



## Extending the shared socioeconomic pathways for adaptation planning of blue tourism

Kari Hyytiäinen<sup>a,\*</sup>, Liisa Kolehmainen<sup>b</sup>, Bas Amelung<sup>c</sup>, Kasper Kok<sup>c</sup>,  
Kirsi-Marja Lonkila<sup>b</sup>, Olli Malve<sup>d</sup>, Jukka Similä<sup>e</sup>, Mikael Sokero<sup>b</sup>,  
Marianne Zandersen<sup>f</sup>

<sup>a</sup> Department of economics and management, University of Helsinki, FI-00014, Finland

<sup>b</sup> Demos Helsinki, Mechelininkatu 3D, FI-00100 Helsinki, Finland

<sup>c</sup> Wageningen University & Research, P.O. box 47, 6700 AA Wageningen, The Netherlands

<sup>d</sup> Finnish Environmental Institute, Latokartanonkaari 11, 00790 Helsinki, Finland

<sup>e</sup> University of Lapland, PL 122, FI-96101 Rovaniemi, Finland

<sup>f</sup> Department of Environmental Science & Interdisciplinary Centre for climate Change (iCLIMATE), Aarhus University, Frederiksborgvej 399, DK-4000 Roskilde, Denmark

### ARTICLE INFO

#### Keywords:

Adaptation planning  
Knowledge co-creation  
Nature-based tourism  
Sustainability transition

### ABSTRACT

This paper offers an approach to long-term planning for an industrial sector that is sensitive to climate change, the state of adjacent natural environments and the associated socioeconomic developments. The paper combines exploratory and target-seeking scenarios to understand the future challenges of nature-based blue tourism under alternative global futures, and to develop sequences of actions to accomplish the best achievable future outcome for blue tourism at a local scale. We detail a bottom-up approach to scenario development for tourism, with local stakeholders developing local scenarios within the boundaries provided by the locally extended Shared Socioeconomic Pathways (SSPs), widely used in climate research. As a demonstration of the approach, a group of invited stakeholders developed locally extended scenario narratives and the adaptation plans for blue tourism for coastal areas surrounding the Helsinki metropolitan area in Finland. The co-creation process yielded several recommendations for immediate action concerning protection of the coastal environments, land use planning, internal communication with the sector and coordinated monitoring of economic, ecological, social and cultural sustainability indicators. The approach offers a way forward for systematically assessing the future risks and opportunities that a changing environment and society create for blue tourism.

\* Corresponding author.

E-mail addresses: [kari.hyytiainen@helsinki.fi](mailto:kari.hyytiainen@helsinki.fi) (K. Hyytiäinen), [liisa.k.kolehmainen@gmail.com](mailto:liisa.k.kolehmainen@gmail.com) (L. Kolehmainen), [bas.amelung@wur.nl](mailto:bas.amelung@wur.nl) (B. Amelung), [kasper.kok@wur.nl](mailto:kasper.kok@wur.nl) (K. Kok), [kirsi-marja-lonkila@demoshelsinki.fi](mailto:kirsi-marja-lonkila@demoshelsinki.fi) (K.-M. Lonkila), [olli.malve@ymparisto.fi](mailto:olli.malve@ymparisto.fi) (O. Malve), [jukka.simila@ulapland.fi](mailto:jukka.simila@ulapland.fi) (J. Similä), [mikael.sokero@demoshelsinki.fi](mailto:mikael.sokero@demoshelsinki.fi) (M. Sokero), [mz@envs.au.dk](mailto:mz@envs.au.dk) (M. Zandersen).

<https://doi.org/10.1016/j.futures.2022.102917>

Received 8 September 2020; Received in revised form 1 December 2021; Accepted 9 February 2022

Available online 18 February 2022

0016-3287/© 2022 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY license

(<http://creativecommons.org/licenses/by/4.0/>).

## 1. Introduction

### 1.1. Helsinki as a blue tourism destination

Tourism in metropolitan Helsinki, located on the shoreline of the Baltic Sea, leans on the city's reputation as the 'Daughter of the Baltic Sea' and the proximity of the sea. The centre of Helsinki is located on a peninsula, with the Baltic Sea and 330 islands surrounding the city. The capital region extends some 30–40 kilometres west and east from the city centre.

A mosaic of open seas and rugged, rocky islets characterizes the region's seascapes. Leisure boating and island hopping are common activities. Many of the islands are developing quickly and becoming better known among tourists, lending the coastal area a high potential for further tourism development. This is partly a result of the city's investments in sustainable tourism as well as the sustainable development of its sea areas. A maritime strategy (Helsinki Maritime Strategy 2030) has been developed to remove the barriers to tourism enterprises, to increase recreation possibilities and to create premises for inspiring life for the residents. The City of Helsinki is committed to reaching carbon neutrality by 2035. To this end, the city has developed a Think Sustainably service for visitors to search for low-carbon services that match certain criteria (See [My Helsinki, 2020](#)).

The city of Helsinki is an international tourism destination of regional significance. In 2019, foreign overnights reached a new record with 3.0 million hotel nights spent by international tourists annually, representing 43% of all international travel in Finland (see [Visit Finland 2020](#)). Nature is Finland's main attraction for more than half of the foreign visitors ([Visit Finland, 2019a](#)). However, when it comes to Helsinki, potential visitors in both Europe and Asia strongly associate Helsinki as a destination to culture ([Visit Finland, 2019b](#)). Of the main tourist regions in Finland, Helsinki experienced the biggest hit during the COVID-19 pandemic, with foreign overnight typically representing a majority. The drop in total overnights in Summer Season 2020 was – 70% compared to overnights in summer season 2019 ([Visit Finland 2020](#)).

Safety and security have been Helsinki's (and Finland's) pulling forces already before the pandemic, and Finland has been ranked as the safest travel destination globally ([World Economic Forum, 2017](#)). In post-pandemic travel and tourism, safety of travel will remain to be a significant attribute when choosing a destination. Helsinki's close proximity to nature and to the sea, the spaciousness and the safe services offer a competitive advantage to the city compared to other capitals. Finland's good preparedness and ability to tackle the COVID-19 pandemic might play a role in the overall picture.

The environmental state of the Baltic Sea is the primary concern for the development of coastal and maritime tourism (also referred to as blue tourism) in and around Helsinki. The Baltic Sea is highly eutrophic due to heavy nutrient pollution from the 1960 s to the 1990 s – a situation that persists even though nutrient loading is currently much lower ([Saraiva et al., 2019](#)). Occasional but massive algae blooms during the high season in July and August reduce the attractiveness of the coastal and marine environment for recreation and visits. However, improving the state of the semi-enclosed shallow sea - and the opportunities for blue tourism and recreation - are not entirely in the hands of local actors and decision makers. The ecological state of marine ecosystems around Helsinki region is driven both by the efforts to reduce nutrient loads from local sources, but also on international efforts to reduce overall nutrient pollution to the entire Baltic Sea.

Climate change is expected to further complicate combatting eutrophication due to increased precipitation and shorter wintertime frost periods, which increase the leaching of nutrients from the land to the sea. The most significant changes in Helsinki will occur during winters, when the rise of temperatures is highest. Increased precipitation, less snow and ice cover in the Baltic Sea will make the winters in Helsinki darker. Other significant impacts include flood risks. Heatwaves, storms and zoonoses will increase, but they are not expected to become major problems in the decades to come ([Pilli-Sihvola et al., 2018](#)).

### 1.2. Uncertain future of tourism

When deciding on projects with long-term implications, such as infrastructure development and urban expansion, coastal blue tourism destinations have to cope with fundamental uncertainties that are beyond their own control and which may affect the resilience of the sector. The way in which climate change unfolds will be strongly shaped by the sensitivity of the climate system, potential tipping points and the level of success of emission reduction efforts. The development of other issues in the environmental domain, including pollution, biodiversity loss and land-use change, is also uncertain.

