REPORT ON GENDER-SENSITIVE CLIMATE RISK ASSESSMENTS FOCUSSING ON FILLING THE INFORMATION GAPS AND PRIORITY ACTIONS THAT ADDRESS CLIMATE-DRIVEN VULNERABILITIES AND GENDER-DISAGGREGATED IMPACTS OF THE TOURISM SECTOR

Final draft December 2022

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Acronyms

AST	Adaptation Support Tool
BUR	Biennial Update Report
CC	Climate Change
EC	European Commission
EU	European Union
EEA	European Environment Agency
ETIS	European Tourism Indicator System for Sustainable Destinations
Eurostat	Statistical Office of the European Union
FAOStat	Food and Agriculture Organization of the United Nations Statistical Databases
GDP	Gross Domestic Product
HWDI	Heat Wave Duration Index
IPCC	Intergovernmental Panel on Climate Change
NAP	National Adaptation Plan
NCCC	National Communication on Climate Change
NC	National Communication
NDC	Nationally Determined Contributions
SBUR	Second Biennial Update Report
SNC	Second National Communication
TNC	Third National Communication
TTCI	Tourist Thermal Comfort Indicators
TWG	Technical Working Group
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNWTO	United Nations World Tourism Organisation

Scope of this document

The scope of this document is to identify climate risks, vulnerabilities, and impacts for the Montenegrin tourism sector. The results will form part of Montenegrin climate change response strategies and support the implementation of the country's wider National Adaptation Plan (NAP). Prior to the development of this report, an analysis of the policy framework has been undertaken in order to identify opportunities for mainstreaming climate change into tourism related policies and planning processes.

The report is based on accredited sources from within Montenegro (particularly MONSTAT), peer-reviewed articles from scientific journals, reports from various European agencies, and draws on commentary from global institutions such as UNDP and World Bank. Readers' attention is drawn to the detailed annotated bibliography provided in the early reporting stages of this project for a comprehensive list of sources.

Executive summary

Whilst climate change will have substantial impact on Montenegro's tourism, it provides a significant opportunity for a sectoral re-set and restructure. The chance to take the industry upmarket, and orient it much more tightly towards being an instrument for wider socio-economic goals of rural development, meaningful employment, and greater net contribution to national income.

The purpose of this report is to provide a gender-sensitive vulnerability assessment for tourism in the context of climate change, identifying both observable and potential impacts on tourism and its stakeholders.

Tourism in Montenegro has the potential to re-set its budget 'sun, sea, sand' product which has roots in the historic past and regional geographies: the 'era of mono-structural low-budget tourism' as one report describes it. As an objectively beautiful country with an untarnished reputation in wider tourism markets, it can be much more than a short season 'fly (or drive) and flop' destination.

Climate change will drive changes. These drivers of change/impacts will include an increasing number of days where daily activities (even by the beach) become too hot for comfort, decreasing snow reliability and shrinking winter sport season, diminished landscape aesthetics, and increased extreme weather events. But, it is difficult to discern an overall strategic policy approach to tourism's climate vulnerability, or moves to strengthen resilience.

However, many of these drivers will deliver benefits. The lengthening of the summer season as April/ May and September/ October become warmer and more agreeable to tourists. As the winter season becomes warmer, and snow declines, opportunities for adventure biking, hiking and climbing will increase. The summer season in winter resorts becomes more important and innovation will drive product development into nature-based tourism, thus providing increased employment and entrepreneurial opportunities.

There is a huge amount of regional (Western Balkans), European, and global research on tourism and climate change. What Montenegro lacks is the institutional coordination and infrastructure to analyse these findings for use in effective policy-making (though the present report makes a good start on that). There must be a dedicated tourism research centre created to:

- provide qualitative and quantitative gender sensitive tourism related data to inform policy making, planning and marketing for Montenegro's new tourism including a scientific base for decreasing the problem of seasonality, and as an evidence base for broadening source markets to diminish reliance on lower income countries such as Russian Federation, Bosnia, Serbia, North Macedonia etc.
- nurture communication between the scientific/ research community, public institutions responsible for planning tourism, and the commercial tourism sector
- run the various tourist/ climate/ comfort models provided in this report to better inform commercial product development and tourism policy
- provide a scientific evidence base for various forms of grant application to major lenders and donors

Thus, it can be seen that adaptation and building resilience in climate change calls not only for addressing immediate climate impacts and issues, but for a fundamental shift in the direction of travel for Montenegro's tourism which can be enabled to fulfil its role in leading the way in supporting Montenegro's transition towards a gender responsive, carbon-neutral and sustainable economy.

Future climate projections have been mapped using GIS and show the impact of changing climate on various aspects of Montenegro's tourism and demonstrates the need for change. These changes will also be driven by changing tourist demand as they become increasingly aware of their own need to act responsibly and their consumer and travel choices will reflect this new green thinking.

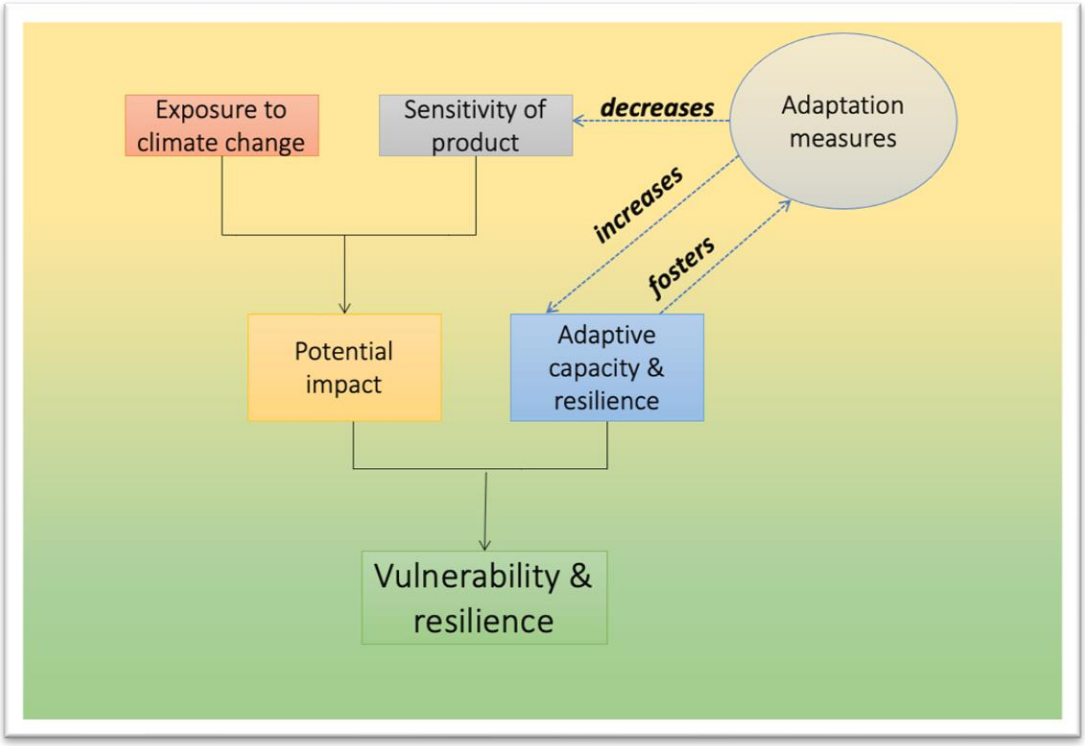
Finally, Montenegro's tourism is not facing an existential threat or disaster. But it must change to reflect the new realities of changing climate, weather patterns, seasonality and consumer choice.

Framework and approach

The framework and approach for climate vulnerability assessment of the tourism sector will be informed and guided by references to tourism in IPCC AR5 and AR6, including:

1. Vulnerability and resilience baseline (in particular, see Table 1, below, and section 4) using existing international, regional, national, and academic reports and papers including expert judgement on tourism sector adaptive capacities and framed by the model developed by Pr. Burns shown in Figure 1)
2. Assessment of the tourism sector resilience by touristic activity (tourism product) as set out in Table 1 (i.e. land-based, water-based, experiential/ culture-based) taking into account, inter alia, various Tourist Thermal Comfort Indicators and sub-sector climate sensitivities
3. Overall, the vulnerability assessment is shaped by Moreno and Becken's five step approach:[1]
    a. system analysis
    b. identification of activity and hazard sub-systems
    c. vulnerability assessments for the different sub-systems at risk
    d. integration for the destination as a whole and scenario analysis and
    e. communication.

Figure 1 Vulnerability and resilience tourism model



1 Moreno, Alvaro and Becken, Susanne(2009)'A climate change vulnerability assessment methodology for coastal tourism', Journal of Sustainable Tourism,17:4,473 — 488 (14)

Table 1 Vulnerability baseline by touristic activity

	Tourism product (seven touristic zones from the 2025 tourism strategy)	Potential climate vulnerabilities/ impacts
NATURAL ENVIRONMENT	**Land-based** • Adventure tourism - rafting, zip line, canyoning, hiking, mountaineering, cycling, etc. hiking and mountaineering, cycling, camping, skiing, horseback riding, hunting etc. • Bird watching • Protected areas (national parks and nature parks) with a diversified offer • Winter tourism - ski centres	**Vulnerabilities** - Flash floods/ thunderstorms/ landslides - More forest fires - Decreased snow cover, increased snow-making costs, decreased ski season - Bird migratory patterns change - Heat makes coastal zone unattractive, reduced biodiversity - Water shortages **Advantages** - Extended spring and autumn hiking/ adventure seasons
	Water/ coastal zone-based • Cruising/ nautical tourism • Swimming/ diving tourism • Fishing and sport-fishing tourism • Protected areas • Sports and recreational tourism (kite surfing, windsurfing, wakeboarding, paragliding and surfing, camps for athletes, sports schools • Health and wellness tourism (Women's beach, healing mud) • Bird watching	**Vulnerabilities** - Algae blooms in lakes - Water temperature changes fish stock profile; reduces biodiversity - Sailing/ yachting dangers from storms and high winds - Bird migratory patterns change - Sea Level Rises (SLR) **Advantages** - Extended spring and autumn seasons
CULTURAL HERITAGE	**Tangible/ experiential assets** • Cultural tourism – museums, castles, religious buildings, archaeological sites, authentic architecture • Touristic village attractions/ annual festivals • Rural tourism - rural households and cottages • Cultural tourism (events, cultural heritage, legends; pirates, slave square, etc.), Spanish author Miguel de Cervantes • Salt in Ulcinj salt works • Gastronomic and wine tourism	**Vulnerabilities** - Archaeological/ outdoor sites too hot to visit comfortably - Food agriculture/ viticulture patterns negatively impacts food and wine - Summer season too hot for rural/ ecotourism villages - Landscape aesthetics diminished **Advantages** - Extended spring and autumn season - Extended specialist food growth season

1. Overview of the characteristics of the sector Tourism in Montenegro

1.1. Geographic profile for tourism

For discussion and reporting purpose, Montenegro can be divided into four touristic regions, which reflects the way in which the tourism sector sees itself for product development and marketing perspectives:

Figure 2 Simple geography of tourism from product development and marketing perspective

