight, because when it comes to green transition, one size does not fit all as thing are today.

Stromma supports the political goals in the environmental areas. We are ready to invest, but we need safe framework conditions that correspond to the investment and the depreciations. We have a shared responsibility – us who operate in the cities and those who set the rules and regulations. If we want to reach the goals, we need to have a common understanding for the challenges we face and a viable economic perspective, so we truly can create the results we all strive for.

So where do we go from here? There is no doubt that the future is green, emission free and sustainable. Not long from now, it will not only be a demand from authorities, but also from consumers. We took our first steps toward a green transition in 2009 when we refitted a boat in Copenhagen to electric driveline. The second electric boat followed in 2013. We are far beyond the first steps and still working hard to reach our targets. ■

Thematic Session II: Underwater Cultural Heritage and Climate Change

Sallamaria Tikkanen,
Intendant, Finnish Heritage Agency and chair of the working group Underwater Cultural Heritage, Finland

Climate change is a threat to cultural heritage and also a threat to underwater cultural heritage.

Underwater Cultural Heritage and Climate Change

When the Baltic Sea Region Cultural Heritage cooperation was launched over twenty years ago, underwater cultural heritage was recognised and agreed to be one of the obvious and important targets and themes for the cooperation. The Working Group on Underwater Heritage was appointed in 1997 and the work started officially in 2000. The aim of the Group is to develop cooperation, good practices and sustainable management to follow up funding programmes, and to initiate joint projects and actions.

Climate change is a threat to cultural heritage and also a threat to underwater cultural heritage. Sea level rise, planetary warming, erosion, storms and ocean acidification impact negatively on the preservation of this submerged heritage. At the moment, we don't have enough data on how climate change will impact on this heritage and which are the best mitigation methods. This means that there is a huge risk of losing this unique historical archive in an unmanaged way.

We shall now dive into history, under the waves and to the turbulent intertidal zones. We shall travel from the Irish Sea and the Southern Scandinavian coast into the Baltic Sea and finally to the world's oceans and seas under the framework of the Decade of Ocean Science. We aim to learn from the "Ocean Past" and from the past climate changes to have a better future, to adapt to the new situation, to mitigate impacts and to have a more sustainable heritage practices and lifestyle. Unfortunately, we cannot give perfect answers for the question of how heritage, underwater heritage and archaeology as a science and as a sector can be part of the solution, but we hope that we can expand our understanding of humanity's relationship with the seas and oceans, open new horizons, and to increase our appreciation for our oceans, seas and the hidden underwater world and landscapes. I believe that we shall finally find the best climate actions and our blue minds to save our seas, oceans and our common and only planet. ■

Sandra Henry, Lead Research Archaeologist, CHERISH project, Discovery Programme. (1)
Kieran Craven, CHERISH project, Geological Survey Ireland. (2)
Gerard Dooley, Centre for Robotics and Intelligent Systems, University of Limerick, Ireland (3)


1.


2.


3.

Climate Change Impacts on Submerged Cultural Heritage Sites

CHERISH (Climate, Heritage and Environments of Reefs, Islands, and Headlands) is a cross-disciplinary project aimed at raising awareness and understanding of the past, present and near-future impacts of climate change on the rich cultural heritage of our sea and coast.

PROJECT BACKGROUND

CHERISH uses a multidisciplinary approach to capture airborne, seafloor and terrestrial datasets. The project works to create a seamless land to sea view of coastal and underwater cultural heritage sites in an endeavour to understand how they are impacted by climate change. In Ireland, sea levels are to increase for all coastal areas[1]. Projected changes in sea level will magnify the impacts of changing storm surge and wave patterns on underwater and coastal heritage. Sea surface warming around Ireland is increasing at an unprecedented rate[1], while increasing CO_2 in the atmosphere means ocean acidification is increasing[1]. These changes to the chemistry of seawater and marine ecosystems means cultural heritage sites such as shipwrecks will be more vulnerable to risks such as invasive species.

Shipwreck studies provide important knowledge on naval architecture, past societies and economies, archaeological condition studies, community engagement with local heritage assets, wreck site formation processes and more. Wreck sites can act as a refuge from fishing activities for marine life and are a source of valuable information on marine biodiversity and habitats, while monitoring surveys inform on how marine life sustained on these sites evolves over time. Assessment of wreck sites can be utilised to access the effects of marine change, such as climate change impacts on our ocean health.

CASE STUDY SITE

SS Manchester Merchant was a 5600 gross tonne passenger/cargo vessel en route from New Orleans to Manchester. The vessel's cargo contained cotton bales that spontaneously ignited 400km off the southwest coast of Ireland. The vessel sought refuge in Dingle Bay, Co. Kerry. On January 15th 1903, the ship was scuttled after efforts to fight the fire were unsuccessful.

The wreck lies in 15m (CD) of water and is orientated northeast – southwest. Local divers reported structural collapse and change to the wreck site in recent years. One element of predicted climate change is alteration to storm patterns, which could impact wave strength and direction, potentially increasing the degradation of sub-surface heritage. Using repeat surveys, the CHERISH project aimed to identify physical change and any associated impacts to seabed dynamics occurring at the wreck of the Manchester Merchant. Information from the biohabitat that the wreck site has created can inform us further on marine climate change in this area.

METHODOLOGY

CHERISH initiated a programme of work to produce individual and combined three-dimensional models utilising point cloud data captured from methods such as multibeam echosounder (MBES) survey, remotely operated vehicle (ROV) and diver videography and photography from which structure from motion (SfM) models are derived. This programme of work is ongoing, with various aspects of the survey work repeated over the course of the project to create monitoring and comparison datasets. The work described within this text is a collaboration between the Irish CHERISH project partners the Discovery Programme and Geological Survey Ireland (GSI) with the Centre for Robotics and Intelligence systems, University of Limerick (CRIS, UL).