Change and dynamics are not restricted to tourism's supply side. Natural disasters and man-made crises can disrupt tourist flows, even though tourism demand for these places often bounces back surprisingly quickly. Furthermore, fads, fashion, marketing efforts and new travel connections can quickly alter tourism patterns. The COVID-19 pandemic, for example, has led to substantial temporary – and perhaps even permanent – changes in travel preferences.

Tourism is a highly climate-dependent and climate-sensitive industry, and coastal destinations are among the most vulnerable ([Scott, Gössling, & Hall, 2012](#)). In addition, the tourism industry is a service sector in which customers move to the providers to enjoy the service. Tourists can choose between a virtually endless number and variety of providers, which makes the tourism industry particularly sensitive to tourists' whims. Regardless of the uncertainties, tourism destinations still have to anticipate and invest to accommodate future tourism demand.

### 1.3. Scenarios as tools for adaptation planning

Scenario analysis provides a tool for assessing the adaptation capacity of industries that are affected by the changing climate and the underlying socioeconomic drivers, and for planning the adaptation measures for resulting, but as yet unknown shifts in climate

resources and customer preferences (Swart, Raskin, & Robinson, 2004). Scenarios used in ex-ante assessments include exploratory and target-seeking scenarios (e.g. IPBES, 2016). Exploratory scenarios (also known as descriptive scenarios) examine plausible futures of an industry under potential trajectories of global and local drivers. Such scenarios help in elaborating drivers and causal interactions relevant for the industry studied, understanding some of the most important uncertainties and vulnerabilities, and identifying future policy challenges. Target-seeking scenarios (also known as normative scenarios) describe a sequence of actions that start from the current situation and lead to some desired future outcome. Target-seeking scenarios can be used for studying the viability of alternative pathways and can contribute to policy design and implementation. In this paper, we combine exploratory and target-seeking scenarios, first to understand future challenges of nature-based blue tourism under alternative global futures, and then to develop sequences of actions to obtain the best achievable future outcome for the tourism industry at a local scale in the Helsinki region.

Scenarios are well established in global environmental change research, particularly as tools for studying climate change mitigation and adaptation. The Intergovernmental Panel on Climate Change (IPCC) has a long tradition of using scenarios to project plausible emissions and climate change trajectories. Since 2014, the state-of-the-art scenario architecture has consisted of emission scenarios (Representative Concentration Pathways, RCPs) and Shared Socioeconomic Pathways (SSPs) (O'Neill et al., 2014). The SSPs describe five alternative and distinctly different narratives for global socioeconomic development during the 21st century (O'Neill et al., 2014, 2017). The SSP narratives are accompanied by numerical projections on population growth (Samir & Lutz, 2017), urbanization (Jiang & O'Neill, 2017), and economic growth (Cuadrasma, 2017; Dellink, Chateau, Lanzi, & Magné, 2017; Leimbach, Kriegler, Roming, & Schwanitz, 2017).

The SSP/RCP framework offers a way ahead for scenario development for different industries, including the tourism industry. The SSP narratives are global in nature, but can be extended and tailored to suit regional and sectoral assessments. A strand of scenario literature called impacts, adaptation and vulnerability focuses on adaptation planning, environmental protection and business development at regional and local scales (Absar & Preston, 2015). For example, Nilsson et al. (2017) used global scenario narratives as boundary conditions in participatory stakeholder workshops to develop locally relevant scenarios of future change for four municipalities located in the Barents Region in northernmost Europe. Reimann, Merckens, and Vafeidis (2018) extended the global SSP narratives in the Mediterranean countries to study population growth within countries, and between coastal and inland areas to study the exposure, vulnerability and impacts of population on coastal hazards and sea-level rise. Rohat et al. (2019) extended combinations of RCPs and SSPs to explore the future of heat-related health challenges in Europe.

The SSP framework has not yet been systematically extended to travel-related services and industries, which hinders effective impact assessments and adaptation planning of the tourism industry. Key ingredients for such extensions are available, as the literature on climate change impacts on tourism has grown rapidly over the past 15 years. For example, a wealth of information is now available about climate change impacts on tourism *potential*, in terms of climate suitability, quality of the natural environment and water availability.

#### 1.4. Objectives

The objective of this study is to develop an approach to adaptation planning in blue tourism at a local level, with an application to Helsinki. We build on and extend the conceptual framework of Scott et al. (2012) to understand the drivers of international tourism at a local scale, and combine exploratory and target-seeking scenarios in line with Kok, van Vliet, Bärlund, Dubel, and Sendzimir (2011) to develop contingency plans and to seek actions that are potentially effective under alternative global futures. We use the SSP narratives (O'Neill et al., 2014) as boundary conditions for a locally relevant extension of the global scenarios in line with Nilsson et al. (2017), and make use of the concepts of backcasting (Robinson, 1982, 2003) and multi-level transitions (Geels & Schot, 2007) to develop adaptation pathways for blue tourism.

The approach centers on the local scale, because that is where adaptation ultimately takes place. Every tourism destination responds differently to the global, regional and national drivers, depending on local circumstances including differences in geographic, economic and cultural contexts and social organisation. Adaptation planning therefore has to be localised and requires stakeholder participation to tap into local knowledge and perceptions. In the approach, stakeholder participation takes the form of co-creation, as local and sectoral actors are best suited for identifying the barriers to adapting to climate change and associated socioeconomic

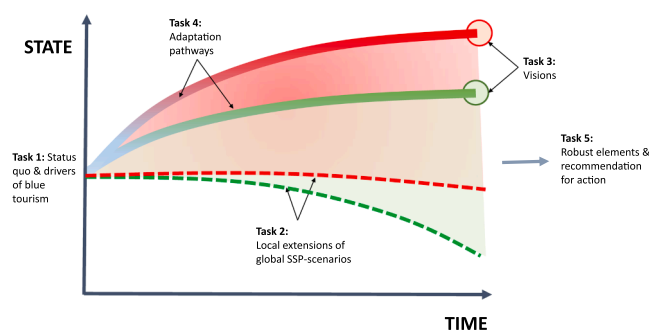


Fig. 1. Conceptual framework for adaptation planning of blue tourism – illustration for two alternative global futures (green and red).

developments, and itemizing factors that are critical for the future success of the industry under a variable global future.

## 2. Conceptual framework for adaptation planning at a local level

The framework for adaptation planning is developed for blue tourism at a local scale, but can be applied to any sector that is driven by global socioeconomic and environmental factors, and can be confined to an area that is small enough not to have a significant effect on global markets. The framework is based on the ideas outlined in several earlier papers (e.g. Kok et al., 2011; Nilsson 2017; Pedde et al., 2019).

The framework consists of multiple combinations of (i) sets of locally extended scenarios for the drivers of blue tourism, (ii) a vision and (iii) an adaptation pathway for the blue tourism industry in the case study area (see Fig. 1). A locally extended scenario describes the development of the core drivers of blue tourism from the current state towards the future. It outlines the overall requirements, boundaries, and opportunities to further develop and invest in the tourism sector, but also provides information about the possible forthcoming risks. Each locally extended scenario is an interpretation of the consequences of a single global scenario for elements relevant to the sector (blue tourism) and the region (Helsinki in our example). Integrated SSP/RCP-scenarios extend until the end of the 21st century, allowing for a long time horizon.

A locally extended scenario is descriptive in nature, and it provides a benchmark against which a realistically attainable vision and sequences of actions can be developed in a proper local and global context. In contrast, vision and target-seeking adaptation pathways are normative in nature. A vision is the best attainable future for the industry given the boundary conditions of the locally extended SSP and the associated climate outcome. A vision should be realistic provided that the industry and other actors make use of the emerging opportunities provided by joint impacts of changing drivers. The adaptation pathway consists of a chain of investments and public interventions that are necessary to make it possible to attain the vision. An adaptation pathway may also address any major risks and concerns related to the extended narratives for future supply and demand of blue tourism.