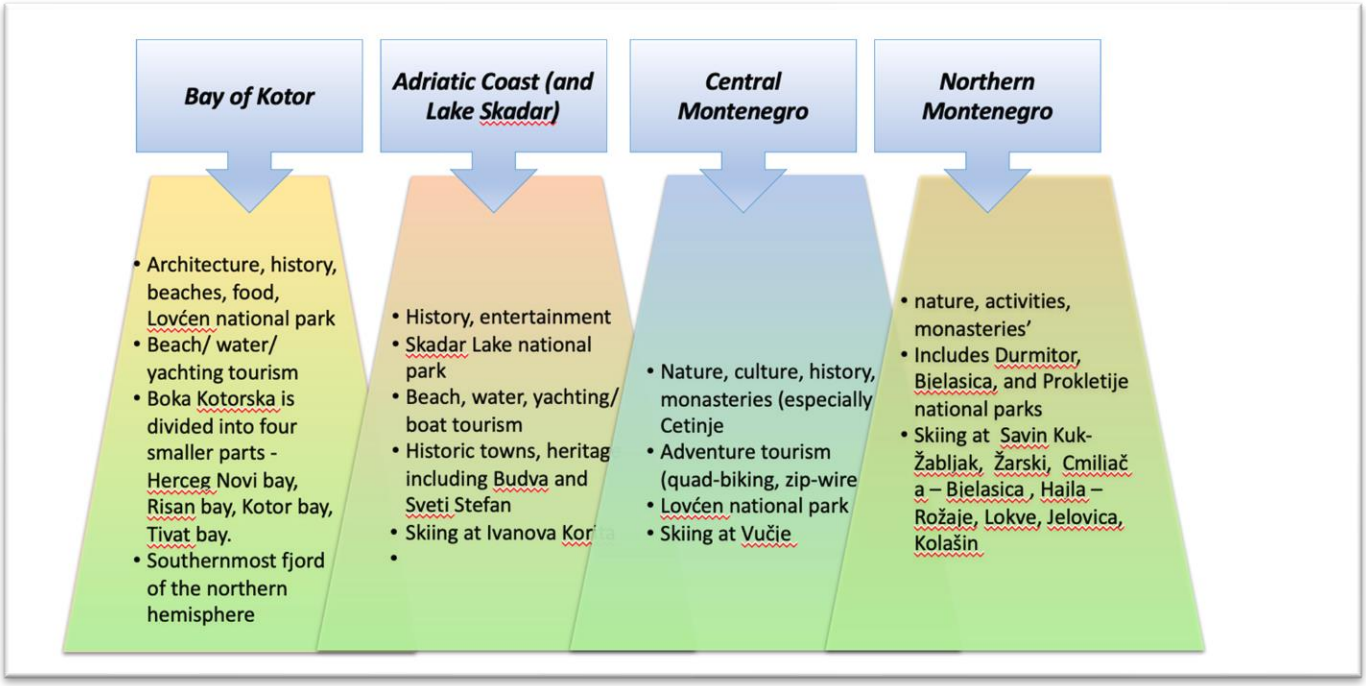


Figure 3 The Dinaric Alps

More specifically, Montenegrin tourism is physically and metaphorically shaped by the Dinaric Alps and the Adriatic coast. The Dinaric Alps run parallel with the Adriatic coast (roughly NW to SE, the so-called Dinaric direction). The Prokletije mountains, which contain Montenegro's newest (2009) national park, Durmitor, are located in the southernmost part of the Dinaric Alps. Durmitor is a UNESCO World Heritage site) containing 48 mountain peaks above 2000m and the Tara Canyon which is the deepest canyon in Europe.

However, it should be noted that UNESCO has reported certain factors that may damage the park: potential development on the Tara River (even a low level threat of flooding parts of the Tara canyon as part of a hydroelectric project across the border on the Republic of Srpska[2],, ski development in the Zabljak/ Savin Kuk area, and boundary/ buffer zone issues.[3]

[2] https://bankwatch.org/blog/drina-dam-groundbreaking-event-met-by-scepticism-and-protests
[3] https://whc.unesco.org/en/soc/4154

The two other national parks are located in, or border the Dinaric Alps: Biogradska Gora (one of the last remaining virgin forests in Europe) and Prokletije (with Zia Kolata being the highest peak in Montenegro; highly biodiverse containing 20% of Balkan flora).[4]

Table 2 National Parks in Montenegrin Dinaric Alps

Name	Main Features
Durmitor	UNESCO - World Heritage List in 1980, - Biosphere Reserve in 1977. Magnificent scenery; glacial features, lakes and valleys; morphological features - mountain ranges and summits rising from high karstic plateaus, deep river canyons; endemic flora and fauna, primeval forests (more than 400 years old, 50 m high trees (spruce, fir, dark-pine, beech); speleological objects, caves, chasms, holes; tourism: mountaineering, speleology. **Tara river canyon** (41 percent of NP surface area) enlisted in UNESCO/MAB, deepest in Europe with 1000-1200 m high sides; crystal-clear water, rafting[5].
Biogradska gora	Situated in NE Montenegro in central part of Bjelasica massif, encircled with mountain summits higher than 2,000 m, streams and valleys[6]. Glacial features, lakes, moraines. Biogradska gora is a primeval forest and strictly protected reserve. Traditional local architecture in villages, katuns (shepherds´ settlements), mills. Close to Tara and Lim rivers.
Skadarsko jezero (Scutari Lake)	Fresh-water fauna and flora; flooded woods of willow and poplar in Bojana/Bune river delta, vast birds nesting areas (cormorant, heron, egret, pelican and other); fresh-river fish; cultural heritage, old monasteries and churches; close to Rumija mountain (mountaineering).
Lovcen	Biodiversity, rare and endemic species; rocky ground, karstic and oromediterranean vegetation; forest reserves (maritime beech-tree); cultural heritage.
Prokletije	The newest of Montenegro's National parks and part of the Dinaric Alps, the Prokletije Range is at the corner of Montenegro, Kosovo, and Albania. The highest point in the country is at the peak of Zla Kolata at 2534 m, though this peak lies partially in Albania. The Montenegrin portion that comprises the national parks is 161 square km[7]. This rugged mountain terrain is known by other names, including the 'accursed mountains' for the jagged edges of the rock formations as well as due to some wildlife such as the endangered lynx. Prokletije National Park is the most biodiverse of all of Montenegro's national parks with 20% of all Balkan flora present.

The Dinaric Alps are important enough to have established a regional network, '**Parks Dinarides'**, of protected areas. The network is dedicated to improving, promoting and supporting natural and cultural values of protected Dinaric regions, and to the implementation of best practices of sustainable development and management. Parks of Dinarides network consists of more than 90 protected areas in Albania, Bosnia and Herzegovina, Montenegro, Croatia, North Macedonia, Slovenia, and Serbia.[8]

Lakes form a significant part of tourism geography in Montenegro being a natural (and in a way, cultural) resource that is utilised by a wide variety of touristic enterprises.

[4] https://meanderbug.com/insiders-guide-to-the-national-parks-in-montenegro/
[5] https://www.summitpost.org/dinaric-alps/155326/
[6] https://www.summitpost.org/dinaric-alps/155326
[7] https://meanderbug.com/insiders-guide-to-the-national-parks-in-montenegro/
[8] https://www.discoverdinarides.com/en/about_us/

If there is to be the necessary shift away from traditional low value 3S tourism (sun, sand, sea) to higher yielding eco or green tourism then lakes will play a fundamentally important part in this. For the shift to high-value tourism that has conservation as well as commerce as a central aim, national parks will play an essential part. Increasing managed tourism to them will help provide the necessary funds to finance conservation and renewal efforts.

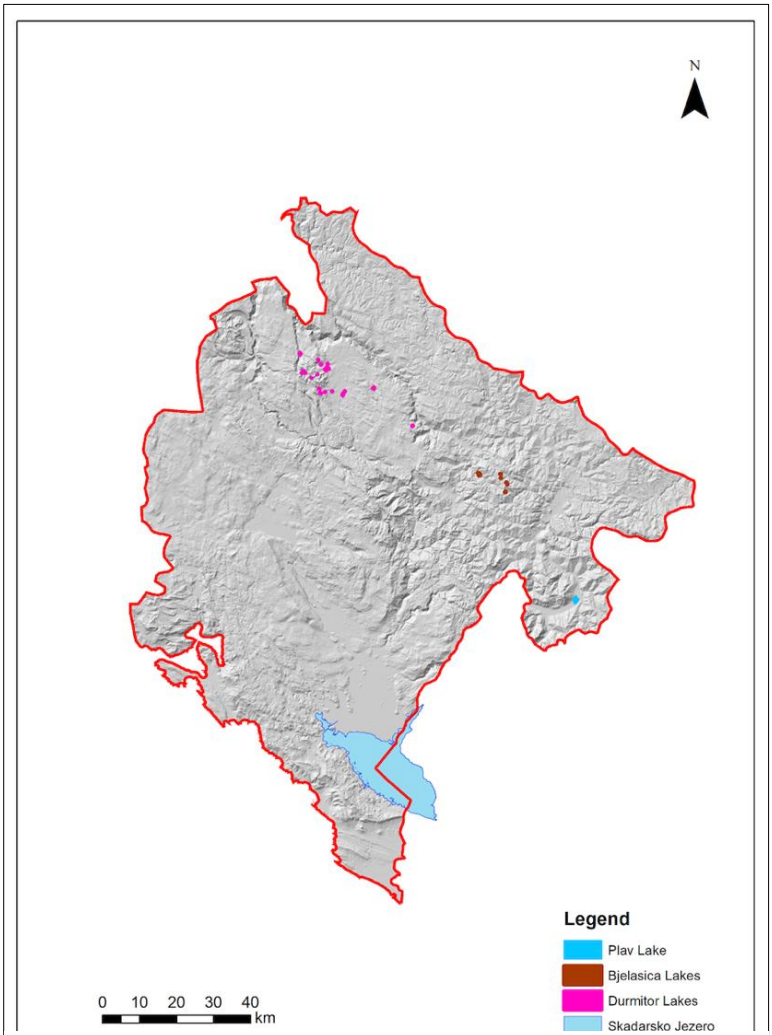


Figure 4 Lakes in Montenegro

As alluded to above, Montenegrin tourism is also geographically defined and shaped by the Adriatic coast (and Lake Skadar). The country has 293 km of Adriatic coastline; its maritime zone extends up to 12 nautical miles offshore covering an area of about 2,500 km^2, with a maximum depth of 1.233 m. The width of the continental shelf (up to 200 m depth) varies along the coast of Montenegro, extending to 9.5 nautical miles at the entrance of the Bay of Kotor, and 34 nautical miles at the River Bojana estuary. The UNEP sponsored MedMPAnet project describes the Montenegrin Adriatic area as follows:

The diversity of geological formations, landscapes, climate and soils, as well as the position of Montenegro on the Balkan peninsula and Adriatic sea, created conditions for formation of biological diversity with very high values, that puts the country among biological 'hot-spots' of European and world's biodiversity. [9]

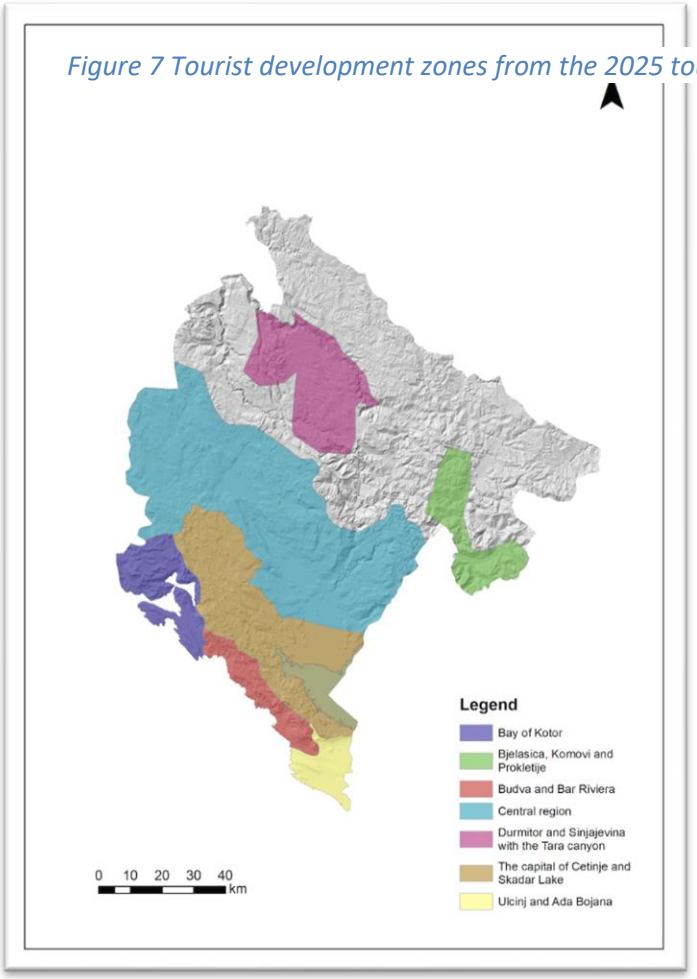
[9] https://www.iucn.org/sites/dev/files/content/documents/2016/en_rac_spa_adriatic_mne_2016.pdf

In protecting this national/ European 'hot-spot' Montenegro's first Marine Protected Area (MPA), **Platamuni Natural Park** was established on 22 April 2021. Platamuni MPA is located in the northwest part of the Montenegrin coast on the open sea, it spreads from Cape Platamuni to Žukovica Bay, somewhat southeast of Buvda - the busiest tourist town on the Montenegrin coast. The area is mostly rocky cliffs, with no beaches, hotels, houses, or infrastructure. It is considered the wildest part of the Montenegrin coast.[10]

Finally, in terms of current national tourism policy planning, the country is divided into seven tourist development zones (broadly following previous planning regimes). These are shown in Figure 5.

Figure 5 Platamuni Natural Park (MPA)

Figure 7 Tourist development zones from the 2025 tourism strategy



[10] https://medpan.org/first-mpa-of-montenegro-declared-on-earth-day/

1.2. Overview of tourism infrastructure

Tourism infrastructure is generally considered to be the physical structures (roads, bridges, water, power, airports etc.), transportation links (trains, buses, trams etc.), and tangible leisure services (ski lifts, hiking trail markers etc.) that provide the substantive framework for tourists, industry, and communities to commercially engage with tourism.