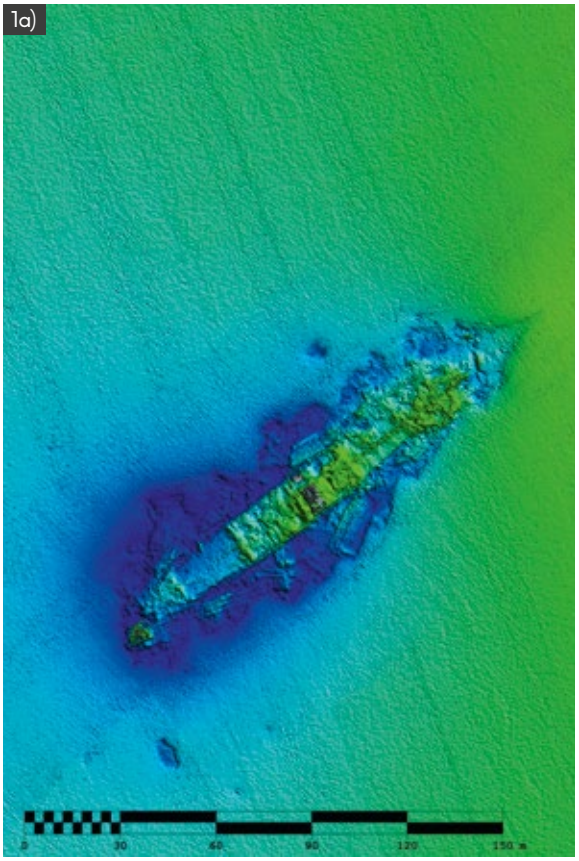
MULTIBEAM ECHOSOUNDER SURVEY

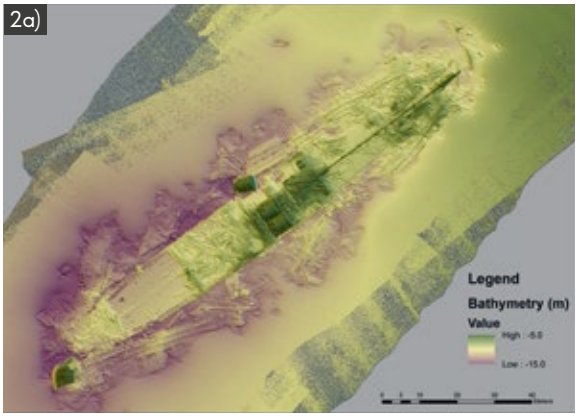
The Irish national seabed survey programme INFOMAR mapped the Manchester Merchant in 2009. In 2019, the CHERISH project undertook an MBES survey of the wreck. These multibeam echosounder wreck surveys used a Kongsberg EM2040D single swath system. In 2021, a monitoring survey of the wreck was undertaken utilising a Kongsberg EM2040D dual head system. The methodology used in both CHERISH surveys remained the same, irrespective of the change in equipment. Both surveys operated at 400 kHz in tracking mode. Multiple survey lines were run at the lowest speed that adequate control of the vessel and heading could be maintained ensuring maximum along-track data density (generally 2–3 knots). A 10° overlap between swaths was maintained and angular coverage of each swath varied between 30° and 70° to maintain coverage within a 10 cm grid over the wreck, the quality of the data was checked in the field. Sound velocity profiles were taken before and after the wreck survey.

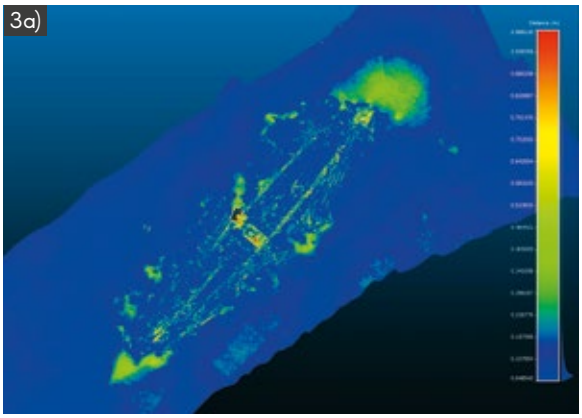
REMOTELY OPERATED VEHICLE SURVEY

In 2021, an ROV survey of the wreck was conducted using the I-ROV system, an inspection-class ROV designed and built at the University of Limerick (UL). It is a smart advanced system, driven by a smart navigation and control suite known as OceanRINGS. This system moves away from manual piloting to automated piloting and control. To achieve a higher survey grade platform, the IROV system facilitates an on-board inertial navigation system (INS) that is utilised by OceanRINGS to provide autonomous navigation & control. The INS is coupled with a Doppler velocity log (DVL) for speed estimation and a submersible GPS gives last known position prior to dive. The INS couples all sensor inputs, including 3-axis accelerometers and 3-axis fibre gyros, to provide a very accurate dead reckoning position over time from last known GPS.

The photogrammetry system utilises a camera system from SubC imaging operated in a continuous shooting mode, it triggers two on-board strobe LED lights when a picture is taken, cameras and strobes are positioned in such a way to minimise backscatter. The acquired photo datasets can then be utilised







↑ Image 1a), Image 1b), Image 1c)

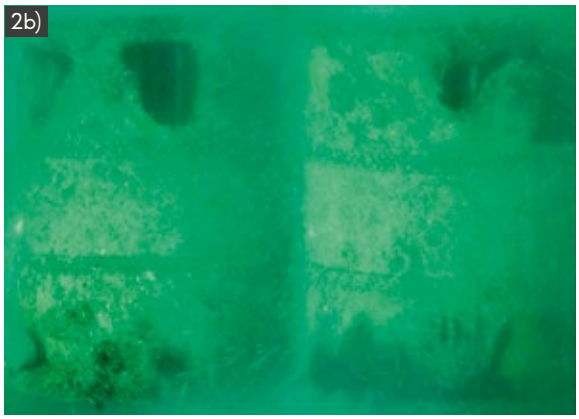
in a structure from motion algorithm known as post-processed photogrammetry to develop additional three-dimensional models of parts of the shipwreck site.

RESULTS

The 2021 MBES and ROV survey was undertaken over the period of two days in June. Comparison analysis of the INFOMAR 2009 survey and the CHERISH 2019 survey, was undertaken using CloudCompare and this has shown degradation of the shipwreck site over a ten-year period. Degradation of the structural integrity of the wreck was identified at the bow, stern and amidship around the boilers. This change is denoted by the colour green on the image below.

Image 1: a) INFOMAR 2009 survey, b) CHERISH 2019 survey c) GSI CloudCompare results, areas of structural change are denoted by green colouring.

The target survey areas for the ROV inspection and data capture were identified from the previous MBES datasets and the results of the point cloud comparison analysis of these datasets. There are many concerns that need to be taken into consideration for ROV operations on wreck sites such as entanglement hazards, poor visibility, and it can be challenging to acquire high quality photogrammetry datasets underwater. The conditions onsite were challenging in terms of visibility and strong tidal currents. The use of the smart ROV platform mitigated to a large degree these challenges.



↑ Image 2a), Image 2b), Image 3)

Image 2: a) ROV image of the boilers b) CRIS, UL photogrammetric model of the boiler

The ROV system completed inspection and photogrammetry surveys on target areas of the wreck site. The first survey area was the boiler section of the wreck site. This photogrammetric survey was setup to ensure good coverage and effective frame/path overlap of the boiler area. For this survey, five passes were completed on one axis and seven passes on the second axis. The second area surveyed was the bow section, which is one of the highest points on the wreck site. A photogrammetric survey was completed of this section of wreckage. Due to its height off the seabed and entanglement hazards presented by this section of wreckage that were more prevalent due to the strength of the currents around the wreck site, the ROV system undertook passes in a less systematic manner but that provided a consistent overlap and full coverage of the upper section of this part of the vessel. The third survey area focused on the propeller shaft, it runs half the length of the vessel starting from the triple expansion engine, just behind the boilers to the stern of

the vessel. For this survey, three passes were completed along the length of the shaft, with additional data collected from passes made either side of the shaft. An inspection survey of the final target area focused on the stern of the vessel, where the rudder can be seen lying flat on the seabed.

Image 3: ROV image of structural collapse of the wreck

The ROV survey recorded collapse of the hull plating, exposing the interior of the wreck itself. The interior of the wreck is a mix of various structural elements including sections of hull plating and interior piping. The ROV SfM models provide dimensional information and data outputs including point clouds and orthomosaics. These models will be overlain on the 2021 MBES data to provide higher resolution data that compliments the point clouds produced from the MBES survey.

FUTURE WORK & DISCUSSION

Over the past decade or so, equipment and methodological advances have resulted in MBES survey showing strong capabilities for identifying and mapping condition change on wreck sites. The ROV survey showed the ability of such systems to undertake visual inspection of these important sites and produce high-resolution three-dimensional models, even under adverse survey conditions. The ROV datasets are rich and supplement datasets acquired from ship based MBES imagery with higher resolution models. The datasets can be utilised to estimate the degradation of the sites over time, given that this survey established a baseline. This work can feed into wider studies on the impacts of climate change on underwater cultural heritage and underwater cultural heritage recording methodologies.

The initial results from the ROV survey shows that the range of species around the wreck is quite diverse. This project will see further collaboration with Indepth Technical Diving and biologists at the University of Ulster. A scheduled diver survey on the wreck site will take place in the latter part of 2021 and will build upon and collect additional data to compliment the ROV survey. The final photogrammetry products will be completed after this subsequent data capture. Partners at the University of Ulster will complete biohabitat and biodiversity analysis, this work will also determine if invasive species are present as part of the biohabitat on the site. Completion of this work will take place once all survey operations on the wreck site are finished and processed.