Fig. 1 visualizes the conceptual framework, and lays out five research tasks. The first research task is to elaborate the drivers of blue tourism, namely the sectors and trends that are relevant for the supply and demand of blue tourism, and to create a common understanding on the current magnitude and state of the sector in the region. The second research task is to extend selected SSP narratives (one at a time) to consider how the drivers of blue tourism are likely to evolve during the entire time horizon. The third research task is to develop a vision that is attainable within the future circumstances outlined in the SSP narrative and locally extended scenario for the drivers of blue tourism, and the fourth is to develop a sequence of investments and policy interventions needed to achieve the vision. The tasks 2–4 are repeated for each alternative global futures represented by the SSPs (note that the locally extended scenarios, visions and adaptation pathways are shown only for two alternative global futures in Fig. 1). The fifth and final task is to identify those elements in the adaptation pathways that are common to several alternative and distinctly different global futures, and to prepare policy recommendations.

## 3. Co-creation of extended scenario narratives, visions and adaptation pathways

Two consecutive one-day workshops were organized in May and September 2019 to co-produce the extended scenario narratives, visions for the sector and adaptation pathways. When inviting the stakeholders, special attention was given to achieving a wide and balanced representation of the various stakeholder groups. In total, 20 and 13 stakeholders attended the two workshops, respectively. The participants represented the tourism business and interest organizations, municipalities, public administration, civic organizations and NGOs, and included entrepreneurs, planners, directors, and researchers. Several participants were expected to be residents in the area.

The workshops started with short presentations and introductions to the topic and went on to address the first four tasks listed in Fig. 1: the first workshop addressed tasks 1 and 2, the second workshop task 3 and 4. After the workshop, the facilitators drafted the policy recommendations (task 5), which the participants had an opportunity to comment on.

The outcomes of the workshop discussions were written on sticky notes and collected on large canvasses. The time horizon of the analysis was 80 years (until the end of the century) as in the SSP storyline, but in the actual work the end point of the analysis was described more loosely (extending to several generations ahead).

**Task 1.** Identify the most important drivers of change for blue tourism in general.

One of the facilitators introduced a preliminary list of drivers of demand and supply for blue tourism (see Fig. S2). The participants considered whether they found the drivers shown relevant, and whether any important drivers were missing. The participants were subsequently asked, in groups of 2–3 persons, to choose 5–10 drivers that they considered the most important. The selected drivers, written on sticky notes, were collected on a large canvas. One of the facilitators organized the drivers, with help and feedback from the whole group, into wider categories. Finally, every participant weighed the relative importance of each of these categories by allocating five votes to the most relevant drivers of change.

**Task 2.** Extend the SSPs to blue tourism in the case study area and to some degree nationally.

Three global scenarios were chosen for extension purposes in order to obtain suitable group sizes (each of the three groups consisting of 5–6 invited stakeholders and 2–3 facilitators). Each group worked independently of the others, and was tasked with producing an extended narrative for blue tourism in the context of one global future: SSP1 (sustainable development), SSP3 (regional rivalry) or SSP5 (fossil-fueled development) and the associated climate outcome. SSP1 was associated with low-end climate change,

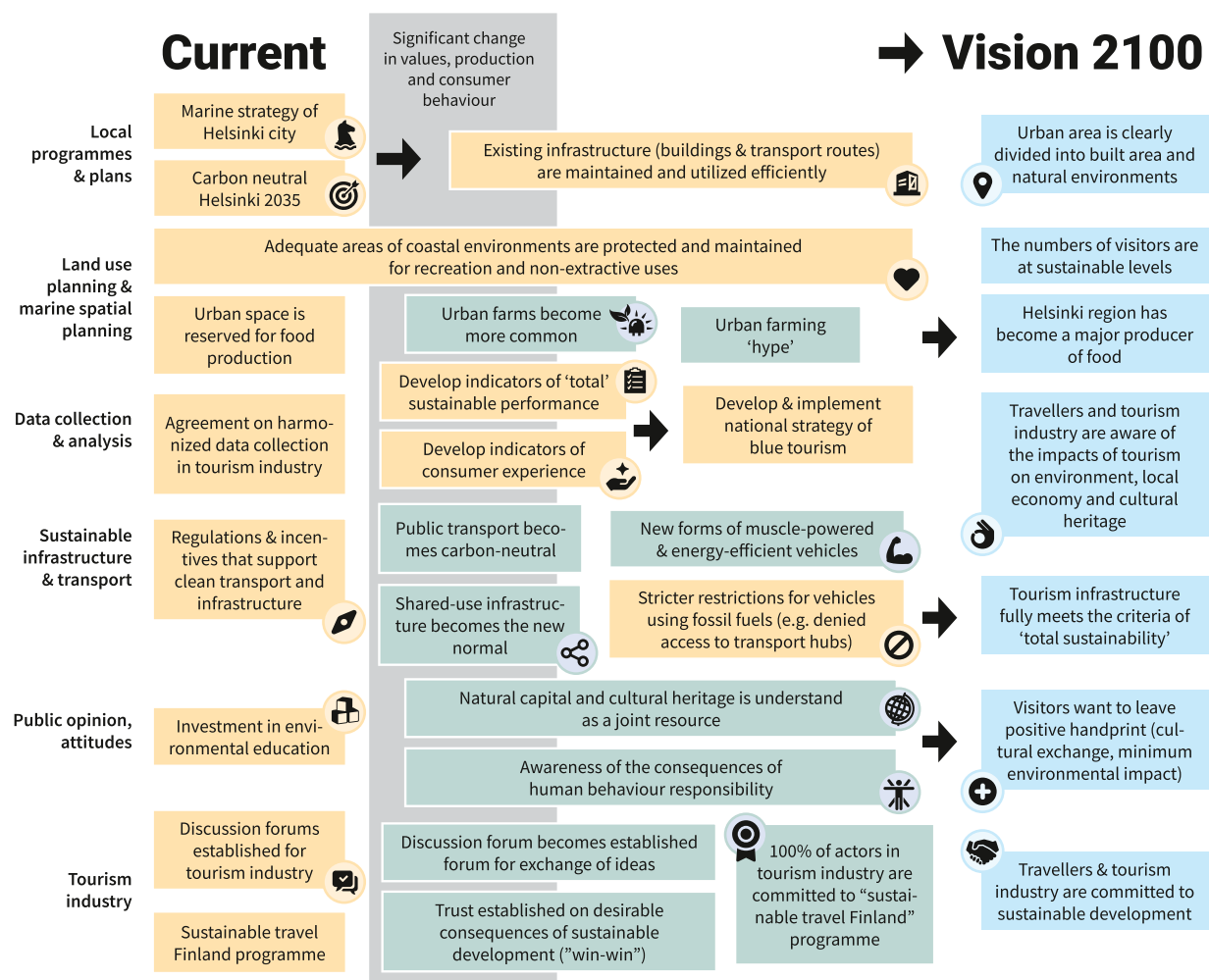
SSP3 with moderate climate change and SSP5 with high-end climate change within the range of RCP2.6–RCP8.5. These three pairs of climate and socioeconomic futures were suggested for extension by the facilitators on the grounds that they cover a wide range of plausible, but distinctly different futures with respect to climate, state of the environment, consumer preferences and other societal factors relevant for the blue tourism.

First, the group members reconsidered the list of main drivers (developed as part of Task 1) and identified those drivers that they found the most relevant in the context of the case study area and the specific SSP narrative they were working with. After that, the members of the group considered (a) how each driver might evolve over time as a result of global development, and (b) how those changes might affect the supply and demand of blue tourism in the case study area. The findings and insights documented on sticky notes were collected and clustered thematically on a large canvas. Finally, the group considered the joint impacts of all relevant drivers on the prospects for blue tourism, and adjusted the clustering accordingly.

After the first workshop, the facilitators converted the findings written on sticky notes into complete sentences and prepared the first draft of the extended scenario narratives. Next, the group members were given the opportunity to comment on the draft narratives. Before the second workshop, the participants were provided with statistical information about past trends in the tourism sector, globally, nationally and in the case study area. In addition, a report on the findings of the first workshop was made available for use as a reference.