Infrastructure will develop over time (either planned or unplanned), most often at public cost. At best, infrastructure development is part of a wider regional or national scheme underpinned by development objectives, zoning, an understanding of existing visitor experience preferences and emerging touristic trends, carrying capacity management, and resource impacts. At worst, development uses infrastructure to merely open up access to protected areas with no thought to protecting natural resources, cultural, or community stress and climate change mitigation and adaptation.

Typically, especially in the case of Montenegro, peak seasonality issues lead to traffic jams, border crossing hold-ups, airport capacity slow-downs (for example, in 2021 Tivat airport saw a total of 671,333 passenger arrivals, but the difference between calendar quarters (Q1-winter, Q2-spring, Q3-high summer) is immense: Q1 =8,835; Q2 =115,401; Q3 =489,929[11] showing huge seasonality. In addition to mobility issues, water shortages occur in certain areas. Regarding water, the Montenegro National Drought Plan has this to say about water and tourism:

> *"… The entire tourism industry is highly dependent on climate and climate change, and expected drought could make it difficult to function and plan in tourism. Drought can affect natural habitats and biodiversity, which are the main attraction of Eco tourists and nature lovers, and biodiversity loss would* ***dangerously jeopardize eco-tourist attractions.*** *Increased temperatures will affect activities of tourists that are related to the environment, such as birds watching and hiking in nature. The change in the amount of precipitation and the hydrological cycle can affect the availability and quality of fresh water sources at the touristic destination. Also, drought can affect river flows and lakes level, which includes* ***further impacts on recreational activities on the beach and sport fishing****…"*[12]

Montenegro has a high number of land and sea border crossings from neighbouring countries by various modes:

- **Road:** with Serbia (Ranče, Čemerno, Dobrakovo, Dračenovac, Vuče), with Kosovo (Kula), with Albania (Božaj, Sukobin, Grnčar), with B&H (Sitnica, Ilino brdo, Vraćenovići, Krstac, Nudo, Šćepan Polje, Metaljka, Šula), with Croatia (Debeli brijeg, Kobila);
- **Rail:** Railway stations Bijelo Polje and Tuzi;
- **Sea:** Seaports of Bar, Budva, Kotor, Zelenika, Kumbor (Portonovi).[13]

However, airport infrastructure remains the key to tourism arrivals. The following table provides an overview of Montenegrin airports and aerodromes:

[11] https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do
[12] https://knowledge.unccd.int/sites/default/files/country_profile_documents/MONTENEGRO%20NATIONAL%20DROUGHT%20PLAN.pdf (Section D page 48)
[13] https://www.montenegro.travel/en/info/border-crossings-and-visas

Table 3 Airports of Montenegro

Airport	IATA/ ICAO	(Description)	Passenger numbers (where available)		
			2019	2020	2021
Tivat	TIV/ LYTV	Mainly seasonal (80% of the traffic is concentrated in the summer period), Tivat airport is 8 km from Kotor and 20 km from Budva. With the opening of Porto Montenegro and the introduction of other high-end tourist services, the airport increasingly caters to business jets[14]. The passenger terminal is a bottleneck in peak summer months[15]. Thus, a new passenger terminal is planned along with expansion of airport facilities. The Adriatic Highway road (E65/E80) passes right by the passenger terminal, making it easily accessible from the entire northern part of Montenegrin coast. *It should be noted that in 2019, prior to the Covid 19 pandemic and prior to the Russia-Ukraine conflict, 511,692 of its passengers were direct from 3 airports in Russia*	1,367,282	189,815	671,333 (Q1 =8,835 Q2 =115,401 Q3 =489,929[16] = **extreme seasonality)**
Podgorica	TGD/ LYPG	Considered the main airport, it is situated 11 km (6.8 mi) south of central Podgorica, in the Zeta Plain. An entirely new passenger terminal was opened on 14 May 2006, while the old passenger terminal underwent reconstruction and refurbishment in 2009 (now often used for VIP). The airport is accessible by the Podgorica – Bar road (E65/ E80), via a short detour. A stretch of this road, from Podgorica to the airport, has been upgraded to expressway standard. A drive from the city centre usually takes less than 15 minutes.	1,297,365	n.a	Incomplete data, BUT: 2021 Q1=56,807 Q2=105,184 Q3=307,646[17] = **extreme seasonality**
Berane	IVG/ LYBR	The airport does not have any fuel facilities. The hangar space is in poor condition and the passenger terminal is in disrepair. No landing or apron lights, no boundary fence nor navigational aids. Locals regularly gather on the runway which is a popular location for drag races and numerous accidents have occurred. The airport is used occasionally by light aircraft. There was a short debate whether Berane Airport should be invested in and possibly revitalized as an international airport. Berane city officials, as well as general public in north eastern Montenegro, favour the reconstruction, saying that such investment would create new jobs; government, not so much. However, the runway requires an extension in order to attract low-cost flights. The proposed length should be 2500 m from current 1900 m	n.a	n.a	
Niksic	--/ LYNK	Serves mostly as a glider/ sport airstrip for the local aviation club. It hosted the 2010 FIA World Parachuting Championships, and its runway was asphalted, with length increased to 1,450m But there is no passenger terminal. It is located slightly west of the centre of Montenegro	n.a	n.a	
Žabljak	ZBK/ --	Located in the ***Žabljak*** Municipality in north-west Montenegro and very close to Durmitor national park. It can only be used for light aircraft.	n.a	n.a	
There is also Špiro Mugoša Airport near to Podgorica, but its 800 m runway cannot serve larger aircraft. Auero clubs Špiro Mugoša and Špiro Podgorice currently operate the airport, and organise parachuting, gliding and other air sports activities and training.					

[14] https://www.wikiwand.com/en/Tivat_Airport

[15] https://www.airports-worldwide.com/montenegro/tivat_montenegro.php

16 https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do

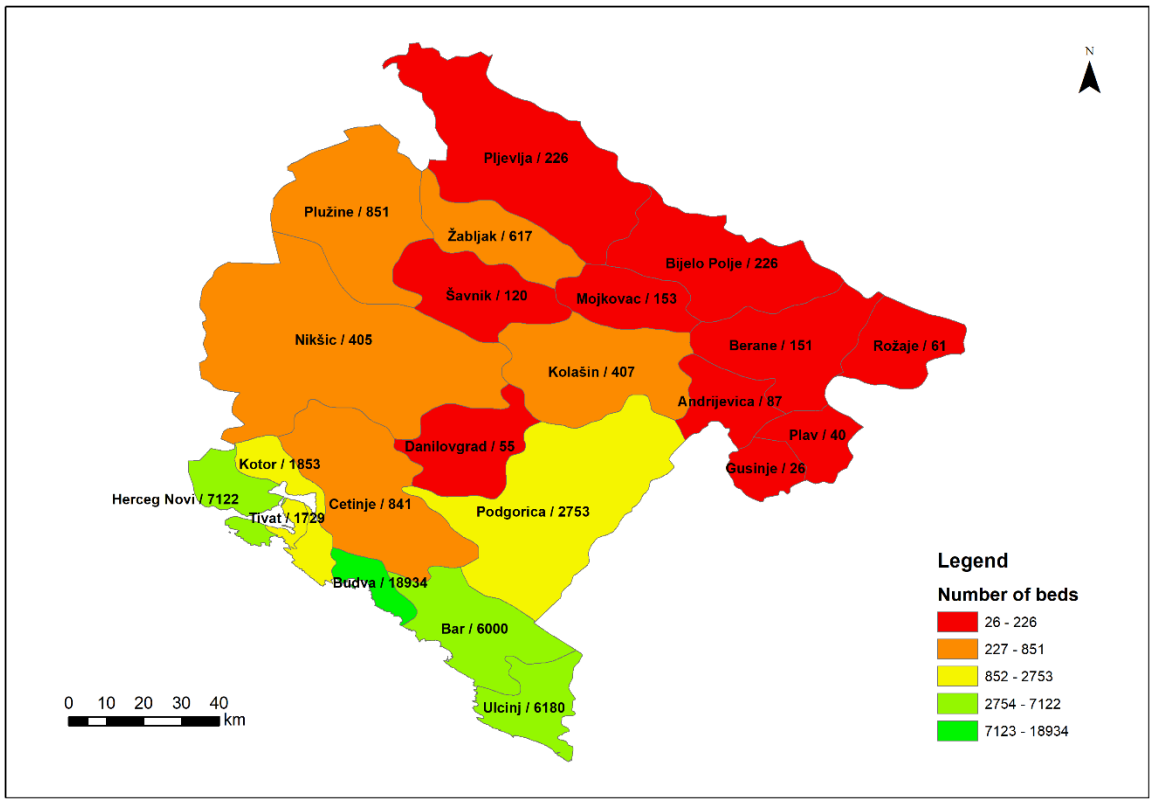
17 https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do

Physical infrastructure in the form of trail markers, a limited number of snow-making machines, and, more significantly, ski lifts[18] are an essential component of the relatively small but important part of Montenegro's domestic and international tourism: winter sport – especially skiing and snowboarding.

Whilst tourist accommodation is not technically 'infrastructure', they do represent an essential component of touristic superstructure, and on this basis, it is worth including a map of where accommodations (bed count not individual establishments) are located by municipality (Figure 8).

It is important to emphasise that the data in Figure 8 represent formal hotel accommodation only. There is a large and dynamic sub-sector providing camping, AirBnB, informal apartment holiday lets, rooms etc.

Figure 8 Tourist accommodation beds (in hotels) per municipality



1.3. Socio-economic trends in the sector

Given the natural, cultural, historical and other factors, tourism in Montenegro is an activity of paramount importance for economic development. On the other hand, tourism as an activity has multiplier effects on economic development, so its contribution to GDP or employment should not be discussed in isolation.

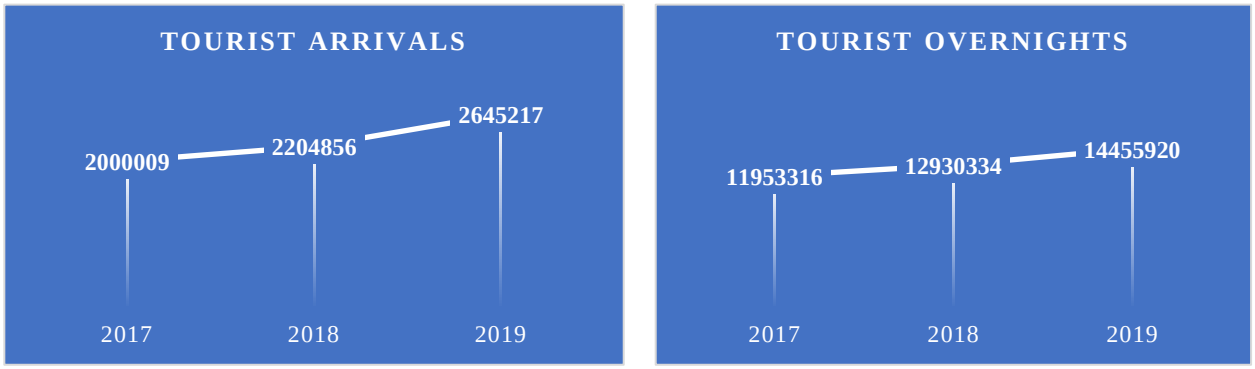
Development of the tourism sector in Montenegro, through investments in increase and improvement of accommodation capacities, increase of accessibility by air, development of infrastructure in ski centres and the availability of other tourist facilities, makes a significant economic contribution. In

[18] https://www.skiresort.info/ski-resorts/montenegro/

2019, according to Monstat data, the number of tourist arrivals and overnight stays increased for the tenth year in a row.[19] At the same time, a record growth rate of arrivals of 20% was recorded, compared to the previous year. Namely, 2.6 million tourists visited Montenegro, with the number of domestic tourist arrivals increasing by 5.9% and the number of foreign tourists by 20.8%. According to the structure of arrivals, places on the coast are still the most visited with 85.8% of total arrivals. The number of tourists on the coast was 21.2% higher than in the previous year, and the number of visits in other places increased by 73.6%, in the capital by 9.6%, in other tourist places by 15.6%. % and in mountains by 15.9%. In the total overnight stays, 94.9% referred to coastal places, while the capital was represented with 2.1%, mountain places with 1.8%, other tourist places with 1% and other places with 0.2%[20].

Given the health situation in the world during 2020, caused by the COVID 19 virus, which significantly affected the tourism sector, 2020 can in no way be considered a representative year for Montenegrin tourism. For this reason, most of the comparisons were made compared to 2019, although data for 2020 are also available.