The CHERISH project is funded through the EU Ireland Wales 2014–2020 programme. The project partners are the Discovery Programme, Geological Survey Ireland, the Royal Commission on the Ancient and Historical Monuments of Wales and Department of Geography and Earth Sciences, Aberystwyth University. ■

1) Cámaro García, W., Dwyer, N., 2021. The status of Ireland's climate 2020. Environmental Protection Agency Report

Minna Koivikko
Maritime Archaeologist and project manager, Finnish Heritage Agency, Finland

A Case Example – Suomenlinna UNESCO World Heritage Site, Sea Fortress and Climate Change

… find a blue pocket you love that drives you to protect the ocean. With no blue, there´s no green. No us, either.

Sylvia Earle, 2021

Suomenlinna, in front of Helsinki, is surrounded by the Baltic Sea (Fig 1). In an ordinary year, we have one million visitors. I am one of the 850 residents of these islands, which gives me an opportunity to promote underwater cultural heritage in a meaningful way. Within this article, I would like to share a story about how a maritime archaeologist can think locally, and act globally, while using the knowledge of the underwater cultural landscape. The location and history of being a part of three different states makes Suomenlinna a perfect place to discuss climate change and assist people to find their own blue minds.

The United Nations has set up 17 different sustainable development goals, and as a specialist in cultural heritage, the Finnish Heritage Agency has picked the most important ones for closer consideration. However, as a maritime archaeologist, I need to choose differently, since for the underwater cultural heritage, the most obvious one is number 14; Healthy and Productive Oceans. It is said that by protecting marine heritage we can assist in achieving healthy seas. It is true that in Finland the blanket protection of heritage sites is based on the Antiquities Act, but the changing climate does not obey laws. What else can we do to protect and preserve this unique heritage for the common source of enjoyment and as a data collection for future generations? This is a big question, and the many answers should contain different types of evaluation. Reactions should be based on multidisciplinary research and take into consideration the possibilities of different co-operation and citizen science. In other words, climate change also changes the way we function as authorities in protecting the heritage.

The changing climate is a difficult subject to discuss since it is emotional and existential for all of us. There is a need for emotional

← Fig 1. Suomenlinna, UNESCO World Heritage site is an 18th century sea fortress in front of Helsinki in the winter. Photo: Suomen ilmakuva Oy

conversations within maritime archaeology, since eco emotions have an effect on how we interact with the sea and underwater heritage at the same time. As researchers of the past, we can offer another viewpoint to the ongoing climate discussion and built trust in human resilience. As moderator Gina Gylver said in Oslo Forum´s last discussion with Karen O´Brien, occasionally, one should look at the scary big picture. What are the scientific scenarios? This view maintains the motivation to choose that which is environmentally friendly, however, it is not healthy to be anxious all the time. At other times, it is better to concentrate on the local level and the things that you have personally chosen to contribute to mitigation and feel good about your actions. This change of views can also constitute a changing between the red mind and blue mind. Blue mind is the calm and hopeful position, whereas red mind contains a reasonable amount of anxiety when facing the inevitable change that we are all experiencing. As maritime archaeologists, we can offer tools to build a personal blue mind and blue space.

It is said that one needs to get personal with climate change to experience a wakeup call. We authored a joint article 10 years ago about Suomenlinna and climate change, and I felt that as a maritime archaeologist we should wait for more environmental data from marine scientists (Leino and Vakkari 2010). I went on to study the recycling of ships and underwater cultural landscape in order to understand human behaviour connected with the sea (Koivikko 2017). The change with the sea has been gradual, and you just accept and adapt to a reduction in visibility, and the number of hard winds keeping you from the sea and doing your fieldwork. However, I had a personal experience last summer, while exceptionally hard winds took down a tree which my grandfather had planted 50 years ago and I had seen grow. For us Finns, forests are important, and their wellbeing has a key role in binding CO_2 emissions.

Forests, as well as trees, are also important to me, and after an exceptionally dry summer in 2021, it was devastating to see a local wildfire

burning large areas of forests in my childhood environment (Fig 2). The fire took place in a windmill farm construction site, which shows that while trying to produce green energy, the process is not always straightforwardly good for the climate. This event made me think that the Baltic Sea has a special ability to preserve wood, since the degradation processes are slow. There is a substantial number of historical wooden wrecks and different constructions around Suomenlinna alone. How can we combine the woods and the wooden underwater cultural heritage in order to tackle climate change?

During 2012, the Finnish Heritage Agency acted at Suomenlinna and we made a test excavation on a wooden coastal construction (Fig 3). The results of this archaeological excavation turned out to give a good example of avoiding coastal erosion. The excavation was funded by The Governing Body of Suomenlinna. Excavations took place on my proposal since I had a personal relationship with this site. I passed by it daily on my way home, and I had monitored the gradual change for years. In the late 1990s, there were only a few poles visible. The soil was peeled off in a project regarding maintaining the shore. After that, the erosion in the waterline started to slowly excavate the site and reveal the construction. As a maritime archaeologist, I realised that no one else would be interested in this undated site in the "no man´s land" between the land and the sea

During the excavation, we made the dendrochronological dating of the site, revealing that the wood was harvested in 1800, making it part of the Swedish era of the fortress. The dating was exact, since analysed samples contained bark. We also learned that the builders had used softwood, such as pine and spruce. The construction itself was made in a durable way, it had multiple layers of horizontal trunks together with poles, which were stuck deep into the soil. However, the ship traffic in a narrow strait creates currents in this inlet, which keeps up the erosion process. The water level changes by one meter during the passing of ferries on their way to Stockholm and Tallinn. The combination of exceptional highwater levels during storms, together with the stress of the traffic, makes this site a notable example of what type of wooden construction can hold the erosion in the Baltic Sea environment.

My question is, could these types of old building techniques be considered as a way of using wood in the coastal erosion barriers to benefit from the wood's ability of good carbon sequestration? Instead of using concreate, stiffened with iron bars, or plastic tubes, the carbon footprint would be smaller in the construction while using wood. In addition, the forests which have suffered from a fire, could be used in different types of coastal activities. After the fire, some trees are still standing and possible to collect. This wood is most likely not eligible for house building or manufactured as paper. Building attractive shoreline places, we can help people become connected to the water. With this type of creative thinking, we have the possibility to be forerunners in creating mitigation strategies. Not only with modern technologies, but also truly learning from the past, sustainable ways of living and maintaining our environment with traditional building methods.

What type of stories can we tell to support the blue mind? Underwater sites are not visible, we look at them with our mind´s eyes, with the information we have on them. Through the concept of recycling ships as creating an underwater cultural landscape with scuttling ships for sailing obstacles and breakwater constructions, I wanted to create more awareness of the concept of reduce, reuse and recycle with my doctoral dissertation (2017). I wanted to create awareness of sensible material use, and the relationship people have with their water environment. Today, I would talk about re-do, reuse, recycle. Since we humans are not good at reducing, it is better to re-think our behaviour, however doing things in a different way is a positive challenge for creativity.