**Task 3.** Develop a vision for blue tourism in the Helsinki capital area, building on the narratives created.

The second workshop started with task 3: developing visions. This task was performed in two, rather than three groups, because the number of participants was smaller than in the first workshop. SSP1 and SSP3 were chosen for further development because they exhibited the greatest contrast with respect to tourism outcomes. Those participants that had worked with SSP1 and SSP3 narratives in



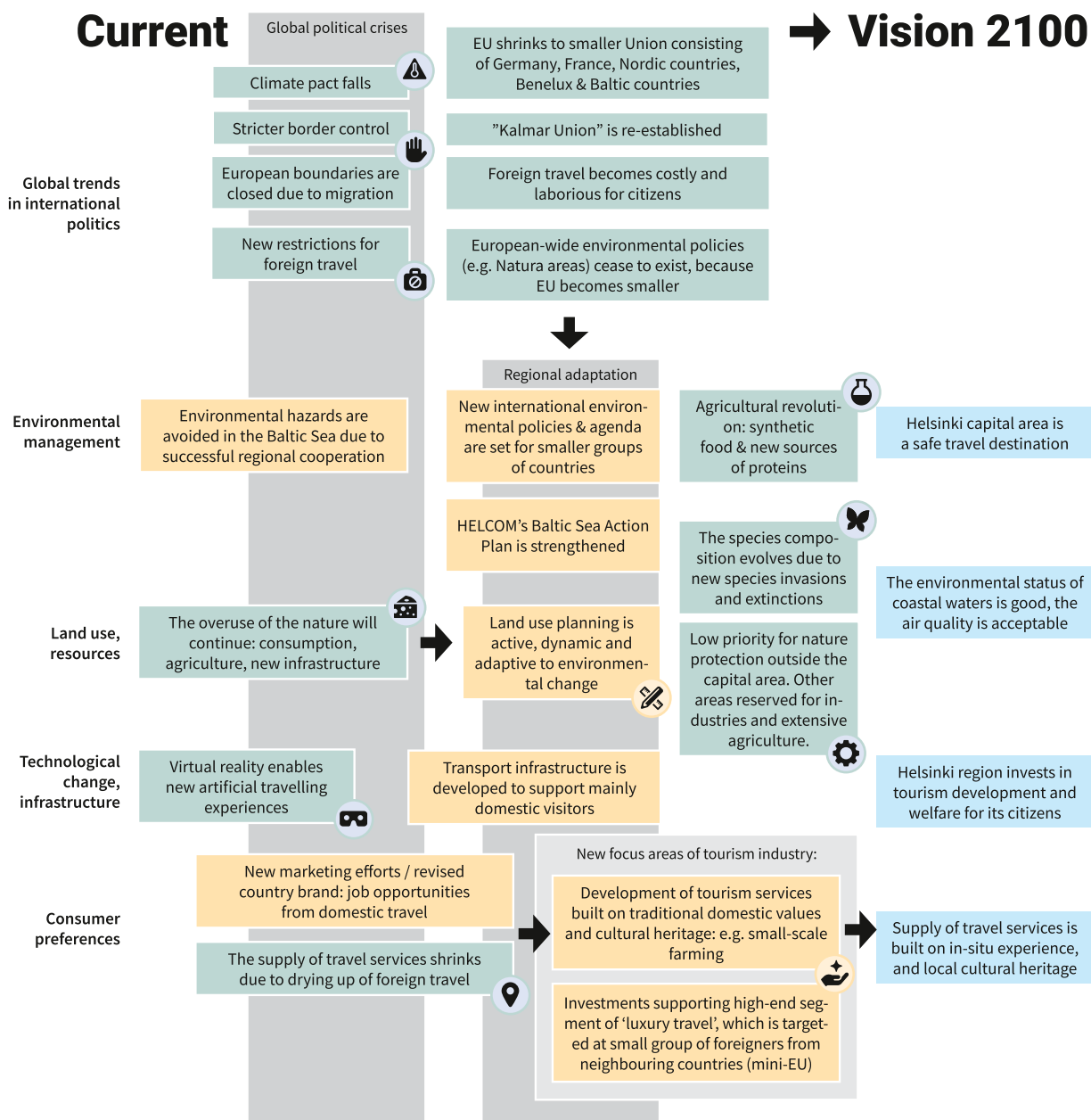
**Fig. 2.** Adaptation pathway for SSP1. The yellow boxes denote new policies, measures or investments. The green boxes denote the consequences of policies and other underlying developments in the drivers of blue tourism (see Table 2). The blue boxes denote the realizations of the vision for blue tourism in the Helsinki area.

the first workshop continued working with the same global SSP narrative.

The participants were provided with a list of guiding questions, addressing the plausible ranges for the volume of the tourism sector, desired visitor profiles, environmental state of the coastal and marine areas, and land use in the future. After that, the group members individually and independently drafted elements that they thought should form part of the vision. Lastly, the group members shared their thoughts within their group, and came up with a shared vision of blue tourism in the Helsinki region. It was pointed out that the vision should be achievable in the context of the global future studied.

#### Task 4. Develop adaptation pathway towards the goal.

To start with, one of the facilitators briefly introduced the idea of backcasting, which begins by defining a desirable future and then works backwards to identify the interventions and investments that would be needed to connect the desired future to the present (Robinson, 1982). Results and visualizations of earlier corresponding projects were shown to the participants for inspiration. Further,



**Fig. 3.** Adaptation pathway for SSP3. The yellow boxes denote new policies, measures or investments. The green boxes denote the consequences of policies and other underlying developments in the drivers of blue tourism (see Table 2). The blue boxes denote the realizations of the vision for blue tourism in the Helsinki area.



the multi-level perspective of technological transitions by Geels and Schot (2007), consisting of three levels – a micro-level of technological niches, a meso-level of socio-technical regimes and a macro-level comprising a socio-technical landscape – was introduced to the participants. They were advised to keep all three levels in mind when building the adaptation pathway to ensure theoretically sound adaptation pathways.

As in the case of task 3, the members of both groups (SSP1 and SSP3) began by developing their ideas in pairs or individually. The group subsequently discussed the suggestions, developed them further, clustered them thematically, and linked elements that had some causal interaction. The suggestions for policy interventions were written on yellow sticky notes and the broader societal developments on green ones. After the second workshop, the facilitators enhanced the adaptation pathways based on the discussions held, and sent the draft canvasses (see the final versions in Figs. 2 and 3) to all participants for comments.

#### Task 5. Policy recommendations.

Based on the documentation of the workshops and the feedback, the facilitators prepared a short leaflet summarizing the outcomes of the co-creation process and outlining the policy recommendations. The recommendations were prepared as desk research by the facilitators and were based on an analysis of those elements of the adaptation pathways that were common to both SSPs. The leaflet was published online and a paper version was shared with the participants of a public briefing reporting the outcomes of the workshops for wider audiences.

## 4. Results

### 4.1. Prioritized drivers of change

Table 1 shows the results of the voting for the most important drivers of blue tourism. Environmental change (changing climate, decline in species diversity, decline of ecosystem resilience) that results from greenhouse gas emissions, land use change and other anthropogenic impacts was the most important driver affecting both the demand for and supply of nature-based tourism experiences. The second most important driver of change was technological development and innovations. The two were also deemed interlinked: for example, it was considered that developments in information technology, robotics and artificial intelligence would make it easier to monitor the movements and ecological footprint of tourists. Developments in information technology enhance the efficient marketing of small destinations globally for various tourist segments, while innovations and new service concepts may speed up the transition towards clean transport.

The direction of global political development strongly affects the next three drivers of change: changes in consumer values, security, and demographic change. Consumer values are reflected in a broad array of choices related to lifestyle, sense of community spirit, and consumer responsibility. Other important drivers include the condition and availability of infrastructure (hotels, roads, natural and cultural sites), destination accessibility from transport hubs (airports, ports, railway stations), economic development and the strength of organizations and institutions that manage and coordinate different actors in the tourism business.