Figure 9 Total number of tourist arrivals and overnight stays, Montenegro



Source: Statistical Office of Montenegro (Monstat)

As data on total tourist turnover are not available, except for collective accommodation, it is noted that, according to MONSTAT data, in 2020 there were 79.2% fewer arrivals and 79.8% fewer tourist nights than in 2019 (in collective accommodation which includes hotels, boarding houses, motels, tourist resorts, resorts, hostels, camps, etc). Collective accommodation does not include individual, so-called "private accommodation" (accommodation in houses and rooms for rent, as well as in tourist apartments)[21]. Negative impact of COVID-19 pandemic was most felt in the sector of tourism and related activities.

The accommodation and food services sector includes the provision of accommodation services for shorter stay of visitors and other travellers, as well as the preparation of meals and beverages for immediate consumption.

[19] Data on total arrivals and overnight stays in Montenegro are published in June of the current year for the previous year. Data for 2020 will be available in June 2021. On a monthly basis, Monstat publishes data on arrivals and overnight stays in collective accommodation.

[20] Central Bank of Montenegro
https://cbcg.me/slike_i_fajlovi/fajlovi/fajlovi_publikacije/godisnji_makro_izvjestaj/2019/realni_sektor_2019.pdf

[21] https://sale-me.com/en/new/v-ijune-277-47-tys-nochevok-82.html

Table 4 - Number of employees, sector - Accommodation and food services, 2009 - 2019

	Number of employees in accommodation and food services	Total number of employees in Montenegro	% participation of employees in accommodation and food services
2009	16,678	174,152	9.6
2010	13,131	161,742	8.1
2011	12,429	163,082	7.6
2012	13,209	166,531	7.8
2013	14,333	171,474	8.3
2014	14,182	173,595	8.2
2015	14,393	175,617	8.2
2016	14,684	177,908	8.3
2017	15,033	182,368	8.2
2018	16,024	190,132	8.4
2019	18,350	203,545	9.0

Source: MONSTAT[22]

The analysis of data on the number of employees (Table 4) confirms the fact that tourism is an economic activity that is extremely sensitive to crisis situations. Specifically, during 2010-2011, i.e., in the period marked by the global economic crisis, there was a decrease in the number of employees in the accommodation and food services sector, so that in 2011 there were 25.5% fewer employees compared to 2009. Period 2012-2019 is characterized by continuous growth in the number of employees in this sector. The crisis situation caused by the COVID-19 pandemic has caused a new decline in the number of employees in 2020 by 27.4% compared to 2019.

Internationally, the tourism sector has a long standing reputation for informal employment practices (colloquially known as cash-in-hand employment). This phenomenon has been explored at a European level by Williams and Horodnic (2020.)[23] Such undeclared work has a number of reasons that are often framed by complex social and personal economic problems. Whilst the numbers are not known, it can be assumed that in common with many other parts of Europe, "14 % of workers in the accommodation and food services sector are in unregistered employment (compared with 5 % of the overall EU workforce). 12 % of all unregistered employment in the EU is in this sector…"

Regarding the average **earnings in tourism**, MONSTAT monthly reports include companies, institutions, cooperatives or organizations of all forms of ownership, as well as their units within, according to the organizational-territorial principle, starting from the municipal level.

In accordance with legal regulations, the employee's salary is gross salary which includes salary for work performed and time spent at work, increased salary, salary compensation and other personal income, which are subject to personal income tax, determined by law, collective agreement and work contract. The average salary is calculated by dividing the amount of total paid salaries in the month by the number of employees to whom the payments are made and the results can be seen in Table 5.

22https://monstat.org/cg/page.php?id=23&pageid=23; https://www.monstat.org/uploads/files/Bilten/2021/2/3.pdf

23 Williams, C., Horodnic, I. (2020) Tackling undeclared work in the tourism sector. A report of the work programme 2019-2020 of the European Platform tackling undeclared work established through Decision (EU) 2016/344.

Table 5 Average net and gross earnings, sector I-Accommodation and food services, 2015-2020 (in euros)

	Net earnings sector I	Net earnings Montenegro	Gross earnings Sector I	Gross earnings Montenegro
2015	405	480	605	725
2016	388	499	580	751
2017	388	510	580	765
2018	415	511	621	766
2019	429	515	642	773
2020	392	524	589	783

Source: MONSTAT[24]

1.4. Sectoral trends

The 2021 season delivered good results considering the circumstances (see Table XXX). 1,670,879 tourist arrivals were registered, (276.3% more than in 2020; 63.1% compared to 2019). In the same period, there were 9,872,573 overnight stays (281.5% more than in 2020; 68.3% of overnights recorded in 2019). Foreign tourists accounted for 95.5%, of overnight stays.

In 2021, 117,321 domestic guests were registered (an increase of 25.79% compared to 2020; 86.53% compared to 2019). A total of 448,770 domestic overnight stays were registered, an increase of 24.41% compared to 2020 (85.91% compared to 2019), with an average tourist stay of 4 days.

During 2021, 1,553,558 foreign guests arrived, an increase of 342.87% compared to 2020 and an achievement of 61.90% compared to 2019, with 9,423,803 overnight stays of foreign tourists, which represents growth of 323.25% more than in 2020 and an achievement of 67.63% compared to 2019, with an average tourist stay of 6.06 days.

Table 6 Number of tourist arrivals and overnight stays during 2019, 2020 and 2021

Tourists/ overnight stays	2019	2020	2021	Index 21/20	Index 21/ 19
Tourists	2,645,217	444,065	1,670,879	376.27	63.17
Domestic	135,592	93,270	117,321	125.79	86.53
Foreign	2,509,625	350,795	1,553,558	442.87	61.90
Overnight stays	14,455,920	2,587,255	9,872,573	381.58	68.29
Domestic	522,382	360,729	448,770	124.41	85.91
Foreign	13,933,538	2,226,526	9,423,803	423.25	67.63

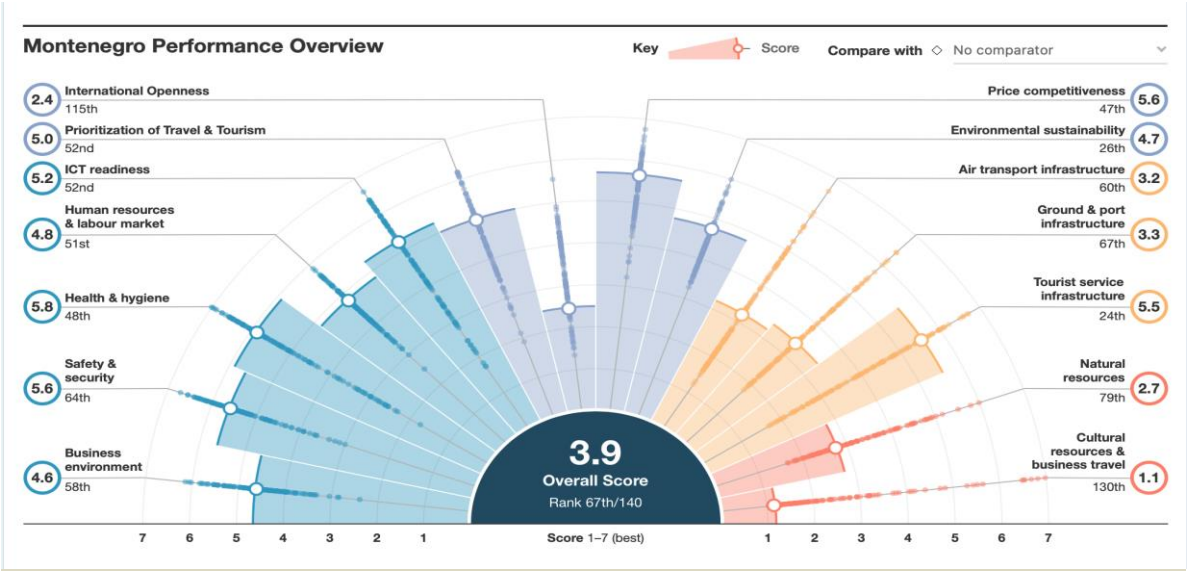
Source: MONSTAT

The World Economic Forum places pre- pandemic tourism in Montenegro in the mid-range of global competitiveness[25] (a useful baseline for considering future tourism in Montenegro) and can be seen in **Error! Reference source not found.**:

Figure 10 Montenegro Tourism Competitiveness Performance Overview (2019- pre-pandemic)

[24] *https://monstat.org/cg/page.php?id=24&pageid=24; data 2020 for https://monstat.org/cg/page.php?id=1743&pageid=246*

[25] http://reports.weforum.org/travel-and-tourism-competitiveness-report-2019/country-profiles/#economy=MNE



The World Travel and Tourism Council also provide a snapshot of the impact of the pandemic[26] (**Error! Reference source not found.**):

Figure 11 Pandemic Impact on Montenegrin Tourism (2019-2020 compared)

Error! Reference source not found. was derived using MONSTAT data and shows some structural changes to tourism. The changes (nationality of tourists, where they choose to stay) may be attributed to lingering effects of Covid and similar changes are expected to happen in the following period having into consideration the War in Ukraine which started in February 2022.

[26] https://wttc.org/Research/Economic-Impact

Table 7 Structural Changes to Overnight Stays Patterns (2019 – 2021 compared)

MONSTAT Release 36/2 (data for 2019)	MONSTAT Release 21/2 (data for 2020)	MONSTAT Release 20/22 (data for 2021)[27]
14,455,920 overnight stays; 2,645,217 arrivals	2,587,255 overnight stays; 444,065 arrivals	6,923,733 overnight stays; 940,456 arrivals
Structure of overnight stays of foreign tourist: Russian Federation (24.9%) Serbia (21.4%) Bosnia and Herzegovina (8.5%) Kosovo (5.4%) Germany (4.6%) Ukraine (3.3%) France (3.1%) United Kingdom (3.0%) Other countries (25.8%)	**Structure of overnight stays of foreign tourists:** Serbia (20.2%) Russia (17.7%) Bosnia and Hercegovina (15.2%) Ukraine (8.5%) Albania (6.7%) Kosovo (5.8%) Germany (3.3) Belarus (2.8%) Other countries (19.8%)	**Structure of overnight stays of foreign tourists:** Serbia (34.2%) Russian Federation (14.6%) Bosnia Herzegovina (14.5%) Ukraine (8.2%) Kosovo (4.8%) Germany (3.7%) Poland (2.0%) North Macedonia (1.8%)
Overnight stays by type of resort: Seaside resorts (94.9%) Capital (2.1%) Mountain resorts (1.8%) Other tourist resorts (1.2%)	**Overnight stays by type of resort:** Seaside resorts (90.4%) Capital (3.2%) Mountain resorts (3.2%) Other tourist resorts (3.2%)	**Overnight stays by type of resort:** Seaside resorts (97.3%) Mountain resorts (1.6%) Other tourist resorts (1.0%) Capital 0.2%)

Pre-Covid data remains useful for seeing where tourists go (municipalities) within Montenegro.[28] Budva had almost 900,000 tourist arrivals in 2018, followed by Herceg Novi and Ulcinj. Six municipalities of the coastal region comprise 85%, and the Capital City of Podgorica comprises 8% of the total tourist arrivals.

Winter-tourism centres, Kolasin and Zabljak, record a significantly higher number of tourists than the rest of the northern region, comprising 72% of total tourist arrivals in the north. Data per top municipality for 2021[29] can be seen in Figure 13.

[27] http://monstat.org/uploads/files/TURIZAM/ind/2021/Arrivals%20and%20overnights%20%20of%20%20tourists%20%20in%20individual%20accommodation%202021.pdf

[28] https://adriaticappraisal.com/wp-content/uploads/2019/10/19Q2_Tourism-and-seasonality-overview_Montenegro_Adriatic-Appraisal.pdf (data for 2018)

[29] http://monstat.org/uploads/files/TURIZAM/ind/2021/Arrivals%20and%20overnights%20%20of%20%20tourists%20%20in%20individual%20accommodation%202021.pdf

Figure 12 Tourist arrivals and overnights per top six municipalities in 2021, in %

The analysis above sets the scene for describing how different geographic locations in Montenegro will be affected by different types of climate change manifestations (obviously sea level rises (SLR) for the Adriatic coast and decreasing snow stability/ reliability in the mountainous regions such as Durmitor).