← Fig 2. Large forest fire in Kalajoki during summer 2021 also left behind trunks which could be used for waterfront erosion barriers. Photo Minna Koivikko 2021

↓ Fig 3. The pole construction at the shoreline has endured for 220 years. This construction could give inspiration for the construction of new waterfront erosion barriers from wood. Photo Minna Koivikko 2012

↑ Fig 4. Wooden wreck dating to 1780´s will be excavated in 2022 in order to educate new scientific divers for underwater archaeology. Photo Maija Huttunen, Nordic Maritime Group 2012

Another story is the multidisciplinary approach to be able to create a list of endangered sites for underwater monuments. At the Finnish Heritage Agency, we have a long co-operation with marine biologists and the latest co-production was a project called Wreck Index. It is an assessment method with different variables for historical wooden wrecks in Finnish coastal waters. So far, it is only published in Finnish (Ruuskanen and Koivikko 2021), however it will be available for an international audience in 2022. At this point, we still don´t have a clear vision of how climate change will affect the Baltic Sea, and as such, we can only have speculative scenarios for the degradation of archaeological sites, like wooden wrecks. They are considered to be biological reefs, and it is natural that changes in flora and fauna will influence the degradation processes. However, it seems that the most disturbing creature, namely Teredo Navalis, the ship eating borer, will also avoid the Baltic Sea in the future since the runoff from increasing rains will keep the salinity levels in the water low, impossible for Teredo Navalis to reproduce

What about the future of Suomenlinna and the rich underwater cultural heritage? In Finland, we only have a handful of specialists working with underwater cultural heritage. Governmental funding is there, but it is insufficient, and luckily there are private foundations supporting projects like the Wreck Index. However, a significant role is also held by international co-operation, and during 2021 the Finnish Heritage Agency signed a contract with Stockholm University, Centre for Maritime Studies, for co-operation in a research programme called *The Lost Navy – Sweden's 'Blue' Heritage 1450–1850*. This programme also involves the Swedish National Maritime

↑ Fig 5. Climate change affects the ice coverage, reducing the optimal diving period of Suomenlinna. Kari Hyttinen (left), Jesse Jokinen and Pasi Lammi preparing for a dive on top of ice. Photo Minna Koivikko 2021

and Transport Museums, and financing mainly comes from Riksbankens Jubileumsfond for years 2021–2026. This is the biggest research project in the Baltic Sea region within the field of maritime studies.

In Finland, this means a sub-project The End of Glory Days, Biography of the Swedish wrecks as 'Blue' Heritage of Suomenlinna. I have the privilege of being the project leader. Climate change is taken into consideration not only in the scientific content of the project, but also in the way we conduct maritime archaeological excavations and research in an island context. (Figs 4 and 5). The aim is to promote creativity, happiness and trust in the future for both local inhabitants and visiting tourists, at the same time as studying the past in the spirit of the United Nations Decade of Ocean Science for Sustainable Development. ■

REFERENCES

1. Leino, Minna and Vakkari, Eeva 2010: Climate change and underwater cultural heritage in the Baltic Sea – case study Suomenlinna (in Finnish) Ilmastonmuutoksen vaikutukset vedenalaiseen kulttuuriperintöön Itämeressä – Esimerkkitapauksena Suomenlinna. Muinaistutkija 1/2010
2. Koivikko, Minna 2017: Recycling Ships, Maritime Archaeology of the UNESCO World Heritage Site, Suomenlinna. https://helda.helsinki.fi/handle/10138/183286
3. Ruuskanen, Ari and Koivikko, Minna 2021: Wreck Index, new method to evaluate different parameters for preservation of historical wooden shipwrecks at the coastal sea area of Finland (in Finnish) Hylkyindeksi, Painemuuttujien arviointimenetelmä historiallisille puulaivojen hylyille Suomen rannikkovesillä. Museovirasto. https://www.museovirasto.fi/uploads/Meista/Julkaisut/Hylkyindeksi.pdf

Antony Firth
Director of Fjordr: Marine and Historic Environment Consulting and Co-Chair, Ocean Decade Heritage Network, United Kingdom

The Ocean Decade Heritage Network, Cultural Heritage and Climate Change

The Oslo Forum 2021 underlines the need for the heritage community to engage with climate action: for the sake of cultural heritage that is at risk due to climate change; but also to mobilise people through cultural heritage to mitigate and adapt to climate change, and enable communities to be resilient. The implications of climate change are especially intense in coastal and marine zones, so our part of the heritage community is very close to the front line. This paper draws attention to a framework that will facilitate action by the marine heritage community towards climate change over the next ten years.

THE UN OCEAN DECADE

The UN Decade of Ocean Science for Sustainable Development, 2021–30 (https://www.oceandecade.org/) is an initiative of the United Nations as a whole, through the UN General Assembly in New York. As its title indicates, the Ocean Decade will last ten years, which is a substantial length of time to work within a single framework compared to the 2–3 year cycle of many projects. The implementation phase started this year with an official launch that took place in Berlin on 1st June.

The focus of the Ocean Decade is ocean science. Its emphasis at the outset was very much on physical oceanographic sciences but ocean science is now being construed more broadly. Cultural heritage is clearly regarded as within the scope of the UN Ocean Decade.

The intention of the Ocean Decade is to deliver sustainable development, defined by reference to the 17 Sustainable Development Goals of the UN 2030 Agenda. Whilst the future of the oceans in 2030 could be pigeonholed under SDG 14, Life Below Water, it is broadly understood that the Ocean Decade is concerned with and contributes to most of the SDGs. This is also the case with cultural heritage. Although mentioned primarily under SDG 11, Sustainable Cities and Communities, the contribution of cultural heritage to the 2030 Agenda is being pursued in a cross-cutting way towards multiple SDGs (see Henderson 2019).

The Vision for the Ocean Decade is 'the science we need for the ocean we want', set against a background of the three-fold crises in climate, biodiversity, and equity. The Decade is intended to be transformative, underlined by the Ocean Decade's Mission: 'to catalyse transformative ocean science solutions for sustainable development, connecting people and our ocean'. It is also worth noting here the Mission's reference to 'connecting people and our ocean': while its focus is on science, there is clear and growing recognition that transformative change requires input from the social sciences and humanities.

Details of the infrastructure of the Ocean Decade are set out in its Implementation Plan (https://www.oceandecade.org/wp-content/uploads//2021/09/337521-Ocean%20Decade%20Implementation%20Plan:%20Summary) but, in brief, the 'ocean we want' is elaborated by reference to seven Societal Outcomes. Immediate and pressing needs are set out as Challenges, and there are also three Objectives relating to analysing gaps, building capacity, and applying it to sustainable development. Climate change is not separately identified: rather, it pervades the whole approach. Similarly, cultural heritage is not singled out, but it is highly relevant to many of the objectives, challenges and outcomes. Taken together, this provides a well-developed framework within which the relationship between cultural heritage and climate change in our oceans, seas and coasts can be elaborated.

THE OCEAN DECADE HERITAGE NETWORK (ODHN)

At the outset, the Ocean Decade had very little to say about cultural heritage. This gap prompted rapid mobilisation from the marine archaeological community, leading to a substantial presence of archaeologists from around the world at the First Global Planning Meeting for the Decade held in Copenhagen in May 2019. This initial advocacy evolved into the Ocean Decade Heritage Network (www.oceandecadeheritage.org), which set out its rationale in an open access paper in the Journal of Maritime Archaeology (Trakadas et al. 2019).

ODHN has continued to press the case for cultural heritage through participation in regional workshops, other preparatory events, and consultative processes. ODHN's lobbying contributed to beneficial changes in the Implementation Plan for the Decade. At the start of this year, ODHN proposed a Cultural Heritage Framework Programme (CHFP) to support and co-ordinate Ocean Decade-related activity in the cultural heritage sphere. It was one of the first Decade Actions to be formally endorsed by the UN Ocean Decade in their announcement on World Ocean Day on 8th June (https://www.oceandecadeheritage.org/launch-of-the-decade-action-cultural-heritage-framework-programme-chfp/). Consequently, there is now a very direct link between actions by the cultural heritage community relating to sustainable development, and the framework provided by the UN Ocean Decade.

The Cultural Heritage Framework Programme is intended to enable individuals, institutions, and networks to work together through the Ocean Decade; helping to co-ordinate activities and reduce duplication; and to achieve a collective whole that is greater than the sum of the parts. Our intention over the next ten years is that the Cultural Heritage Framework Programme will ensure that 'the ocean we want' – including action relating to climate – is inspired and informed by the long and diverse histories and living heritage of people and the sea.

CLIMATE ACTION AND THE UN OCEAN DECADE

Turning now to climate change, I would like to summarise some of the challenges we face:

- Cultural heritage threatened directly by climate change – in a range of coastal and marine environments, often through quite complex pathways.
- Cultural heritage threatened by adaptation and emergency responses – the way that society is responding to climate change is introducing additional and perhaps greater threats to heritage than climate change itself.
- Cultural heritage threatened by difficult decisions – as the magnitude of impacts and the pressure on time increases, inability to make convincing decisions about heritage may itself result in loss.