### 4.2. Locally extended scenario narratives

Table 2 provides a short summary of the global developments relevant for the future prospects of blue tourism and locally extended narratives developed by the workshop participants for the drivers of blue tourism. The global developments are abstractions of the narratives of O'Neill et al. (2017), while the workshop participants developed the prospects for demand and supply of tourism services at a local scale. The narratives addressed the coastal zone of Helsinki, but developments at national and wider geographic scales were also discussed. Below, we summarize some of the developments in the main drivers as included in the narratives. The full-length versions of the scenario narratives are presented in the supplementary material.

*Environmental change* is a consequence of several anthropogenic pressures, which are driven by population growth, consumption patterns, consumer awareness and values. It refers to the changing composition of fauna and flora, reduced seasonality, a warming climate, increased or decreased precipitation, and an increased probability of catastrophic climate outcomes. The workshop participants considered the direction of change to be predominantly negative, resulting in impoverished marine fauna, and a reduced number of destinations suitable for blue tourism. The workshop participants regarded climate change as an inescapable future development,

**Table 1**  
Ranking of the most important drivers of blue tourism.

Ranking	Main overall drivers of change	Share of votes
1	Environmental change (climate change, trends in species diversity)	24%
2	New technologies and innovations (virtual reality, digitalization etc.)	19%
3	Changes in values and consumption patterns	12%
4	Security issues (domestic & international) and restrictions to movement and travel	11%
5	Demographic change (population growth/decline, aging)	10%
6	Accessibility, tourism infrastructure	8%
7	Economic growth, distribution of wealth, new concepts of trade and transaction (e.g. sharing economy)	7%
8	Institutions /regulations (mandate and strength of international, national and regional organizations)	7%
9	Education	1%

**Table 2**

Global developments relevant for blue tourism and selected elements of the locally extended scenario narratives.

	SSP1 – sustainable development	SSP3 – regional rivalry, a rocky road	SSP5 – fossil-fuelled development
<b>Global future</b>	Environmental considerations guide national and international policies. UN Sustainable Development Goals have been reached. Societies are open. Inequalities within countries and between countries are small. Consumption focuses on services. Economies grow steadily, but at a moderate speed. International organizations are strong.	Nationalism and protectionism are the guiding principles. Security and self-sufficiency are important national goals. International trade declines. Countries turn inwards economically, politically and culturally. Consumption focuses on domestic products and services. Inequalities within and between countries are high. Economic growth is slow. International organizations are weak.	Reliance on fossil fuels in the energy sector is the guiding principle. The overall demand for goods and services grows. Open societies. Global markets for goods and services. Inequality within and between countries decreases. Migration is common. Economic development is fast. Regulation of polluting industries is low. Investment in treatment technologies is driven by the markets.
<b>Consumer values</b>	Overall sustainability becomes the principal norm. Despite growing consumer individualism, the quest for sustainable lifestyles shapes the forms and limits of free choice and creates new norms.	Consumer preferences are homogenized within countries due to fears fuelled by nationalism and authoritarian rule. Safety and ease of travel drive the choice of destination.	Consumers are ready to make use of virtual reality that enables enjoyment of ecosystems that have already been lost.
<b>Demand</b>	Overall demand for sustainable blue tourism increases. Travelers search for meaningful experiences. The duration of stays is prolonged.	Overall demand for tourism is low and sensitive to economic fluctuations. Domestic travel increases and international travel decreases. The tourism industry serves: (1) domestic travelers, and (2) a small number of international elite travelers.	The aggregate demand for tourism markedly increases due to high global population growth and the increasing purchasing power of consumers. The tourism industry serves (1) international mass tourism, and (2) elite travelers.
<b>Local supply</b>	Number of destinations suitable for blue tourism remains constant or slightly decreases due to climate warming and partial success in climate mitigation and adaptation. Conditions that combine snow, cold (or moderate) weather, clean water and air become globally scarcer. Appreciation of experiences of such environments increases.	The availability of tourism destinations decreases due to climate change, biodiversity loss and declining international travel. However, preserving nature-based destinations makes it possible to meet the increasing domestic demand. Maintaining the current tourism infrastructure will be challenging.	Increasing algal blooms and less clear-cut seasonality reduce the possibilities for nature-based tourism in the Helsinki region. However, the relative competitiveness of high latitude areas increases as relatively clean and calm natural environments become scarcer in other regions.

and the narratives were built based on an assumption about the pace of change. Consequently, the role of environmental policies in mitigating climate change or reducing its impacts on biodiversity and the ecological state of waters varied between scenarios.

*New technologies and innovations* in information technology, GIS, robotics, artificial intelligence and vehicle powertrains will revolutionize the transport sector, environmental monitoring, social and cultural indicators, marketing, as well as the control and monitoring of tourist flows. Under sustainable development (SSP1), new technologies give rise to new services concepts, such as mobility as service (MaaS), which smooth the transition towards small-impact travel. Reduced space in urban environments stimulates the development of small muscle-powered or electric vehicles.

*Changes in values and consumer preferences:* Consumer values vary across the SSPs. Values strongly affect consumer preferences and the choice of destinations. Consumer responsibility is the guiding principle for SSP1, and consumerism for SSP5. In SSP3, authoritarian rule and the fear of external threats, coupled with safety considerations affect consumption intentions: preferences may become more homogenous within countries. Values affect the choice of destination and the type of services in demand. Travel focuses on eco-conscious trips in the case SSP1, on domestic travel in the case of SSP3, and on long-distance, short-duration mass tourism to popular destinations, and elite travel in the case of SSP5.

*Security and safety* issues are major determinants of the tourism industry, particularly in the case of SSP3. Increased cross-border charges and stricter control create barriers limiting international travel. International travel is still possible, but the volumes decrease markedly. International travel remains common between countries that are culturally similar or that belong to the same political coalition.

*Infrastructure and accessibility:* Transport increasingly relies on flying and high-speed train connections between growing cities. The accessibility of tourist destinations depends on connections to the major hubs, and transport system nodes. Shared use of infrastructure (including housing and vehicles) between travelers and the local population allows for the efficient use of resources. Land use plans and marine spatial plans are important instruments in allocating space for tourism activities and for the necessary infrastructure. Leaving coastal areas unbuilt as options for future uses is important for the long-term availability of destinations, particularly for nature-based tourism.

*Demographics:* The birth rate is an important determinant of the future demand for tourism services in addition to economic growth and the evolution of consumer values. Moreover, migration will be a major uncertain factor affecting the amount of labour available for the tourism industry.

*Economic growth and distribution of wealth:* Wealth increases the overall demand for travel services, particularly in SSP5, under which economic growth is fast. With sustainable development (SSP1), economies grow steadily, increasing the demand for low-impact destinations and services in particular. With SSP3, the uneven distribution of income and wealth leads to market segmentation, and the development of different services for mass and elite tourism.

*Institutions:* Due to the considerable diversity and fragmented nature of the tourism sector, strong sectoral institutions are needed for both determining national goals within the sector and monitoring the environmental and cultural footprint of the industry. Joint



efforts are also required in order to make blue tourism destinations better known and to improve the employer brand of the tourism industry.

#### 4.3. Visions

Under SSP1, the long-term vision for the regional development of blue tourism is: *The Helsinki capital area offers meaningful experiences that support sustainable development*. The key idea is that sustainable tourism supports a 'good life' for both visitors and the local population. Sustainable tourism avoids conflicts between locals and tourists, as it provides meaningful encounters between different cultures and promotes intercultural exchange. There was a strong consensus within the group that tourist flows are not harmful in themselves, as long as the provision of tourism services can be organized in an environmentally and locally sustainable manner.

The vision for the more dystopian SSP3 future is: *The Helsinki capital area is a safe, clean and easy tourist destination that encourages the visitor to return to an original and genuine travel experience*. In this future, opportunities for economic and cultural exchange diminish, and the prospects for international tourism are weak. However, Finland and the Helsinki capital area are able to adapt to global developments and focus on the region's strengths to create the best possible conditions for a balanced regional economic structure. The local tourism industry adjusts to changes in changed consumer values: the quest for authenticity and traditional values and the importance of environmental quality in destination choice.