2. Overview of the climate adaptation planning processes in Montenegro

2.1. Overall climate adaptation planning process in Montenegro

The assessment of climate adaptation in the relevant sectoral and climate protection legislation has concluded that there is no legally established framework for climate adaptation planning in the country, despite the existence of various Laws and planning processes that somehow relate to climate change adaptation. The assessment has resulted in the following specific conclusions:

- The Law on climate protection of Montenegro (Article 5) recognises the National Adaptation Plan (in the further text NAP) as basis climate planning instrument and defines the minimum content of the NAP.
- According to the prescribed minimum content of the NAP in the Law (Article 9), the NAP would also need to define the institutional framework for climate adaptation in the country.
- The Law doesn't prescribe mechanisms for cross-sectoral policy alignment and mainstreaming of the adaptation priorities in the sectoral policies and plans.
- The Law doesn't prescribe climate change coordination mechanism as for example National Climate Change Committee, Climate Council or Sustainable development council.
- The Government of Montenegro (GoM) supported by international organisations have taken steps to develop a long-term adaptation planning process in the process of the preparation of the National Climate Change Strategy by 2030 and the preparation of the Third National Communication. However, all these processes have been project based and haven't been institutionalised and legally established.
- The National Climate Strategy by 2030 has been prepared in 2013 and its content is not aligned with the latest EU requirements for long term strategic planning for climate action defined in the Regulation 1999/2018 (the Energy Governance Regulation).
- Despite the fact that the National Climate Strategy by 2030 has adaptation aspects into its content, the document only provided an overview of the internationally recommended approaches for climate adaptation, and provides information on the preparatory elements and the processes essential for the development and implementation of the NAP. The table containing the preparatory elements and the process for development and implementation of the NAP is well elaborated, but it is general for all sectors and it doesn't set clear responsibilities for specific institutions, timelines and institutionalised coordination mechanism needed for implementation of such steps in a form of a specific action plans.
- In addition, the National Climate Strategy by 2030 provides an overview of the proposed adaptation measures by sectors as defined in the draft Second National Communication, which are no sufficiently described and the process of identification of the vulnerabilities and definition of this measures is not elaborated.
- The TNC of Montenegro prepared in 2020 in its Sector vulnerability and adaptation analysis provides very clear recommendation that the priority activity for climate adaptation is the strengthening of the strategic planning for climate change adaptation at the local and regional levels, as well as in the sector-level planning process. In addition the TNC

recommends this to be accomplished through the development of action plans for climate change adaptation at the local and regional levels, development of action plans for climate change adaptation of vulnerable sectors, integration of adaptation measures in strategic and development documents, preparation of plans for the prevention of climate change impacts in sectors vulnerable to climate change, and through the development of methods and standards for implementation of adaptation measures. Also, an additional proposed measure is strengthening of local and regional governments and other relevant national, regional, and local stakeholders regarding climate change adaptation. These measures are very valid, but again, they don't describe and prescribe the national coordination mechanism for climate adaptation, the legal and the institutional aspects for establishment of such mechanism, as well as the processes and the responsibilities for climate change adaptation on national and local level.

- Despite the fact that in the framework of the TNC a vulnerability assessment and adaptation measures for all priority sectors has been done, the adaptation planning process done in the framework of the preparation of the TNC is not prescribed and responsible stakeholders and processes for coordination, elaboration, implementation and monitoring of the climate adaptation are not defined.

- Montenegro's Updated NDC provides a development framework and guidance for more ambitious adaptation goals to be developed under the project "Enhancing Montenegro's capacity to integrate climate change risks into planning". According to the Updated NDC, the goals defined by the NDC will have a clear effect on project activities focusing on addressing the gaps of an underperforming coordination framework, the lack of institutional capacity, the insufficient information and lack of finance to fund adaptation investments and will also improve the capacity of the private sector to understand and respond to climate vulnerabilities and risks.

Taking into consideration all conclusions listed above, one of priorities of the NAP Project should be to define, legally regulate and institutionalise the national climate adaptation planning processes.

2.2. Assessment of the sectoral climate adaptation planning process relevant for the tourism sector in Montenegro

There is no formally established climate adaptation planning process relevant for the tourism sector. The coordination and the adaptation planning are done on an ad-hock or project driven bases, with no clearly defined stakeholders, roles and responsibilities.

Below this text is a list of policy documents for the tourism sector and an overview of the climate change consideration in this specific documents.

Touristic Master Plan for Montenegro

Tourism planning in 21st century Montenegro has followed a familiar pattern with a series of tourism master plans starting with the 2001 Touristic Master Plan for Montenegro (facilitated as part of the 'integrated overall regional approach to reorganising and developing tourism in Croatia and Montenegro'). Its focus was on increasing hotel bed numbers, higher accommodation standards leading to what it described as 'high quality Majorca' fun in the sun for 'summer bathers' but with increasing attention to 'culture-nature' tourism. The big challenge for that period was trying to emerge

from the 'era of mono-structural low-budget tourism' (Yugoslav era hotels with quantity not quality as the priority) with a focus on developing Western and Northern European tourist markets. The starting point at this time being very low with 'Just 1-3,000 of 26,000 available hotel beds are suitable for the international market. This accommodation focus was balanced with a 'five regions' approach where five touristic regions would have their own plans. Two of these regional Masterplans were prepared by DEG, in cooperation with Montenegrin experts and the Ministry of Tourism, in 2003 – for Boka Kotorska and Velika Plaža at Ulcinj.

The plan contains an overview of problems facing the nascent industry, product development strategies, investment incentives, market intelligence, and three pilot schemes "…we propose the three regions whose sustainable development is key for the positioning and long-term economic success of Montenegro's tourism:

- Ulcinj – as a high-quality beach/bathing resort
- Boka Kotorska/Herceg Novi – as an exclusive individual resort
- Skutari Lake – as a touristic-rural landscape park…"

The plan finished with short (2002), medium (2005/10), and long term (2020) measures and actions which included infrastructure, product diversification, and touristic development zones.

Whilst taking care of the environment was acknowledged, as was typical at the time, little mention was made of sustainability (apart from a negative comment "…Environmental awareness is not a competitive advantage, because all providers include sustainable tourism as a component!").

Montenegro Tourism Development Strategy to 2020

The Montenegro Tourism Development Strategy to 2020 was prepared by the Ministry of Tourism and Environment with support from BMZ), DEG, GTZ, and international market expertise from CREATOP-Creative Tourism Projects.

This is a well prepared, ambitious plan for tourism to 'ultimately serve as the engine of sustainable growth….' With product diversity/ product differentiation and sustainability as the twin pillars of its thinking. Tourism product identity (which gives a clear message to the market) features the 'Wild Beauty!' logo.

The plan created a clear vision for tourism and pathways to achieve it.

Unlike the previous plan's somewhat dismissive discussion on sustainability, the 2020 plan says "…The all-embracing principle of sustainability is not just important for ecological and social reasons. Its principles are intended to safeguard all the assets of the tourism sector and make 'Wild Beauty' a core product of the destination brand…"

Following its SWOT analysis, the plan presents the strategic goal, five objectives and a number of measures to reach them for tourism. Measure 2.2 talks about the need for consistent quality across the whole country '…Establishing Montenegro with a 'Unique Selling Point'(USP) calls for integration of all regions into a single high quality destination. Thus all regions and sub-regions need to be enabled to offer high standard products. Guests need to be made possible to travel around the country and enjoy diverse products at a high level; regardless whether on the coast, up north, in rural or urban areas…'

Most importantly, for this report, the plan emphasises sustainability as measure 2.3 '…Priority NSSD objectives in the area of sustainable tourism are: a) diversification of tourist offer (development of village, agro-, eco-, mountain, cultural, sports and other forms of tourism, especially in the northern part) in support to the extension of the tourist season and attraction of guests with higher purchase power (the final aim being increase of direct and indirect revenues from tourism); and b) integration

of sustainability criteria in sanctioning tourism development projects (i.e. for the adoption and assessment of plans), especially when it comes to coastal and winter mountain tourism…'

The plan lays out a number of tourism products to be developed and emphasises the need to reduce seasonality which has detrimental effects on employment and financial viability in the long term.

Most importantly, in terms of tourism planning the suggestion was for cross-municipality clusters rather than tourist development zones:

'…Montenegro as a destination can be subdivided in touristic terms into six clusters, whose scenic and cultural traits differ from each other:

1. The steep rocky coastline from Lustica to Ulcinj with its many bathing bays, the centre of beach tourism, including well-known, largely modern bathing resorts such as Budva and Bečići.
2. Ulcinj, a place with an oriental flair and the most expansive sandy beach on the eastern Adriatic, with Ada Bojana and Valdanos. Velika Plaža affords the greatest development prospects in the Montenegrin tourism sector
3. The Bay of Kotor, surrounded by steep rock faces rising sharply out of the sea and the heritage of Venetian culture, unique at the Mediterranean and eminently suited for developing a particularly high-yield and diversified product (nautical tourism, golf courses, etc) in the Tivat Bay and Lustica peninsula, provided the infrastructure problems are solved
4. The capital Cetinje and Skadar Lake, also two unrivalled assets thanks to their historical significance, the diversity of local species and the breath-taking scenery at the lake
5. The mountainous regions of Durmitor and Sinjajevina with the Tara canyon and the national park.
6. The mountainous landscapes of Bjelasica, Komovi and Prokletije, with one, soon two, national parks, monasteries and mosques…'

Montenegro Tourism Development Strategy 2022-2025 with Action Plan

The present strategic document in the field of the tourism sector developed by the Ministry of Economic Development recognise climate change as a threat and acknowledge the need for serious and sustained action, but doesn't contain detailed plans or coordinated approach to climate adaptation in the tourism sector (for example, section 11.4.2 of the Strategy contains three paragraphs on climate change). The first describes the global agreement championed by the UNWTO and UNEP: the 'Glasgow Declaration on Climate Action in Tourism[30]' that commits signatories to halve tourism emissions by 2030 and reach net zero before 2050. The Glasgow Declaration has at its centre, an ambition to "move rapidly away from carbon- and material-intensive ways of delivering visitor experiences, instead prioritising community and ecosystem wellbeing, then tourism can be a leader in transforming to a low-carbon future." In some senses, this is reflected in the new government tourism strategy which seeks to green the industry in the medium term.

The following is an overview of the Strategic, National and International Framework, whose priorities are correlated with the priorities of Montenegro Tourism Development Strategy 2022-2025 with the Action Plan (Source: Montenegro Tourism Development Strategy 2022-2025 with Action Plan).

[30] https://www.oneplanetnetwork.org/programmes/sustainable-tourism/glasgow-

Strategic framework of Montenegro Tourism Development Strategy 2022-2025 with the Action Plan

Europe 2020 Strategy and South East Europe 2020 Strategy	Commitments from the EU accession process of Montenegro (Chapters 3, 20 and 27)	Smart Specialization Strategy of Montenegro 2019-2024
Multiannual Financial Framework EU 2021-2027	National Strategy for Sustainable Development of Montenegro until 2030	National Strategy in the field of Climate Change until 2030
EU: Tourism and Transport in 2020 and beyond	Montenegro Development Directions 2018-2021	Strategy for the Development of Micro, Small and Medium Enterprises (MSMEs) in Montenegro 2018-2022
EU macro-regional strategy: for the Adriatic-Ionian region 2014-2020 (EUSAIR) and EUSDR	Montenegro's Program of Accession to the European Union 2020 – 2022	Strategy for the Development of Official Statistics 2019-2023
Europe's moment: Repair and Prepare for the Next Generation	Montenegro Economic Reform Program 2022 – 2024	Disaster risk reduction strategy 2018-2023
For a new EU integrated Tourism Policy: EUROPE – 27. countries, one destination	Macroeconomic and fiscal policy guidelines for the period 2020 -2023	National Employment Strategy 2021-2025
Europe, the world's number one tourist destination, new policy framework for tourism in Europe	Economic and Investment Plan for the Western Balkans	Strategy for the Development of Women's Entrepreneurship of Montenegro 2021 – 2024
	Europe now!	Strategy for Regional Development of Montenegro 2014-2020
Strategic framework of the EU	**Obligations of Montenegro in the process of accession of Montenegro to the EU and the Strategic Framework of Montenegro**	**Strategic framework of Montenegro**
↓	↓	↓
MONTENEGRO TOURISM DEVELOPMENT STRATEGY 2022-2025		
↑	↑	↑
Sectoral strategies	**Thematic Strategies / Programs**	**Other relevant documents**
Industrial policy of Montenegro 2019 – 2023	Strategy of scientific research activity 2017 – 2021	European Green Deal Investment Plan 2021-2030
Strategy for the Development of Forests and Forestry 2014-2023, National Forestry Strategy	Cultural Tourism Development Program of Montenegro 2019 -2021	Study and road-map for policy and incentive options for green businesses in agricultural, tourism and energy sectors
Energy Development Strategy of Montenegro until 2030	Health Tourism Development Program of Montenegro 2021-2023	EC 2020 Progress Report on Montenegro
Transport Development Strategy 2019-2035	Program of Rural Tourism Development of Montenegro 2019 - 2021	GHG emissions from tourism 2018
Strategy for the development of agriculture and rural areas in Montenegro 2015-2020		

3. Data constrains, gaps and recommendations

3.1. Available sectoral information for climate sensitive vulnerability assessment of the sector health

In Montenegro, the gender segregation of the labour in the accommodation and food services states that the rate of women`s employment was 48.7% in the category accommodation in 2019, and 38.4% in the category activity of preparing and serving of food and beverages for the same year . The rate of women`s share for 2020 is declining in the category accommodation with 46.4% and slightly decreasing for the activity of preparing and serving of food and beverages with 38.8%., which implies that women are losing their positions as holders and/or managers and are increasingly presented in the labour force with reduced income.