On the other hand, we have some strengths also:

- Experience in dealing with threats to cultural heritage – throughout its own history, our sector has focused on threats to cultural heritage and how to address them.
- Evidence and methods – generating and presenting evidence is integral to our sector; and the methodologies we can deploy in coastal and marine environments are improving very rapidly.
- Understanding of people and their changing environments – the topic that is facing global society is one in which we are already specialised.
- Audiences and participants – our sector's history of public engagement means that we have good means of communication with communities and society at large.

We are better able to face these problems and to maximise our capabilities if we share experience within our sector from organisation to organisation, jurisdiction to jurisdiction. But we also need to share our experience with ocean scientists and policy makers, so they become more familiar with the contribution we can make, and increase the opportunities in which we can apply our discipline. ODHN and its Cultural Heritage Framework Programme provide a framework, set within the overall UN Ocean Decade, for us to share practice and increase the impact of our climate actions.

The scope of climate action by the marine heritage sector can be illustrated in respect of mitigation, adaptation, and resilience. Mitigation means doing what we can to facilitate reductions in CO_2 production and to expand alternatives. Examples relating to coastal and marine heritage include:

- Being efficient in how we deal with the heritage implications of renewable energy schemes – such as offshore wind farms – so that heritage safeguards are maintained but schemes can progress rapidly.
- Demonstrating how people were able to thrive in low-carbon societies even quite recently – showing how ocean transport and communications worked over many millennia using emission-free transport – sailing vessels – for example.
- Looking after the heritage of communities bound up in high carbon activities, so that transition to a low carbon future does not feel like a negation of their history and identity.

Adaptation – making changes to how we live – can be a greater source of risk to cultural heritage than climate change itself. There are important issues for us to address in the coastal and marine heritage sector:

- We are already embarked on rapid and monumental changes to our landscapes: but these changes are not always based on an understanding of landscape being a result of human as well as natural factors.
- The presence of cultural heritage is not always factored-in, so there may be inadvertent damage to specific heritage features or to the historic character of the landscape.
- Without understanding the role of people through time, the changes being wrought may have unexpected consequences and result in maladaptation.

There is an especially pressing need to incorporate cultural heritage perspectives into adaptation: there is no value in archaeologists simply agreeing this between themselves; we must engage with the coastal and marine managers who are making adaptive changes now.

Resilience concerns our ability to absorb, cope with and respond to an environment in which our climate has changed. Again, our sector can contribute to improving the resilience of places and communities:

- We can help by sharing our long view of change in human environments, showing how places and ways of life have absorbed disruption, both chronic and acute.

- We can also help by empowering communities to engage with their changing environment, encouraging a sense of agency in negotiating their past, present and future.
- We can help communities to re-equip themselves with traditional knowledge embedded in their surroundings: not returning to the past through nostalgia, but learning lessons for the future from centuries of practice.

The UN's 2020 Climate Action Pathway for Resilient Coastal Zones and Oceans (https://unfccc.int/climate-action/marrakech-partnership/reporting-tracking/pathways/resilience-climate-action-pathway#eq-3) provides a projection of what climate action by the marine cultural heritage sector could look like by 2040. Liaising with the Climate Heritage Network, ODHN was able to insert references to the contribution that culture and heritage can make to resilience, which we hope will soon be reflected in specific measures:

TABLE 1 / CULTURAL HERITAGE FOR RESILIENT COASTAL ZONES AND OCEANS

	By 2021	By 2025	By 2040
Policymakers		Ensure coastal planning tools, such as Integrated Coastal Zone Management and incorporate climate change adaptation indicators, including those relating to cultural heritage and traditional/indigenous knowledge	Ensure a thorough understanding of the human history of coastal areas actively drives adaptation and resilience policies for coastal communities affected by rapid shoreline change and extreme weather events.
Technology providers and innovators		Extend technological capabilities and capacity to coastal communities in developing countries – including large ocean states – to enable them to record their local heritage.	
Civil Society	Strengthen the use of cultural heritage to raise awareness of society's continuing dependence on the changing ocean	Ensure ocean literacy programmes in schools and communities mobilize traditional knowledge and achieve sustainable behaviours.	

* Summarised from https://unfccc.int/sites/default/files/resource/Action_table%20_Resilience.pdf

CONCLUSION

The Ocean Decade provides a vital framework within which the marine heritage community can engage with ocean scientists and policy makers over the next ten years. The threats presented by climate change to cultural heritage are extremely pressing; but we have strengths and opportunities too – not just in safeguarding heritage sites but in contributing directly to mitigation, adaptation, and resilience in our communities, locally and globally. ODHN and the Cultural Heritage Framework Programme are here to make such engagement as effective as possible, so that the cultural heritage sector can have a truly transformative effect. ■

REFERENCES

1. Henderson, Jon. 2019. 'Oceans without History? Marine Cultural Heritage and the Sustainable Development Agenda'. *Sustainability* 11 (18): 5080. https://doi.org/10.3390/su11185080.
2. Trakadas, Athena, Antony Firth, David Gregory, Dolores Elkin, Ulrike Guerin, Jon Henderson, Jun Kimura, et al. 2019. 'The Ocean Decade Heritage Network: Integrating Cultural Heritage Within the UN Decade of Ocean Science 2021–2030'. *Journal of Maritime Archaeology* 14 (2): 153–65. https://doi.org/10.1007/s11457-019-09241-0.

Thematic Session III: 20th Century Built Heritage and Climate Change – Adaptive Re-use

Martin Søberg
Associate Professor, Institute of Architecture and Culture at the Royal Danish Academy, Denmark

Climate change prompts us to reconsider how we build

20th Century Built Heritage and Climate Change – Adaptive Re-use

Climate was always an inherent aspect of all building activities: We build to protect ourselves, our fragile bodies, from the harshness of the wind and the rain, of the sun and the snow, to avoid the risk of getting too hot, too cold, or too wet. Yet the climate also affects the materiality of the buildings themselves, causing wear and tear, even deterioration and perhaps even destruction. It makes our relationship with buildings a constant struggle of endless maintenance and repair.

Climate change exaggerates those processes and reminds us of the vanity of human beings, of how foolish we are in believing that we are at the centre of the universe, thereby forgetting our own destructive powers which has had detrimental consequences for other life forms and for the diversity of the planet's living environments. The construction of buildings, cities, infrastructures, urban spaces, and landscapes consumes an immense amount of energy and natural resources. Accordingly, climate change prompts us to reconsider how we build. A more sustainable strategy is the attempt at using fewer resources by re-using what is already available, to recycle and to consider lifespans, in more intelligent and creative ways.

The session "20th Century Built Heritage and Climate Change – Adaptive Re-use," organised by the 20th Century Built Heritage Working Group, addressed questions of adaptive re-use, of transformation, and preservation of built structures through case studies in various contexts. It pointed to the challenges of adaptive re-use of 20th Century built heritage. Questions pertaining to scale and modern building technologies such as reinforced concrete are unavoidable while the task of reducing energy consumption by retrofitting existing buildings also prompts us to consider what to preserve and how, which histories to tell, who's histories. How can knowledge and preservation contribute to a more sustainable future while also enhancing life quality and a sense of community? ■

Liisa Pakosta
Equal possibilities commissioner, Estonia

Comfortable Living Spaces: Quality of Life in Old Houses

2021 had very hot summer in Estonia – but in my home built in 1913, the temperature was cool due to the window placement that allowed the air to move through the flat, offering thermal comfort without ventilation, noise or any change in electricity bills. The neighboring house, built in 1898, even has the original window shutters preserved, enabling even more effective thermoregulation. At the same time, we read news about the demolition of old buildings, that make room for new, more energy efficient ones. For too long, cultural heritage has been absent from mainstream sustainability debates[1]. The knowledge informing decision-making in this field is indeed extremely limited[2]. At the same time, a survey on Polish attitudes towards cultural heritage has shown that 45% of small town residents believe that cultural heritage can improve the quality of life and 69% understand its economic benefits[3].