#### 4.4. Adaptation pathways

Figs. 2 and 3 show the adaptation pathways for the SSP1 and SSP3 scenarios, respectively. The pathways consist of new policy initiatives, interventions and investments (yellow boxes); broader developments that follow from the joint impacts of SSP-specific trends and local interventions (green boxes); and final states reflecting both the vision and earlier chain of events (blue boxes for the end of the century). The pathways consist of activities such as management and monitoring programmes, land use plans, investment in infrastructure, developments in the transport network, and adjustments in food chains. The adaptation pathways are also characterized by globally driven changes in consumer preferences, public opinion, technological development and international policies.

In the SSP1 adaptation pathway, blue tourism in the Helsinki area contributes to global goals such as the UN's Sustainable Development Goals by committing to the principles of sustainable tourism. Individual actors in the tourism business gain confidence in that all of the other actors are similarly committed to the principles of sustainable tourism. Sustainability does not turn into a contest between actors and businesses, but the common goal of achieving a sustainable metropolitan area guides decisions. A sectoral institution collects and analyzes monitoring data concerning the ecological, economic, social and cultural sustainability indicators of tourism in a coordinated manner, which allows for evaluation and information sharing. The preservation of natural areas against disruptive uses has a high priority in land use planning. The policies already set by the government and the municipalities are effective and speed up the transition towards zero-emission traffic, an increased role for local food production and environmental education (including lifelong learning). The current negative tourism footprint turns into a positive handprint in the local community. A positive handprint means that tourism enhances and enriches cultural exchange and does not adversely affect the environment.

In the SSP3 adaptation pathway, the Helsinki area is adapting to unfavourable global developments, minimizing disadvantages and taking advantage of new opportunities. International crises are evident and they strongly affect the national adaptation pathway. In the pathway developed by the workshop participants, the European Union splits up into a number of looser coalitions. Most policies are reactive in response to emerging problems. The number of international policies on environmental management decreases and they become less impactful. Global climate action diminishes and the management of international environmental problems becomes more difficult. Due to increasing tensions in the relations between countries, international travel becomes costly and burdensome for travelers. As one adaptation strategy, countries build new tourism infrastructure to serve domestic customers and, in a more limited manner, the diminishing segments of high-income international travelers. In the Helsinki region, tourist attractions emphasize traditional cultural values and cultural heritage. National parks in coastal environments are favoured. The traditional way of enjoying travel services in situ becomes the favoured option again rather than virtual reality and artificial travel experiences.

### 5. Discussion

#### 5.1. Contributions and interpretations

This study introduces an approach for long-term adaptation planning in tourism, a sector that is sensitive to climate change and the state of the natural environment. The approach uses explorative scenarios and normative target seeking scenarios, a combination that contains several innovations. First of all, while trend analyses (e.g. OECD, 2020) and explorative scenarios (e.g. Yeoman, 2012, Draper, Goodman, Hardyment, & Murray, 2009) for tourism do exist, almost none of them are consistent with the dominant narratives used in climate change and global change research, the IPCC's Representative Concentration Pathways (RCPs) and Shared Socioeconomic Pathways (SSPs). The few scenario analyses for tourism that are consistent with the RCPs and/or SSPs, such as Koutroulis, Grillakis, Tsanis, and Jacob (2018) exploration of the vulnerability of European summer tourism, focus on very large areas. This study contributes to the literature on scenario planning in tourism (see also Gössling & Scott, 2012) by extending the global SSPs to develop local explorative scenarios for tourism, based on global drivers. The back-casting technique that is used to identify or construct pathways

towards normative visions follows the work by [Dubois, Ceron, Peeters, and Gössling \(2011\)](#), [Peeters and Dubois \(2010\)](#) and others, who applied back-casting techniques to tourism in the context of sustainability. A new element is the embedding of the visions and the back-casting exercise in the explorative scenarios. Developing normative visions and pathways for tourism that are consistent with the explorative scenarios in which these visions are pursued, improves the visions' consistency and realism.

Specifically, the approach uses selected global futures and the gradual building of co-created knowledge as boundary conditions for each of the consecutive steps in an adaptation planning process consisting of five research tasks. The choices are narrowed down during each subsequent step. Such an approach helps to achieve a high degree of consistency between the global future pathways and the local scenario extensions, facilitates consensus building within the co-creation groups, and helps to implement several participatory research tasks within a limited amount of time.

Working independently, the teams created visions and adaptation pathways that can be interpreted as contingency plans for two distinct global developments. The adaptation pathways are markedly different as they are responses to visions reflecting opposing worldviews and attitudes about the corporate and private responsibility underlying the SSP narratives. At the same time, the pathways include several common elements, which have the potential to be of broader relevance for planning blue tourism in the Helsinki area.

Firstly, both adaptation pathways are characterized by some degree of crisis or 'push' that triggers change. In the SSP3 adaptation pathway, the major socioeconomic paradigm shift results from failed climate negotiations, resulting in a loss of confidence between countries, a decline in trade, and an increased emphasis on regional development. The adaptation pathway under SSP1 includes a small and local environmental disaster that changes people's values and consumption behaviour. Alternatively, the change in values under SSP1 may result from consistent information control or smaller impulses that lead to a more balanced and gradual 'small step' sustainability transition.

Another element that characterizes both adaptation pathways is the belief that public policies are relevant for the development of the tourist industry. In particular, land use planning decisions and infrastructure investments were considered influential. The SSP1 adaptation pathway puts more emphasis on information control, while the SSP3 adaptation pathway emphasizes norm control. The adaptation pathways for the SSP3 scenario also contain policies that directly diminish tourist flows. These include cross-border charges such as airport taxes.

A third common element is that resilient and healthy coastal and marine ecosystems remain prerequisites for successful blue tourism. Hence, the success of cross-sectoral environmental policies is of crucial importance. Sufficient space is needed for both current and future generations of local residents and visitors to enjoy and make use of undisturbed (or hardly disturbed) natural environments. A fourth common element in the adaptation pathways was the notion that the values of consumers, the local population and service providers significantly shape the extended scenario narratives and the adaptation pathways. For example, under the SSP3 adaptation pathway, the quest for genuine nature experiences gradually reduces the demand for artificial digital travel experiences and shapes the services provided. Under the SSP1 adaptation pathway, all of the main actors are deeply committed to contributing to the sustainability transition.

In a way, reality caught up with the scenario making. About half a year after the completion of the workshops, the COVID-19 pandemic triggered a decline in travel and trade, similar to but much more dramatic than the declines triggered by failed climate negotiations in the SSP3 adaptation pathway. International travel quickly dried, but travelling restrictions have also created new opportunities for some companies in catering, housing and tour operators. Easily accessible nature recreation areas and national parks became very popular in Finland during spring and summer 2020, and the number of bookings of summerhouses for the holiday season increased significantly.

One important question is whether and to what extent the existing set of SSPs depict relevant directions of change in the post Covid-19 era. In general, any set of scenarios has a limited shelf-life and will be outdated at some point, after which there is a need for an update or replacement by a new set of scenarios. There is an ongoing debate in the scenario community about the role of discontinuities in general and the specific example of COVID-19. [Raskin and Swart \(2020\)](#) argue that surprises and extreme events such as the COVID-19 pandemic might require new types of scenarios that adequately and more accurately deal with extremes. [O'Neill et al. \(2020\)](#) discuss the implications of COVID-19 pandemic for the SSPs with respect to three types of consequences it may have on societies worldwide. They conclude that the SSP–RCP framework continues to be relevant and is flexible enough to include wildcard events, but monitoring the consequences of COVID-19 will be important for deciding on timing and type of future revisions of the scenario framework.