In the category Holders of ownership over business entities in Montenegro women are in 8.7% owners of entities in the Food and beverage service activities sector, while in the category Accommodation their representation is 11,8%.

The latest data from the Labour force survey (Publication Women and Men in Montenegro, Persons in employment by sectors of activity and sex, Montenegro LFS 2019) states that in the "Accommodation and food services" category, women are represented with 8.7% while men in 11.9% . On the other hand, the Montenegro Tourism Development Strategy 2022-25 indicates that "In the sector of tourism, the holders of activities are primarily micro, small and medium-sized enterprises, which creates the preconditions for developing a family business that enables the employment of greater number of women (in the tourism sector more than 50% of employees are women) and young people". There is no reference to this figure in the Strategy.

Still the data from the publication "Owners of business entities in Montenegro in 2011, by gender" are indicating the huge gender gap in this category where men are dominating with 88.2%.

Different figures are presented in different documents, still the general impression is that this represents a gender gap that places women in the vulnerable position in terms of earnings and income.

During 2021, the Ministry of Economic Development, through several support measures within the Public Call in the field of rural tourism[31], encouraged the development of the existing offer, but also the increase in the number of registered rural households in total number of 189 rural households .

According to the brochure "Rural households in Montenegro" in the North region there are 118 male registered rural households against 30 female households, in the Central region there are 22 male and 4 female registered rural households, and in South region the gender gap is smallest with 10 male and 4 female and 1 family registered rural households. The biggest gap is noticed in the North region, where the number of the households is the highest, opposite to the South region where the ownership of the households is almost the same.

Men are dominating in the ownership structure of the rural tourism households, and therefore it can be concluded that men are the target group when dealing with the adaptation policies in this sector of the tourism, while women are once again the vulnerable group with lower ownership share, especially in the North and Central regions.

These data can be compared to the data from the publication Women and Men in Montenegro, 2019 on financed credits in 2019 (the number is not referring to tourism separately, and it is a general number), still, gender differences can be noticed, due to the fact that in 2019 20 unemployed men have received financed credits against 13 women (the purpose of the credit is not known)

[31] https://www.goldbarhome.com/en/news/record-number-of-registered-rural-households-during-2021/

Housewives are most represented in the inactive labour force in the North region with 21% from the total inactive rate, followed by the South region with 17% and the least represented in the Central region with 15%. Housewives and other commercially/ financially inactive people have the largest share in the total number of inactive people in Rožaje, Plava and Ulcinj, and at the same time the smallest share of pensioners and others with income from property.

Whilst acknowledging the complexities of tourism (crosscuts the economy, has links with other sectors, seasonality, socio-cultural implications etc.) it is difficult to discern an overall strategic approach to the climate crisis, tackling vulnerability, and strengthening resilience.

Temperature, humidity, and precipitation are factors that heavily influence touristic decision-making and thus activities. That said, tourism is a human behaviour, so these weather elements remain subjective even within their spatial-cultural context. However, in adaptation planning and policy for tourism, little consideration has been made on seeing climate (and weather) as a touristic resource, or as an integral part of the product: it is most often taken for granted.

The Ministry of Economic Development's tourism planning directorate and the Hydrometeorological Institute of Montenegro (HMZCG) must develop a much stronger relationship to understand the science behind the threats and opportunities for tourism in the lights of climate change. For example, Annex 3 (PESTLE report) of the National Tourism Strategy (2025) discusses investment in ski and winter tourism:

> *'Significant investments are needed in infrastructure when it comes to winter tourism. Namely, winter sports focus primarily on Kolašin and Žabljak. Both municipalities of the village have small ski resorts. While in Kolašin in recent years, significant investments have been made in cable cars and ski slopes, the resort in Žabljak is in poor conditions and is far from international standards. The third small ski resort is in Vučje near Nikšić. Montenegrin ski resorts are limitedly competitive at the regional level. Compared to other ski resorts in Europe, they are of a significantly lower standard. There is an underdeveloped infrastructure for Nordic skiing'.*

At present, HMZCG does not seem to be geared up to be of direct assistance to the tourism industry (but such is the nature of government meteorological departments whose main function is data gathering and country-wide assessments). Successful tourism adaptation planning will increasingly rely on need accurate climate scenarios and weather forecasting, which would greatly support preparation of programmes for the upcoming season, and long-term infrastructure, product, and facilities investment.

However, for this to be effective, the tourism side (public/ planning and private/ investment sectors) must make their needs clear. In this sense, the need for re-framing and reformulating relationships with climate services might be considered. The figures below show HMZCG weather stations and Montenegro's hydrological stations. The questions arise, to what extent are the weather and hydrological stations located usefully near touristic zones? And to what extent does the tourist industry (public and private sector) communicate its needs usefully with HMZCG?

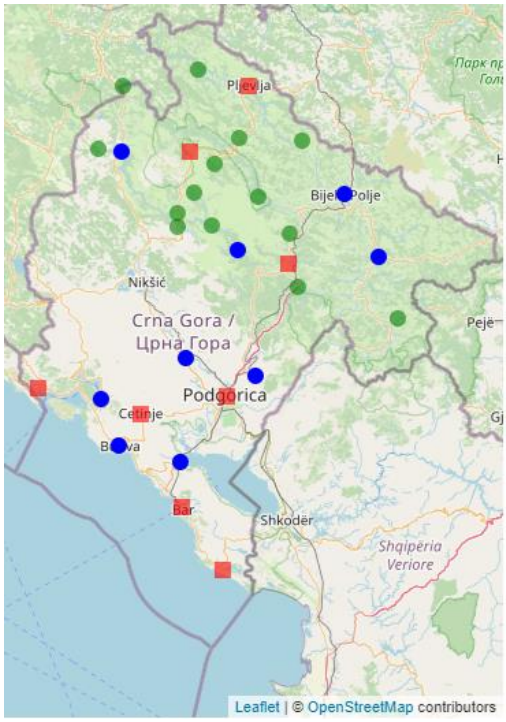


Figure 13 Location of HMZCG weather stations

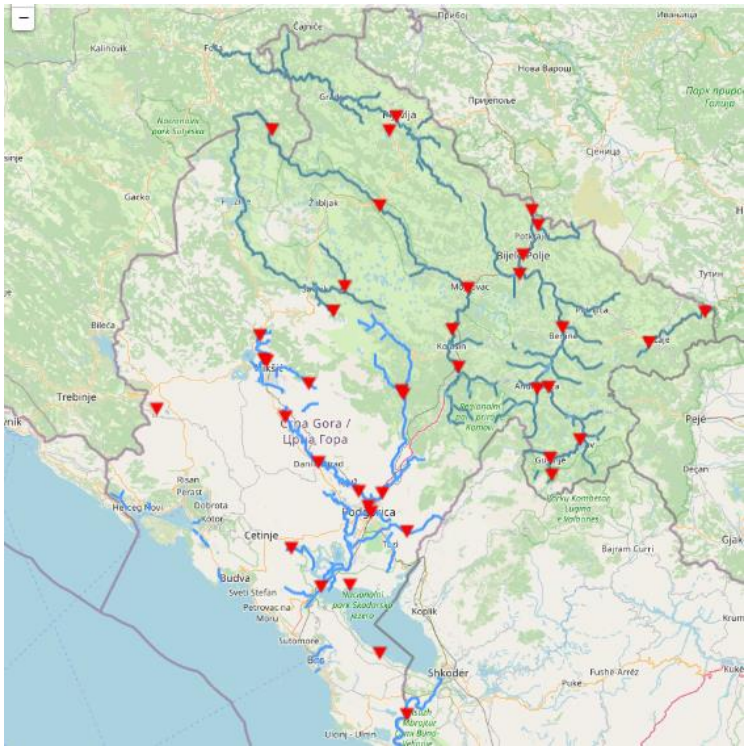


Figure 14 Location of HMZCG hydrological stations

The Figures above emphasise the need for good matches between meteorological and hydrological data generation and use-requirements of those planning tourist zones and products, and developing adaptation (and mitigation) frameworks, policies, and actions.

For the tourism sector, such changes in meteorological and hydrological data communication would also mean less emphasis on 'whole-country' climate scenario building and much more on site-specific scenario planning that is of direct, practical use for the tourism sector in investment planning and risk management.

In terms of adaptive capacity, Montenegro presents certain paradoxes. Whilst some parts of government are fully aware of and engaged with climate change and other environmental issues (some of which are framed by Montenegro's EU Accession obligations), tourism is not sufficiently integrated with the various government institutions; it remains something of an outlier.

Montenegro has a competent scientific community but one which has either failed to recognise the importance of the relationship between tourism, the natural environment and climate change or has not been incentivised to make this area a subject for empirical research. So, whilst scientific capacity certainly exists, the issue is one of awareness, communication, and subsequent action. An exception to this is

Building adaptive capacity is not something the tourism sector can tackle by itself. It will only be improved by sector awareness of the need for climate action at the business operations level, and a symbiotic, supportive relationship with the scientific, research, and policy making communities beyond the narrow confines of the tourism industry.

For example, Table 14 shows the compilation of tourist products and activities listed by the new government tourism development strategy with vulnerability commentary.

These products and threats could be classified in several ways (the new tourism strategy plan classifies them under the seven tourist development zones).

3.2. Gaps and constrains in the sectoral information for climate sensitive vulnerability assessment of the sector health

Regarding the **data gap assessment**, for tourism, even the concept of 'data' reveals certain challenges. Traditionally, tourism data show visitor arrivals numbers disaggregated by originating country, port of entry, and type of transport and sometimes by gender, age, income group/ profession etc.). I addition, data provides type and location of accommodation. Occasionally, a visitor survey might take place that drills down into spending patterns and satisfaction levels.

The tourism sector is facing a serious lack of sex-disaggregated data in terms of assessing the gender-based vulnerabilities in the context of climate change adaptation processes.

Namely, the following categories of data, sex-disaggregated, were needed for the purposes of this report:

- Socio-economic structure: poverty rate, employment rate, unemployment rate, informal labour (partial data are existing)
- Decision-making structure: private and public entities (there are no official data which can be found on one location, data are scattered and not systematised);
- Gender responsiveness in the legal and policy level: laws, policies, national communications, national projects, programs and strategies (no data provided);
- Labor force in related sectors: vertical and horizontal labour segregation (public and private entities) (partial data existing);
- Adaptation measures and their effects[32] (policy and program level) (no data available).

[32] Gender indicators are being developed within the project: Third Biennial Update Report (TBUR) project, GENDER ANALYSIS WITHIN THIRD BIENNIAL UPDATE REPORT (TBUR), Montenegro

There is no existing analysis on gender-based vulnerability in the tourism sector in relation to climate change in general, and the available official statistics are quite rough only in two categories: gender segregation of the labor in the accommodation and food services and Holders of ownership over business entities in Montenegro in the Food and beverage service activities sector and category Accommodation. Namely, there are no information on sex-disaggregated data for types, sectors and levels of employment in the tourism industry (by sex) (SDG indicator) as well as tourism occupations affected by climate change caused changes (by sex and geographical location) (SDG indicator), which are two crucial gender indicators in assessing the gender gaps in adaptation needs and differences.

On the other hand, Montenegro does not provide sex-disaggregated data on policy and program level[33] in order to assess the gender gap in the gender-based vulnerabilities` needs and access to the adaptation efforts of the country.

The available sex-disaggregated data are presented in the Section 4 of this report, still, there is a big challenge to be met in the country in order to segregate the data by sex in purpose of designing realistic and sustainable adaptation measures and efforts.

That said, in many countries, these data languish in stored data sets with little use made of them. In a sense, such data is useful for snapshots and monitoring tourism performance at the most basic level but provide little by way of helping planners and businesses understand various impacts of tourism such as environmental and social. If there are to be stronger links between Montenegro's newly proposed year-round green tourism and conservation/ environmental management/ and supporting rural development, then a new approach to data generation and the development of new data sets is essential.