WE HAVE A LOT TO LEARN FROM OLD AND TESTED BUILDING SOLUTIONS

Buildings are responsible for nearly a quarter of global greenhouse gas emissions. Globally, they are the number one reason for intensive building decarbonisation programmes that also have unintended consequences for historic buildings. In order to save the environment, live in a comfortable environment and minimise greenhouse gas emissions, a broader political and spatial planning, as well as architectural and technical understanding and more informed decision-making is needed. By broader I mean the "old" holistic understanding from the periods of limited building resources, i.e. heritage buildings. Last year, a research article was published in the International Journal of Energy Production and Management that argued the following: *The effective utilisation of natural ventilation in heritage buildings could save a significant rate of electrical energy, as the airflow pattern affects interior comfort conditions; achieving users' thermal comfort counts as an added value. In Mediterranean heritage buildings, they compared closed and open windows and basically found out that keeping the windows open or closed in right schedule can save up to 47% of the total cooling and heating electrical energy annually.*[4] To conclude, there are good, much more comfortable solutions to buildings

← Sookuru living house (built 1963–64) before removal to the Estonian Open Air Museum. Photo: Maret Tamjärv, 2013

life-cycle assessment than buying new 'assembled in China' technology, produced and soon left to decay alongside millions of others. Mental health and sense of neighbourhood, emotional well-being, living comfort from one side and calculation of all the related costs are directly related to sustainable usage of older, already existing houses. And old spatial planning knowledge, including gardening possibilities or airdrying of clothes, add sustainability as well.

LONGER LIFE CYCLE IS POSSIBLE

The life cycle approach and holistic sustainability are becoming more mainstream in all areas of design, but spatial planning and public building regulations seem to be left behind in this movement. The lack of definitive empirical evidence to form the basis for better decision-making and much more long-term solutions could be changed with more research. There is a need for more thorough understanding about how to prolong the expected life cycle of renovations. People keep being drawn to marketing tricks that promise "new comforts, better than ever," that often turn out to be too noisy, expensive, or otherwise lead to a lower quality of life. For example, mechanical ventilation with heat recovery was banned from schools during the COVID-19 pandemic as it proved to be a health risk. Instead, fresh cold air was introduced from the outside. It is also becoming more common to plan kitchens to the North side or at least a shaded area of the house to minimize the refrigerator energy consumption. However, this new normal really constitutes a return to the "old fashioned"– even though it was not that long ago since they were last considered normal.

A more problematic side could be to find political will to change for example the normative 50-years life cycle of a building to 250 years. But, walking through the old towns – is there any reason why the planned life cycle should be any shorter?

↑ Kolchoz farm house flat renovated to 2019 style at Estonian Open Air Museum.
Photo: Heiki Pärdi (2021)

← Original interior from 1960's. Estonian Open Air Museum. Photo: Heiki Pärdi

EVEN THE OLD KOLKHOZ APARTMENT HOUSE CAN BE RENOVATED TO HYGGE LEVEL

Visualising and telling the stories of comfortable living in old houses is a powerful tool. Estonia was under the Soviet Union occupation 1940–1991 and after the Second World War, life in the countryside was reorganised to collective farms called kolkhozs. At the Estonian Open Air Museum in Tallinn this year, a new exhibit was opened – a house with four flats as a typical kolkhoz life example. The original looks substandard at best (photo 1). But one of the flats is renovated to 2019 style (photos 2, 3) and this flat has all the comforts of modern time combined with "old fashioned" ones, like one can open the windows for quick natural ventilation, the room plan is very efficient and in an astonishing way the modern interior reflects the original cozy minimalism of the 1960s (photo 4), the period when this house was designed and built. The museum has fully used the potential to visualise the hygge-possibilities of recycling in even the most hopeless old buildings and thus raised the awareness of ecological and also socially responsible ways of recycling living spaces. ■

NOTES

1. E. Battis-Schinker, S. Al-Alawi, R. Knippschild, et al. 'Towards quality of life indicators for historic urban landscapes – Insight into a German-Polish research project', *Environmental and Sustainability Indicators*. 2021, vol.10. p. 100094 ; P. Mella, P. Gazzola. 'Sustainability and quality of life: the development model' - Enterprise and the Competitive Environment, vol. 2 (2015), pp. 542-551; M. Obad Šćitaroci, B. B. Obad Šćitaroci. 'Heritage Urbanism', *Sustainability (Basel, Switzerland)*. 2019, vol.11 no 9. p. 2669 .
2. Fouseki, K, D Newton, KSM Camacho, et al. 'Energy efficiency, thermal comfort, and heritage conservation in residential historic buildings as dynamic and systemic socio-cultural practices', 2020.
3. A. Chabiera. 'People – heritage – space: Heritage potential in the eyes of towns residents', *Zarządzanie publiczne (Uniwersytetu Jagiellońskiego)*. 2019 no 1. p. 47 57.
4. A. M. Rehab, Z. El-Sayed, D. Taha, et al. 'An approach to achieve thermal comfort and save energy in heritage buildings using different operating patterns', *International Journal of Energy Production and Management*. 2020, vol.5 no 4. p. 314 .
5. V. W. Y. Tam, N.L. Khoa. '*Sustainable construction technologies : life-cycle assessment*'. Oxford, England, Butterworth-Heinemann (Elsevier), 2019.

Pia Ilonen
Architect, ILO Architects Ldt, Finland

Drive or Die – The Cable Factory Story

For the last 30 years, the Cable Factory has been one of the major cultural centres of Helsinki. I am focusing on the years 1989–91 when the industrial monument was in peril.

The factory was erected on the shores of Helsinki during the years 1943–1954. During its manufacturing years, many hundreds of workers braided copper wire at the cable factory and encased it in rubber for electrical wiring and corded telephones. Others developed the wireless voice communications systems. The Nokia mobile phone success started in this building, so it was a monument to Finnish inventiveness and prosperity. It was a unique place on a big scale, ahead of its time.

The life in the building vanished in the mid-1980s when the factory moved out of the city. The Cable Factory was a massive hulk on the furthermost waterfront of the inner city. It could not serve anymore and the city planning failed to see the potential of the building, too big as it was. An empty floor space five football fields in size, and hundreds of rooms, from the smallest cubicles to the largest interior in the country – the Sea Cable Hall. It had to disappear – unless a cultural change occurs!

At that time, things were changing in our society at such a pace that, although we were probably not fully aware of it, there actually was a revolution going on before our eyes that was reshaping people´s lifestyle – a cultural change was going on; technically, economically, politically and socially. Maybe that was the reason why it was possible to see such a radical development happening in the Cable Factory: a process of transforming the factory into a cultural centre, something very unique, and thus saving this industrial monument from demolition. Looking back to those times, it is easy to see that the ideaswe are now calling *bottom-up, creative bureaucracy, user-centered ideology* were real in that case.

The forgotten building was re-visited and brought to life in 1989. Maintenance of the empty premises generated expenses, which the Nokia company covered with short-term rentals for one year, before the building would come under city ownership. The building therefore quickly filled with people from a range of

↑ Surprisingly enough, one of the key factors in the success of the cultural centre concept is the huge size: the floor space of the former Cable Factory is almost 55,000sqm2. Photo Stefan Bremer 1989.