## 5.2. Comparison with the literature

The literature on the interaction between SSPs and tourism is scarce. [Reimann et al. \(2018\)](#) extended the SSP narratives to population projections in Mediterranean countries and qualitatively assessed the consequences for sea-based and coastal sectors. Their findings regarding the general trends in the overall demand for coastal tourism, changes in the tourist segments (mass tourism, elite tourism, and conscious travel), as well as the intensity of coastal zone management (weak versus strong institutions) were similar to ours across the SSPs studied.

[Tonazzini et al. \(2019\)](#) prepared a set of recommendations for the transition towards sustainable coastal and maritime tourism. Many of their recommendations, aimed at the global scale and at a more general level, resonate well with the recommendations vis-à-vis locally developed adaptation pathways in this study. Both studies emphasize the need to promote policy coherence, active stakeholder collaboration, the creation of a cooperation mechanism, and an ecosystem-based approach to integrated maritime and coastal planning. On the other hand, the stakeholder workshops in this study also included and introduced nuances and details of local importance. For example, the workshop participants identified the sustained availability of sparsely populated, quiet and serene

coastal and marine environments and archipelagos as an important strength for nature-based tourism in the Helsinki region. Consistent land use and marine spatial planning were considered as primary tools for achieving this goal. New constructions are to be allocated to areas that have already been developed. Natural environments should be reserved for non-extractive uses that maintain their potential for blue tourism and other as yet unknown uses.

One important choice in studies that combine adaptation pathways with multiple global futures is whether to develop one common vision for all plausible climate and socioeconomic futures or one vision for each of those futures. In this paper, we made a deliberate choice to develop visions separately for each plausible global future. The tourism sector in one small region and open economy is sensitive to changes in the international policy environment and security conditions. Thus, a vision building on the assumption of continued open markets may not be feasible under other equally plausible futures with more restricted global trade. In contrast, for larger economic regions that are more resilient to global changes, a common vision is well justified. For example, [Frantzeskaki et al. \(2019\)](#) developed transition pathways at the European scale. Exploring multiple sustainability transition pathways to the same desired regional future helped to identify actions and strategies that are robust, in the sense of being effective under a broad range of plausible socioeconomic and climatic conditions.

### 5.3. Feedback and lessons learned

One challenge in planning a co-creation process is to find a good balance between the time and effort requested from stakeholders and the amount of prior desk research. In this study, the stakeholders spent two full working days on workshops. Providing some of the materials in advance (such as a preliminary list of drivers and explanations of the global scenarios) accelerated progress and guided work. The flipside of such a structured co-creation process is that it may constrain the freedom and space for the creative identification of surprising and ‘out-of-the-box’ solutions (Nilsson et al., 2014). Acknowledging this threat, the facilitators encouraged the participating stakeholders to be creative during the workshops.

Another challenge posed by a co-creation process that consists of descriptive tasks (such as a local extension of global narratives) and normative tasks (such as the development of a vision and adaptation pathway) is how to keep these two tasks separate. Several issues that ultimately formed part of the vision or adaptation pathways were already mentioned during early phases of the process. The facilitators made notes on the normative elements when they were first mentioned, and brought them up in the discussion later on. More structured and stricter facilitation would have helped to guide the discussions more efficiently, but may also have constrained the brainstorming and free expression of ideas and emerging issues.

Some workshop participants described feeling an emotional and cognitive load in relation to the different global futures. In general, the participants found it hard to imagine and to become absorbed in global futures that represent extremes within a large set of imaginable and plausible futures. The participants found it relatively straightforward to develop local extensions, visions and adaptation pathways under the SSP1 future (sustainable development), which was regarded by many as a desirable global future. Conversely, the participants found the increased dependence on fossil fuels under the SSP5 future (fossil-fuelled development) difficult to internalize. The workshop participants found it relatively easy, but uncomfortable, to get carried away by the SSP3 (regional rivalry) future.

We presented the results of the workshops in a public briefing in Helsinki in January 2020. The briefing was attended by 36 participants representing media, local tourism industries, research organization, regional and municipal authorities. In addition, we received feedback from discussions raised by two newspaper articles published on the public briefing, a podcast episode prepared on the prospects of sustainable blue tourism and other discussions with stakeholders. The feedback concerned both the co-creation process and the results. According to the comments obtained, the main contribution of the process for the practitioners was that it provided a long-term planning horizon and broad cross-sectoral perspective for planning in a sector that is heavily driven by short-term fluctuations. The tourism sector consists of large number of companies of varying sizes that usually look 1–5 years into the future for their operational planning. Using a long time horizon expands the options to consistently manage infrastructure, nurture craftsmanship and maintain adequate amounts of coastal environments for future uses – all factors necessary for securing the long-term viability of tourism business. Overall, the participants felt strong ownership of the results and motivation to apply them in their organizations.

### 5.4. Policy recommendations

The locally extended socioeconomic scenarios and adaptation pathways that were developed for the coming 80 years gave rise to four recommendations for immediate action. The first two recommendations concern society at large. Firstly, increase efforts to reduce the pollution loads in the sea, both nationally and in cooperation with other countries that share the Baltic Sea coastline, because improving the state of the Baltic Sea and the coastal areas is a prerequisite for the future success of blue tourism in the area. Secondly, preserve untouched coastal area and marine space in order to leave enough space for potential future tourism opportunities, as yet unknown. Use the currently built area efficiently through consistent long-term planning of land use and marine space.

The last two recommendations are directed at the tourism industry. First of all, immediately start with coordinated monitoring and analysis of ecological, social and cultural sustainability indicators for the tourism industry. Coordinated and joint analysis would give the industry a better opportunity to draw initiatives and concerns systematically and clearly into the public debate, and to the attention of policymakers. Secondly, establish a forum in which tourism industry actors can create a common understanding of the conditions of environmental, social and cultural sustainability, of global sustainability as a competitive asset, and of synergies (win-win between actors). Such a forum would provide the basis for a long-term strategy for the industry, and could turn the data from coordinated

monitoring into information, recommendations and action.

## Declaration of Competing Interest

None.

## Acknowledgements

This research has been conducted as part of the BLUEADAPT project, which is funded by the Strategic Research Council of the Academy of Finland (grant number: 312650). The authors warmly thank the workshop participants for devoting their time, effort and expertise.

## Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.futures.2022.102917](https://doi.org/10.1016/j.futures.2022.102917).