But the main point about tourism is its complexity, its seasonality, and its interconnectedness. Therefore, the big challenge for tourism (public, private, and third sector) is how to use data from other sectors including, inter alia, environmental, meteorological, socio-economic data sets to reinforce its cross-cutting potentials. For example, addressing the questions, how can tourism play a substantive role in the rural economy and its development? What is the potential for tourism in advancing REDD+ objectives? How can beneficial linkages be made between tourism, gastronomy, viticulture in a sustained way? In answering these three questions (and there are many others) responses must be framed by climate concerns and sustainability.

3.3. Recommendation for improved data collection and management of gender sensitive climate relevant data for the tourism sector

In summary, for tourism there is more of a sectoral data matching issue than data gaps, although Montenegro does, in line with many European countries, lack gender-specific data that would help policy-makers better understand the needs of women in tourism. This is especially relevant to the low-paid or no-paid labour undertaken in informal unregistered accommodation provision.

It may also be said that for the purpose of the present report there is a knowledge gap on the extent to which public sector institutions communicate effectively about tourism planning and monitoring.

The following recommendations are crucial for improved data collection and management of gender sensitive climate relevant data for the tourism sector:

- **Gender responsive coherence, governance and operational procedures in the tourism sector:** Development of institutional structure (in a form of procedures) for sex-disaggregated

[33] Data were requested from the officials in February, 2022. No data provided.

data collection on policy, program, project level in health sector to identify gender gaps in in the needs as well as the level of inequality in the access to adaptation services and resources;

- **Creation of the set of gender-sensitive indicators** based on the existing practices on collecting sex-disaggregated data upgraded with the international sets of gender indicators (SDGs);
- **Capacity building** on the methods and instruments for collecting sex-disaggregated data, as well as monitoring and reporting through design of gender indicators.
- **Monitoring and reporting**: Development of institutional structure (in a form of procedures) for monitoring progress on gender equity and equality and tracking gender-differentiated results.

See also Table 12, 'critical questions in considering gender-tourism dynamics.'

4. Findings on sectoral risks, vulnerabilities and impacts from the past and the present climate variability in Montenegro

4.1. Observed impacts on the sector Tourism

Climate change has a proven effective impact on a wide range of economic sectors and activities including tourism. The economic sensitivity of a region will be largely dependent on its political stability together with physical, environmental, social and cultural characteristics. Given how climate change can have direct and significant effects on tourism, understanding the implications of climate change in relation to Montenegro's competitiveness and tourist demand patterns should play a central role in destination management and forecasting.

Montenegro's attractiveness, and most of the types of tourist activities it can host, are at present heavily reliant on its weather and climate. As weather patterns experienced by tourists change over time change, the reputation and image of Montenegro will also change leading to pressure for a change in product offerings and seasonality.

This is not all about direct impacts such as water shortages, ambient temperatures too hot for beach holidays, or unreliable snowfall for winter leisure, the impact may also be indirect. Montenegro's tangible cultural heritage may become less attractive with the potential for reduced tourist induced spending that contributes towards upkeep and preservation.

Net losses or gains resulting from changes in climatic conditions will depend on:

- The change in the tourists' evaluation of climate-related amenities, which determine their length of stay and visiting period
- The capacity of the tourism sector to be innovative in product development and knowledgeable about climate adaptation
- The strength of policy-makers to push through necessary regulatory frameworks and innovative national marketing that takes account of climate realities (essentially tackling the seasonality and geographic balance issues of Montenegro's tourism.

A model[34] showing the interconnectedness between climate change and the tourism system is illustrated in Figure 15. The model sets out four impact paths (shown as 1–4) by which climate change can affect the future prospects of tourism. These paths are applied to the case of Montenegro:

1. **The first pathway** (drawing together the destination tourism system and climate change) includes the direct climatic impacts that affect the length and quality of climate-dependent tourism seasons. *Observable changes in Montenegro include declining snowfall and declining reliability of seasonal snow suitable for winter sport and leisure especially in north Montenegro but also in Vučje and Ivanova Korita. Heatwaves are a serious issue for South-East Europe and Montenegro Red Cross has set up awareness campaigns and training in collaboration with GIZ[35]such extreme weather events are increasing and pose a threat to tourists' bioclimatic comfort in the context of the Tourism Climate Comfort Index[36]*
2. **The second pathway** (linking macro scale drivers of tourism and environmental conditions), illustrates indirect climate-induced environmental change, affecting the natural assets, which influences the destination image. *In the case of Montenegro, forest fires, such as*

[34] 10.3390/heritage2010019

[35] https://www.climatecentre.org/2093/montenegro-red-cross-readies-for-summer-heat/

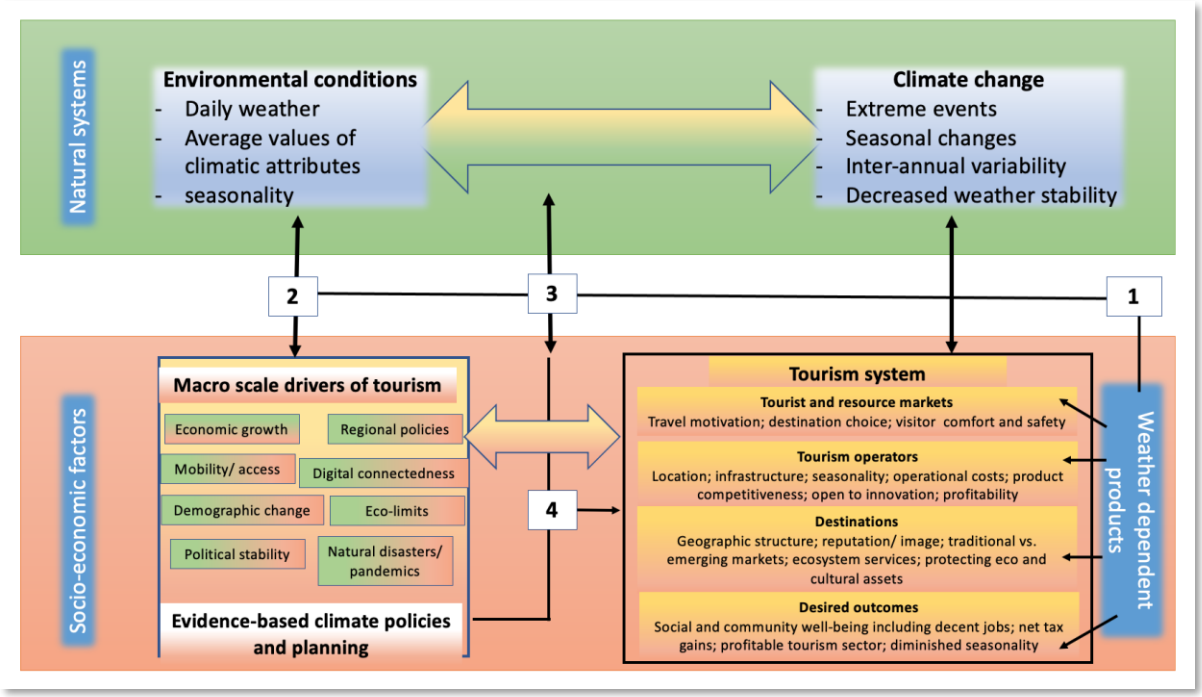
[36] https://www.researchgate.net/publication/308370823_Tourism_climate_comfort_index_TCCI_-_An_attempt_to_evaluate_the_climate_comfort_for_tourism_purposes_The_example_of_Serbia/figures

happened at Pljevlja in 2021 affects tourists' perceptions of stability, desirability, and calmness – all necessary contexts for tourism.

3. **The third pathway**, (the confluence of tourism systems, drivers and climate change) shows indirect impact of climate socioeconomic change such as decreased economic growth and discretionary wealth, increased political instability and security risks or changing attitudes toward travel. *In Montenegro this can be seen in the lack of success in lengthening the unsustainably high levels of seasonality.*
4. **The fourth pathway** (showing the influence of policy and planning on the national tourism system), could alter transport cost structures and destination or modal choices, as well as adaptation policies related to water rights or insurance costs; this has important implications for tourism development and operating costs[37]. *Montenegro's lack of clear climate policy in relation to tourism planning has the potential to damage investor confidence and the general uplifting of tourism quality in the country.*

The impact pathway model can easily be applied to Montenegro using data and tourism systems (supply chains, product development modes, quality of public-private sector communications and relationships, efficacy of policy making and strength of industry resilience etc.) descriptions to be found in the present and previous tourism development plans and strategies.

Figure 15 Tourism-climate impact paths



General changes in climate and weather directly affects the attractiveness of a location and/or its suitability for different forms of recreation for tourists and indirectly affects many specific environmental characteristics of locations, including vegetation, animal populations, and scenic amenity values which also influence tourism and recreation opportunities in various ways, including:

- Effects of increased temperature on beach and lake tourism
- Effects of increased temperature, reduced snowfall and more rain on skiing opportunities

[37] Scott, D.; Lemieux, C. Weather and Climate Information for Tourism. Geneva and Madrid: Commissioned White Paper for the World Climate Conference; WMO: Geneva, Switzerland; UNWTO: Madrid, Spain, 2003. [Google Scholar]

- Effects of changes in the frequency and magnitude of floods and droughts

Table 8 Climate Hazards and What They Mean for Tourism in Montenegro[38]

Climate Hazard	Impact	Observed Events in Montenegro
Precipitation and temperature-induced changes in the discharge of streams and lake levels	Indirectly affects: • the attractiveness of a location for tourists • structure and development of aquatic ecosystems and habitats that influences the supplies of environmental services enjoyed by tourists[39]	Travel trade reported 'Kotor and Budva are flooded, the water level in the Bojana River is growing'[40] and 'flooding to city of Ulcinj because of torrential rains. Attributed to unexpected snowmelt because of high air temperature; restaurants, accommodation flooded (March 2018)
Precipitation and temperature-induced changes in water quality and temperature	Indirectly affects: • the attractiveness of a location for tourists • structure and development of aquatic ecosystems and habitats that influences the supplies of environmental services enjoyed by tourists	Research from September 2020 shows suspended particulate matter from wildfires increases risk to aquatic ecosystems of Lake Skadar[41] as well as to the surrounding tourism hotspots
Sea-level rise induced changes in salt water levels, salt water quality and temperatures[42]	Directly and Indirectly affects: • beach recreation opportunities • tourism infrastructure	Montenegro's Third National Communication to UNFCCC specifically states 'loss of attractiveness of the coastal areas… loss of economic assets… decrease in tourist visits [and] erosion of coastal zones and beaches (pp213-4)
Increased drought and higher temperatures that make it easy for fires to start and spread	Directly affects: • visitor and resident safety • tourism infrastructure including campsites • Destination reputation and image	Trade magazine Travel Weekly reports 'Wildfires rage in Croatia, Montenegro at the height of tourism season'[43] (tourists evacuated) Most endangered are forests in the seaside and the central part, wherein the high temperature air in the summer period creates conditions for development of the fire[44].

Given the importance of water/ beach tourism at the height of summer, bioclimatic comfort and wellbeing derived from reliable daily weather conditions (often referred to through the Tourism Climate Index (TCI)[45] (or more recently UTCI – see below) is of significant importance to tourists, as can be seen in Table 10.