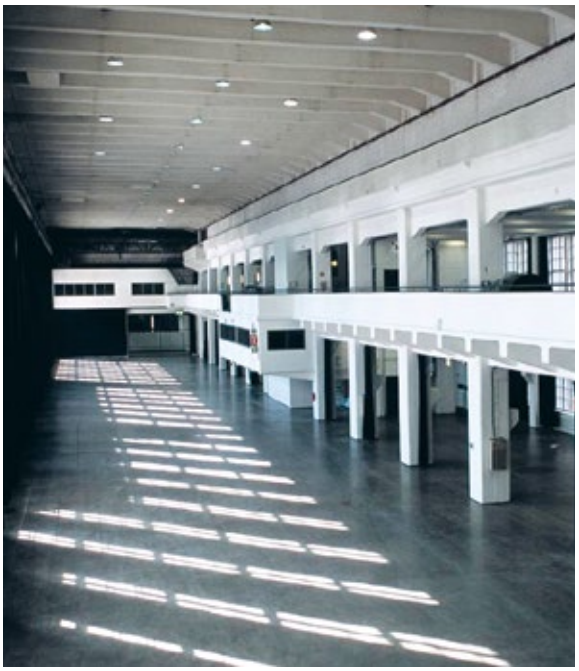
← The Cable factory identity consists of the local industrial past and the history of its transformation by new users. Photo Stefan Bremer 1989

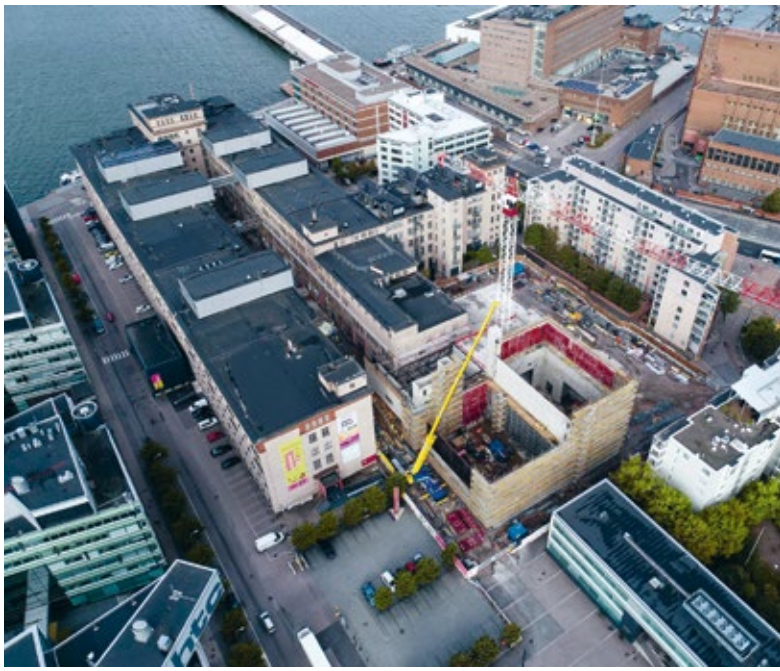
cultural fields. A huge cultural centre was born spontaneously, straight out of the blue!

A cultural change was happening inside the frames of the building, but nobody was talking about it or seeing it yet. They were too busy occupying a free space, working in a place of their own, built by themselves in an open building: a space for opportunity, a democratic space.

Demands for the building to be protected were mounting among the users. It was not only about protecting the building but also a question of saving the whole community born during the occupation. People working in the building had to take the story of the place forward. They formed the Pro Kaapeli Association, initiating a campaign and demonstrating the potential of the place, employing a series of plans, inviting politicians, circulating ideas, exchanging thoughts. The name of a dynamic theatre performance in the big Sea Cable Hall with cars and motorcycles, Drive or Die, very much describes the energy of that activity

In 1991, the city finally accepted the Pro Kaapeli strategy as the basis for the future use and restoration. Norms and standards were questioned, and new organisational thinking developed, allowing interaction and participation – quite radical strategic thinking at that time. The Cable Factory property management company was set up by the City of Helsinki. The concept is an astute one: a property management company that facilitates culture but supports itself and restores the building out of its own pocket and not with subsidies. The company does not have any determined vision about contents, no productions of its own – it only rents out spaces.





↑ The Sea Cable Hall. Photo Heli Rekula 2006

↗ The Cable Factory now faces its biggest transition: The Dance House extension is the company's largest project to date and first new building construction, designed by JKMM architects and ILO architects. Photo Eficicfinland 2021

That is a model which needed a lot of creative bureaucracy in the first place.

The Cable Factory is a building project forever on the move. It is an open framework with concrete pillars and beams, a building free to change over time as a result of interventions. The interiors have been built, pulled down and built again for 30 years when required as tenants come and go. The building has been technically overhauled as unobtrusively as possible over the long term. There has been an understanding of recycling building materials down to the last brick.

The project has not been a traditional renovation exercise, but more a kind of urban planning in which the vibrancy of the environment is facilitated by having the right mix of diverse activities, by an intelligent rental policy, user-friendliness, and interactional change management. There is an aesthetic philosophy behind this that cherishes the vestiges of industry, and a certain rusticity.

The principle of open construction is important. For reasons of flexibility, some of the spaces have to be devoid of any specific purpose. This is why, with all the public spaces on the ground floor, the criteria have been to rent them empty, apart from basic fittings for electricity, lighting and display hangings. This allows clients to construct spaces for each event in the form they want.

A continuously changing transformation process, a building project forever on the move goes on and on. Traces of industrial past are still in the air. The identity of the place is strong, and the atmosphere is unique. The industrial history and new use are united in such a way that the stories of both still issue from the walls. ■

Jekaterina Lavrinec
Urban Researcher and Associate Professor, Vilnius Gediminas Technical University, Lithuania

Rediscovering Green Spaces Through Creative Practices

Green areas in the neighbourhoods and districts are a valuable resource from which local communities and wildlife benefit. Seeking to unlock the green potential of the residential areas, a paradigm of cultural planning, or place-oriented citizens-driven approach to urban planning and development is instrumental. Co-design, urban games and other creative activities can be used by local communities as a tool for exploring, re-evaluating and reinventing the open green yards of the "micro-districts", built back in the 60s-80s.

Seeking to explore how art activities and everyday creativity of the residents contribute to the participatory development of green zones in the neighbourhoods, I refer to the case of Šnipiškės district, Vilnius . The district of 3.12 km² has its historical part with the distinct character of the suburbia of 17th–19th century, a part of Soviet-era blocks of flats, and a growing area of high-rise offices and new housing (mostly gated communities). While greenery plays only a minimal decorative role in the recently developed business part, the gardens by the private houses in the historical part take most of the plots and play an important role in the activities of the residents. The area with freely arranged blocks of flats, built back in the 60s–70s, is characterised by open yards and pedestrian walkways through courtyards and between the five-storey and few nine-storey apartment houses. The open green spaces with a significant variety of trees, shrubs, climbers and herbs contribute to the walkability of this area. While the perimeters of the districts are noisy and polluted, the walkways through interior courtyards provide comfortable conditions to reach public transport stops, schools and kindergartens, shops, post offices and other services.

The attitude of the residents towards the greenery in the districts is diverse. Among the residents, there are active gardeners (mostly elderly ladies), who cultivate tiny flower gardens by the houses. Families with kids, groups of youngsters,

↑ A network of the open green spaces in the blocks of flats is intensively used by the residents for the transit, for walks and for daily contacts with nature and each other. Accessible network of green spaces is an essential aspect of the quality of life in the districts.

and dogs with their owners actively use the courtyards on a daily basis. Car drivers use green areas for chaotically growing parking. Besides humans, there are cats, birds, bats, hedgehogs and insects that use a system of open green spaces and benefit from the variety of plants.

Although it is common to refer to the open green areas in the "micro-districts" as places where "nothing happens", these areas play an important ecological role in supporting biodiversity, providing natural conditioning, supporting health and social contacts of the residents. Viewing nature through the window may have health benefits, as well as bird watching and taking care of the animals and plants in the area. However, these small interactions with the natural environment remain very personal, almost marginalised, and require deep understanding of the ultimate role they play both for personal well-being and collective identities (e.g. there are small clubs of interest between ladies who look after the cats in the yards, and they develop a network of mutual support). In some cases, they might be a core part of a daily routine.