## References

- Absar, S. M., & Preston, B. L. (2015). Extending the shared socioeconomic pathways for sub-national impacts, adaptation, and vulnerability studies. *Global Environmental Change*, 33, 83–96. <https://doi.org/10.1016/j.gloenvcha.2015.04.004>
- Cuaresma, J. C. (2017). Income projections for climate change research: a framework based on human capital dynamics. *Global Environmental Change*, 42, 226–236. <https://doi.org/10.1016/j.gloenvcha.2015.02.012>
- Dellink, R., Chateau, J., Lanzi, E., & Magné, B. (2017). Long-term economic growth projections in the shared socioeconomic pathways. *Global Environmental Change*, 42, 200–214. <https://doi.org/10.1016/j.gloenvcha.2015.06.004>
- Draper, S., Goodman, J., Hardyment, R., & Murray, V. (2009). Tourism 2033: Four scenarios, a vision and a strategy for UK outbound travel and tourism. Forum for the Future: London, UK.
- Dubois, G., Ceron, J. P., Peeters, P., & Gössling, S. (2011). The future tourism mobility of the world population: emission growth versus climate policy. *Transportation Research Part A*, 45, 1031–1042.
- Frantzeskaki, N., Hölscher, K., Holman, I. P., Pedde, S., Jaeger, J., Kok, K., & Harrison, P. A. (2019). Transition pathways to sustainability in greater than 2 °C climate futures of Europe. *Regional Environmental Change*, 19, 777–789. <https://doi.org/10.1007/s10113-019-01475-x>
- Geels, F. W., & Schot, J. (2007). Typology of sociotechnical transition pathways. *Research Policy*, 36, 399–417.
- Gössling, S., & Scott, D. (2012). Scenario planning for sustainable tourism: an introduction. *Journal of Sustainable Tourism*, 20(6), 773–778.
- IPBES. (2016). The methodological assessment report on scenarios and models of biodiversity and ecosystem services. S. Ferrier, K.N. Ninan, P. Leadley, R. Alkemade, L.A. Acosta, H.R. Akçakaya, L. Brotons, W.W.L. Cheung, V. Christensen, K.A. Harhash, J. Kabubo-Mariara, C. Lundquist, M. Obersteiner, H.M. Pereira, G. Peterson, R. Pichs-Madruga, N. Ravindranath, C. Rondinini and B.A. Wintle (eds.). Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany. 348 pages. <https://doi.org/10.5281/zenodo.3235428>.
- Jiang, L., & O'Neill, B. C. (2017). Global urbanization projections for the Shared Socioeconomic Pathways. *Global Environmental Change*, 42, 193–199. <https://doi.org/10.1016/j.gloenvcha.2015.03.008>
- Kok, K., van Vliet, M., Bärlund, I., Dubel, A., & Sendzimir, J. (2011). Combining participative backcasting and exploratory scenario development: experiences from the SCENES project. *Technol Forecast Soc Change*, 78, 835–851. <https://doi.org/10.1016/j.techfore.2011.01.004>
- Koutoulis, A., Grillakis, M. G., Tsanis, I. K., & Jacob, D. (2018). Mapping the vulnerability of European summer tourism under 2 °C global warming. *Climatic Change*, 151, 157–171.
- Leimbach, M., Kriegler, E., Roming, N., & Schwanitz, J. (2017). Future growth patterns of world regions – A GDP scenario approach. *Global Environmental Change*, 42, 215–225. <https://doi.org/10.1016/j.gloenvcha.2015.02.005>
- My Helsinki (2020). Think Sustainably – good living in Helsinki. <https://www.myhelsinki.fi/en/think-sustainably/think-sustainably-good-living-in-helsinki> (Accessed 29 June 2021).
- Nilsson, A. E., Bay-Larsen, I., Carlsen, H., van Oort, B., Björkan, M., Jylhä, K., ... van der Watt, L.-M. (2017). Towards extended shared socioeconomic pathways: a combined participatory bottom-up and top-down methodology with results from the Barents region. *Global Environmental Change*, 45, 124–132.
- OECD. (2020). *OECD Tourism Trends and Policies 2020*. OECD. <https://www.oecd.org/cfe/tourism/OECD-Tourism-Trends-Policies%202020-Highlights-ENG.pdf>.
- O'Neill, B. C., Carter, T., Ebi, K., Harrison, P. A., Kemp-Benedict, E., Kok, K., ... Pichs-Madruga, R. (2020). Achievements and needs for the climate change scenario framework. *Nature Climate Change*, 10, 1074–1084. <https://doi.org/10.1038/s41558-020-00952-0>
- O'Neill, B. C., Kriegler, E., Ebi, K. L., Kemp-Benedict, E., Riahi, K., Rothman, D. S., ... Solecki, W. (2017). The roads ahead: Narratives for shared socioeconomic pathways describing world futures in the 21st century. *Global Environmental Change*, 42, 169–180. <https://doi.org/10.1016/j.gloenvcha.2015.01.004>
- O'Neill, B. C., Kriegler, E., Riahi, K., Ebi, K. L., Hallegatte, S., Carter, T. R., ... van Vuuren, D. P. (2014). A new scenario framework for climate change research: the concept of shared socioeconomic pathways. *Climatic Change*, 122, 387–400. <https://doi.org/10.1007/s10584-013-0905-2>
- Pedde, S., Kok, K., Hölscher, K., Frantzeskaki, N., Holman, I., Dunford, R., ... Jäger, J. (2019). Advancing the use of scenarios to understand society's capacity to achieve the 1.5 degree target. *Global Environmental Change*, 56, 75–85. <https://doi.org/10.1016/j.gloenvcha.2019.03.010>
- Peeters, P., & Dubois, G. (2010). Tourism travel under climate change mitigation constraints. *Journal of Transport Geography*, 18(3), 447–457.
- Pilli-Sihvola, K., Haavisto, R., Leijala, U., Luhtala, S., Mäkelä, A., Ruuhela, R., & Votsis, A. (2018). Sään ja ilmastomuutoksen aiheuttamat riskit Helsingissä. City of Helsinki. Kaupunkiympäristön julkaisuja 2018:6. <https://www.hel.fi/static/liitteet/kaupunkiymparisto/julkaisut/julkaisu-06-18.pdf>
- Raskin, P., & Swart, R. (2020). Excluded futures: the continuity bias in scenario assessments. *Sustainable Earth*, 3, 8. <https://doi.org/10.1186/s42055-020-00030-5>
- Reimann, L., Mervens, J. L., & Vafeidis, A. T. (2018). Regionalized Shared Socioeconomic Pathways: narratives and spatial population projections for the Mediterranean coastal zone. *Regional Environmental Change*, 18, 235–245.
- Robinson, J. (1982). Energy backcasting: a proposed method of policy analysis. *Energy Policy*, 10, 337–344.
- Robinson, J. (2003). Future subjective: backcasting as social learning. *Futures*, 35, 839–856.
- Rohat, G., Flacke, J., Dosio, A., Pedde, S., Dao, H., & van Maarseveen, M. (2019). Influence of changes in socioeconomic and climatic conditions on future heat-related health challenges in Europe. *Global and Planetary Change*, 172, 45–59.
- Samir, K. C., & Lutz, W. (2017). The human core of the shared socioeconomic pathways: Population scenarios by age, sex and level of education for all countries to 2100. *Global Environmental Change*, 42, 181–192. <https://doi.org/10.1016/j.gloenvcha.2014.06.004>
- Saraiva, S., Markus Meier, H. E., Andersson, H., Höglund, A., Dieterich, C., Gröger, M., ... Eilola, K. (2019). Baltic Sea ecosystem response to various nutrient load scenarios in present and future climates. *Clim Dyn*, 52, 3369–3387. <https://doi.org/10.1007/s00382-018-4330-0>

- Scott, D., Gössling, S., & Hall, C. M. (2012). International tourism and climate change. *WIREs Clim Change*, 3, 213–232. <https://doi.org/10.1002/wcc.165>
- Swart, R. J., Raskin, P., & Robinson, J. (2004). The problem of the future: sustainability science and scenario analysis. *Global Environmental Change*, 4, 137–146.
- Tonazzini, D., Fosse, J., Morales, E., González, A., Klarwein, S., Moukaddem, K., & Louveau, O. (2019). Blue Tourism. Towards a sustainable coastal and maritime tourism in world marine regions. Edited by eco-union. Barcelona. [https://www.resortsupportfiji.com/wp-content/uploads/2019/07/BUE-TOURISM-STUDY\\_compressed.pdf](https://www.resortsupportfiji.com/wp-content/uploads/2019/07/BUE-TOURISM-STUDY_compressed.pdf).
- Visit Finland (2019b). Visit Finland Brand Tracking 2019. Ipsos. <https://www.businessfinland.fi/4b134d/globalassets/julkaisut/visit-finland/tutkimukset/2019/visit-finland-brand-tracking-2019-ipsos-presentation-pdf.pdf> (accessed 29 June 2021).
- Visit Finland (2019a). Visit Finland Visitor Survey 2018. <https://www.businessfinland.fi/4a3f63/globalassets/julkaisut/visit-finland/tutkimukset/2019/visit-finland-visitor-survey-2018.pdf>.
- Visit Finland (2020). Rudolf-database for tourism indicators in Finland. (<https://www.businessfinland.fi/suomalaisille-asiakkaille/palvelut/matkailun-edistaminen/tutkimukset-ja-tilastot/tilastopalvelu-rudolf/>) (accessed Dec 11 2019/29 June 2021).
- World Economic Forum (2017). The Travel & Tourism Competitiveness Report 2017.
- Yeoman, I. (2012). 2050 – Tomorrow's tourism. Bristol: Channel View Publications.