It is rare that open yards and green links between them become a place for vivid celebrations or other events, however, a great number of everyday social contacts happen there. Some residents develop daily rituals, connected to these spaces — e.g. meet with the neighbours, feed cats or birds, read or arrange small picnics outside, go for a slow walk around the blocks, etc. According to the interviews

↑ Motorisation of the city takes over the former green spaces, sports grounds, and playgrounds in the districts.

with the residents of the blocks of flats area, collected in Šnipiškės in 2019–2020, there is a lack of interior non-commercial spaces for senior people in the district, however the outdoor spaces are considered as the informal places for meeting in the warmer season. Some residents invest their time cultivating small gardens, looking after the cats in the whole area, repairing urban furniture (Laimikis archive 2020).

A routine rhythm of life in the "micro-districts" is reflected in the non-formal yet popular name for these areas, which is "sleeping districts". This name reflects the dominating, residential function of the areas, it also has a negative connotation, connected to the idea "nothing happens there", "there is a lack of cultural life". However, as the residents put it, "well, it is a sleeping district, but that means we are the best sleepers here, it is a place to have the best sleep!" (materials of the "Yours Yard" co-design ideas workshop, January 2021). This insight was developed by the residents further, noting that compared to the public spaces in the city centre, green spaces in the "micro- districts" meant for "calmer use": "These are places you visit after work, just to relax. Spaces for introverts. For slow rhythm. For meditation. For listening to nature. For observing nature. For being in public with yourself. A design of such space could draw upon local plants. Maybe kind of a hut made of plants. It might be a transparent structure, to observe the environment while you are inside. For the residents it is also important to monitor what is going on in the yards"

↑ Tiny gardens by the blocks of flats are voluntarily cultivated by the residents, usually by the elderly ladies, and require much time and care. These tiny gardens may become a special topic for the botanic walks in the area.

(Ibid, ideas of various participants brought together). These ideas were embodied during the co-design and gardening workshops that took place in spring-summer 2021 in one of the yards of the district, which was chosen by the residents.

The results of the field research conducted in 2019–2021 in Šnipiškės showed that the accessibility of the green yards and interconnection between them is crucial for daily social contacts, mobility and recreation. The public demand for the green spaces, green routes and walks have become even more vivid during the lockdown in 2020–2021. Although nowadays in some Vilnius communities, fences are considered as an easy solution to "keep the order and safety inside the fenced territory" (it is a very recent trend), by fencing the whole yards by the blocks of flats, a network of green spaces would be fragmented, and social connections, walking and interaction with nature within the district would be significantly reduced. Another threat comes from uncontrolled motorisation, which results in the chaotic parking in the yards of the apartment blocks, limiting the variety of functions of the green areas (recreational, social, cultural). The ad hoc solution of the city administration is to give more green spaces that have been taken chaotically for the new parking lots (which results in the growth of hard surfaces in the districts). But the chaotic parking continues to grow rapidly in "micro-districts", raising tension among neighbours: some conflict because of the parking place closer to the house, and some seek to save the green space from the illegal parking.

↑ By placing plywood cats, birds and bats around the district, playful routes in the area were launched. After some time, the cats started “travelling” around the area, some were taken by the residents to their home, and while attending the area you can find some of the cats placed in the windows of the blocks of flats.

Raising awareness about the importance of the system of open green areas in the "micro-districts" can be done in many directions. One of the principles, which the "Laimikis.lt" group started using while conducting participatory research in the wooden part of the district in 2012–2017 was gamification. To unfold the rich history of the wooden neighbourhood (a part of which is a cultural heritage site, which was referred to as an "abandoned criminal site" for many years), cooperative art activities with local residents, cultural routes and games are instrumental. As a case, in 2013–2015 (with a preparatory phase in 2012), an ongoing artistic action "Street Mosaic Workshop" was initiated, inviting residents and visitors to decorate the surfaces of the district with ceramic mosaics, commemorating the history of ceramic production in this area in 17th–18th centuries. In this way, a cultural route that embraced the decorated "stops" emerged. Small gardens, water pumps, architectural elements and other peculiarities have become parts of the route. By encouraging walking, you encourage closer contact with the environment and promote the understanding of its uniqueness and fragility. On the basis of the collected documentation of the urban elements, houses, gardens, skylines, an urban game "Urbingo" (the first version published in 2013) was developed. By providing playful tasks for the users and encouraging them to explore the areas, it serves as an actively used archive, instrumental for monitoring the change in the area.

A similar tactic appeared to be instrumental in the area where blocks of flats dominate. Although this part of the district is considered a typical "sleeping district", it has its historical, ecological and geological layers which are a part of the undiscovered identity of this place. The old fruit trees in the yards between the blocks of flats are linked to the homestead, most of which are gone. The variety of plants is impressive yet barely recognised by most of the residents (the lack of this kind of knowledge environment is known as "plant blindness"). The variety of species of birds, bats and bugs is interesting to explore. As the cultural planning approach is based on the local knowledge, we started from the mapping of the creative activities, needs and ideas of the residents, who contribute to the maintenance of the green yards and green links. Walks around the area appeared to have good premises, but needed some contribution to become a cultural activity that would unfold the cultural potential of the green areas. For this reason, an educational excursion focusing on the urban character of this area and the creative activities of the residents was developed. A number of artistic interventions around the district were arranged in cooperation with the local residents as a part of emerging playful routes (e.g. 36 plywood cats in the yards and 13 other plywood heroes, including lady gardeners, birds and bats; colored bird houses and decorated stone gardens; small exhibitions, etc.), some of these objects started travelling around the area, some were taken by the residents and placed by the windows, and some were included into the urban orientational game, developed for this area. During the period of 2019–2020, Vilnius TECH student groups tested various cultural routes that consisted of 5–8 stops and had different topics — focused on the history, hidden treasures and art objects, soundscape, sports activities. For these routes, maps were produced or free applications for the routes were used. A number of placemaking workshops ("Yours Yard"), performances ("Teatronas") and urban games ("Laimikis.lt") were co-arranged with the local children and their parents to activate the green areas and to promote the knowledge of its biodiversity. One of the games, "Street Trees", devoted to the urban plants, was developed in cooperation with the park historian dr. D. Labeckis, who documented and described the trees, shrubs and climbers in this area. Using this material, a game that encourages finding and identifying various plants was designed and tested. Through participatory creative actions, the green links between the yards in the area gain new meanings, new scenarios, get coloured with new emotions, and become a part of the image of the district. ■

We would like to thank

- The Baltic Region Heritage Committee, for choosing Oslo as the location of the forum – even though it had to be digital, we hope the audience got a sense of Oslo from the location and the films
- All the speakers, without you there would be no Oslo Forum
- The working group members for suggesting programme speakers
- Our moderators who did such a good job: Gina Gylver, who led the first three sessions, and Hannu Matikka, Sallamaria Tikkanen, Martin Søberg, who led the thematic sessions
- Jan-Robert Jore for directing the film The Power of Volunteering. Who are the volunteers in the cultural heritage sector – and why are they doing it? and Espen Frøysland and Hannu for introducing it
- Blackfilm and Marta Anna Løvberg for the short films from Oslo and the Oslo Maritime Museum
- The Norwegian Maritime Museum for hosting the conference
- Our technical production team from HOLI led by Simen Hallset and Hans Marius Indahl
- Doggerland, with Richard Burgess, Anders Ådin and Jenny Gustafsson, for the wonderful music
- The communications departments at Arts Council Norway and the Directorate for Cultural Heritage
- The project group for Oslo forum: Noelle Dahl-Poppe, Andreas Skauen Pedersen, Henrietta A. Taube, Vegard Berggård, Eva Marie Sund and Kristin Eliassen