Table 9 shows ski resorts (with a brief vulnerability comment on declining snow risk) based on findings from multiple studies over the past decade showing very clearly that low lying ski/ winter tourism

[38] Adapted and updated from Calloway, J., Kašćelan, S., Markovic, M. (2010) The Economic Impacts of Climate Change in Montenegro: A First Look (UNDP)

[39] https://www.researchgate.net/publication/24130111_Climate_Change_and_Tourism_in_the_Mediterranean

[40] https://waytomonte.com/en/n-674-kotor-and-budva-are-drowned-the-water-level-in-the-bojana-river-grows#google_vignette

[41] https://www.biotaxa.org/em/article/view/em.2020.37.7/64071

[42] https://issuu.com/un_montenegro/docs/the_economic_impacts_of_climate_cha

[43] https://www.travelweek.ca/news/wildfires-rage-croatia-montenegro-height-tourism-season/

[44] https://www.unccd.int/sites/default/files/country_profile_documents/Montenegro%20national%20drought%20plan_0.pdf

[45] The tourism climate index (TCI) systematically assesses climatic conditions for tourism using 7 parameters which include the following: average monthly rainfall, average temperature, average relative humidity, maximum temperature, minimum relative humidity, average daily sunshine duration, and wind speed.(see also section 3.1 of this report)

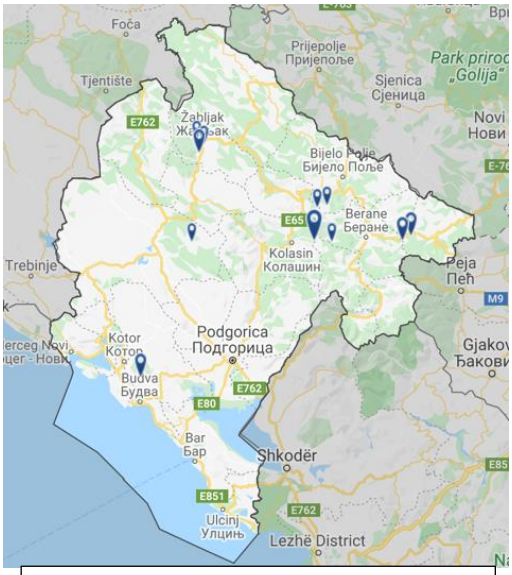
resorts are at risk from increasingly unreliable snow. For example, a 2003 UNEP report[46] concluded that climate change will have the effect of pushing more and more winter sports, higher and higher up mountains, concentrating impacts in ever-decreasing, high-altitude, areas. The study suggests that many resorts, particularly the traditional, lower altitude resorts of Europe, will be either unable to operate as a result of lack of snow or will face additional costs, including artificial snow-making, that may render them uneconomic. Examples included:

- Austria, the present snow line is likely to rise 200 to 300 metres over the next 30 to 50 years. Many mountain villages, above all in the central and eastern parts of Austria, will lose their winter industry because of climate change.
- Italy, half of the winter sport villages are below 1,300 metres. Some of these are already facing major problems with snow cover.
- Germany, many ski resorts are at relatively low altitudes. Resorts in the Black Forest area and in Allgaeu could be severely affected by climate change.

The researchers considered a ski resort "snow reliable" if, in seven out of 10 winters, it receives at least 30 to 50 centimetres of snow on at least 100 days between 1st December and 15th April.

Table 9 Ski resorts, height difference, and climate change risk and vulnerability

Resort	Height difference (and Height)	Risk of declining snow
Kolasin 1450/ Kolasin 1600	615 m (1420 – 2035 m)	Medium
Cmiljace-Bjelasica	337 m (1570 – 1907 m)	Medium to high
Savin Kuk-Zabljak	698 m (1515 – 2213 m)	Medium to low
Lokve	244 m (1316 – 1560 m)	Medium
Zarski	145 m (1650 – 1795 m)	Medium
Hajla-Rozaje	227 m (1158 – 1385 m)	High to medium
Ivanova Korita	30 m (1240 – 1270 m)	Medium
Durmitor	468 m (1485 – 1953 m)	Medium
Vucje	160 m (1370 – 1530 m)	Medium
	60 m (1460 – 1520 m)	Medium
	520 m (1330 – 1850 m)	Medium



Source: https://www.skiresort.info/ski-resorts/montenegro/

Montenegro's own TNC to the UNFCCC[47] (April 2020) and the National Drought Plan (2020) highlighted risk from declining snow.

More recently, Morin et al. (2021) report that ski resorts below 2000 metres are at risk from snow reduction (these generalisations should be taken against site specific information) and, except perhaps

[46] https://www.cabi.org/leisuretourism/news/5395

[47] https://unfccc.int/documents/254489

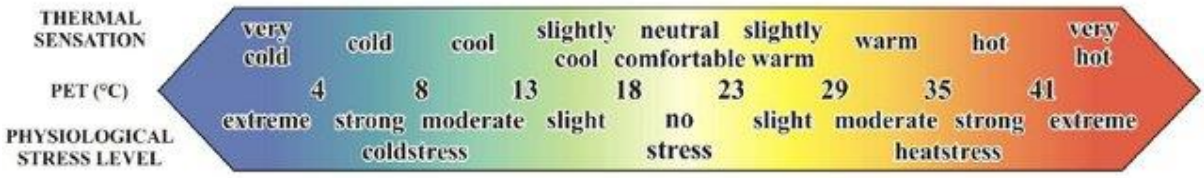
Kolašin, all Montenegrin winter resorts are below 2000 metres. A UNEP report from their 'Mountain Adaptation' series, 'Outlook on Climate Change Adaptation in the Western Balkan Mountains states that "Climate change is projected to have substantial impacts on sensitive mountain environments, with implications for the attractiveness of mountain environments for tourism and the occurrence of natural hazards Mountain ski resorts are among the tourism sectors considered most at risk."

Table 10 Facets of climate – human impacts and significance[48]

Facets of climate	Impact, significance
Thermal	**Physiological impact**
Integrated effects of air temperature, humidity, wind speed, short-and long-wave radiation, personal factors	Heat sensation, thermal/ bioclimatic discomfort, physiological stress Climate therapy
Physical	**Physical impact**
Wind	Dust, sand, damage to property
Rain	Wetting, reduced visibility and enjoyment
Snow	Winter sports/ activities
Ice	Personal injury, damage to property
Air quality	Health, allergies, wellbeing
Ultraviolet radiation	Health, suntan, sunburn
Aesthetic	**Psychological impact**
Sunshine/ cloudiness	Enjoyment, attractiveness of site
Visibility	Enjoyment, attractiveness of site
Day length	Period of activities, convenience

Developing this further, academics in the field have developed an outdoor thermal comfort index (UTCI)[49] that proves useful as an analytical tool where data exists to support it. The universal thermal climate index is a human biometeorology parameter that is used to assess the linkages between outdoor environment and human well-being. The universal thermal climate index (UTCI) is a human biometeorology parameter that is used to assess the linkages between outdoor environment and human well-being. Thermal comfort indices describe how the human body experiences atmospheric conditions, specifically air temperature, humidity, wind and radiation[50].

Figure 16 Universal Thermal Comfort Index



[48] Alecandrakis, G., Manasakis, C., Kampanis, N. (2019) Heritage 2(1) Economic and Societal Impacts on Cultural Heritage Sites, Resulting from Natural Effects and Climate Change. 10.3390/heritage2010019

[49] Outdoor Thermal Comfort Tool https://citizenscienceproject.org.au/resources-for-citizens/thermal-comfort-tool/

[50] https://climate-adapt.eea.europa.eu/en/metadata/indicators/thermal-comfort-indices-universal-thermal-climate-index-1979-2019#:~:text=Thermal%20comfort%20indices%20describe%20how,response%20to%20the%20thermal%20environment.

Finally for this section, is presented observations on tourist sector resilience. (Table 11). This shows a varied picture with some very positive factors (such as the industry demonstrating its commitment to a sustainable future through achieving many international green awards. The negative points arise from a lack of any coordinated approach to planning coordination, a lack of product diversification in the light of climate change, and a lack of liaison/ coordination with the scientific and research (including meteorology) community.

Table 11 Rapid Resilience Assessment for Montenegrin tourism

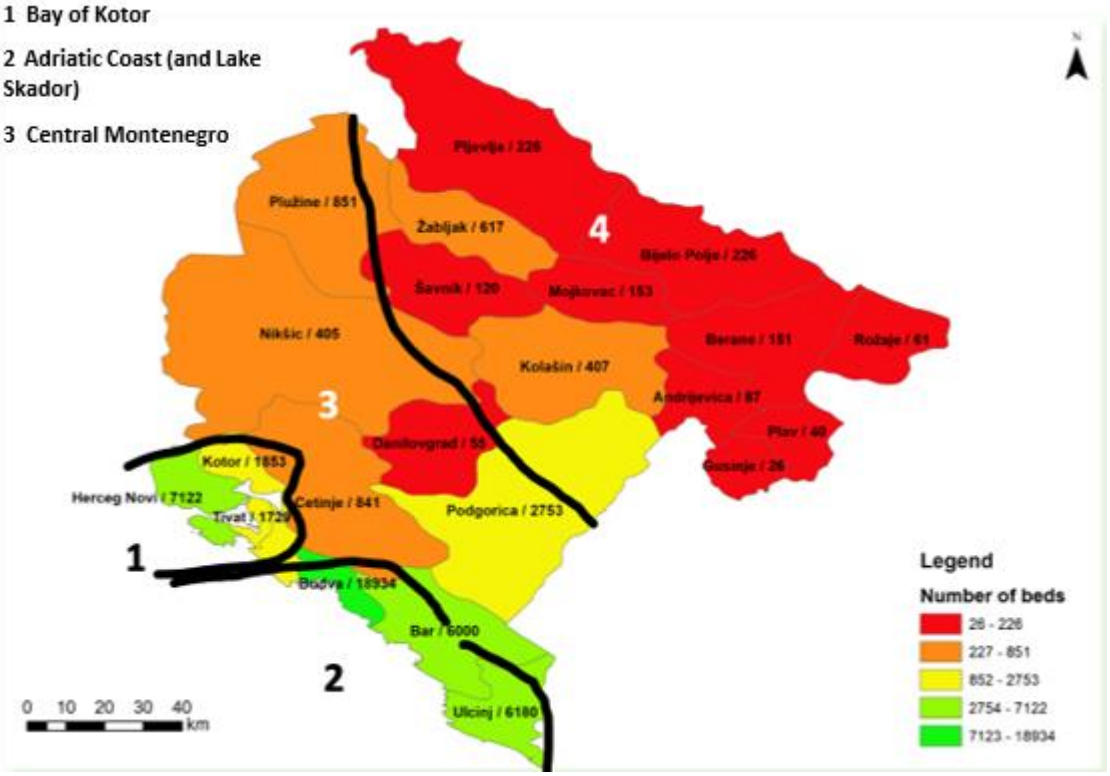
	Rapid Resilience Assessment for Montenegrin tourism
GOVERNANCE, POLICY, AND MONITORING (PUBLIC SECTOR)	**Existing actions and plans** - Continuous set of tourism plans which acknowledge environmental issues and conservation but fail to meaningfully engage with the climate crisis - Other government agencies have observed critical issues for tourism and also its vulnerability including lack of resilience in climate matters (National Spatial Plan, Maritime Spatial Plan, National Programme of Priority Activities in the Field of Climate Change Mitigation and Adaptation to the Framework of Cooperation with the Green Climate Fund 2021-2023), National Drought Plan, 3rd Biennial Update Report of Montenegro to UNFCCC, TNC, National Strategy for Sustainable Development to 2030) - UNDP 'Towards Carbon Neutral Tourism Project' - AFD Supporting the Investment and Development Fund of Montenegro to Finance Climate Projects (https://www.afd.fr/en/carte-des-projets/idf-development-and-financing-sustainable-climate-projects) - EU Project Nautical Tourism and Promotion of Regional Ports (REGLPORTS) **Gaps and barriers** - Bewildering/ overwhelming array of plans and projects that mention tourism (in addition to specific tourism plans) - Existing plans should be re-visited and re-oriented to take account of increasing urgency of climate emergency - Complete lack of coordination and strategic planning to implement such plans for the benefit of the tourist sector and wider economy - There needs to be a rapid shift from planning to implementation through a tourism climate action working group - Lack of coordination with the science community, lack of research
PRODUCT DEVELOPMENT AND DIVERSIFICATION (PRIVATE AND THIRD SECTOR)	**Existing actions and plans** - lack of specific knowledge (e.g. changes in ecosystems or weather patterns) - growing awareness of conservation and green measures emerging - UNEP/ GEF project 'From Coast to Adriatic Sea: a Better Protected Montenegro' that will develop three new integrated C/MPAs established, namely Platamuni, Katič and Stari Ulcinj, covering a total of at least 2,301.2 hectares - Several adaptation and mitigation measures (solar boat at Herceg Novi, Solar ferries, GUE (hotel complex) in Podgorica awarded Green Key membership, Majestic Hotel (Budva) awarded EU Green Ecolabel certificate. In total some 24 properties in Montenegro have been awarded eco certification of various sorts - Tivat was named one of the winners of Sustainable Top 100 Destinations Award 2020 (mainly for the saltpans conservation area) **Gaps and barriers** - For all the planning efforts by government, Montenegro is still consistent with 20th century 3S tourism (sun, sand, sea) which has limited ability to generate high returns (fierce competition), risks becoming unpopular as tourists become aware of dangers and tired of the product, and is competitive only on price: in effect, an unhelpful zero-sum game - lack of specific knowledge (e.g. changes in ecosystems or weather patterns)

	- very limited technical, financial and human resources and capacity in the sector to address adaptation and mitigation - need for additional practical tools and assistance to build better resilience through adaptation - potential loss of interest in climate issues as the disaster of the pandemic takes emotional and financial toll on the sector - lack of specific climate adaptation policy guidance and active/ effective sustainability framework

4.2. GIS mapping of the current and the future climate change impact on the health sector in Montenegro GIS mapping of the climate change impact on the tourism sector in Montenegro

The map below shows the four 'convenient' geographic regions of tourism in Montenegro. These regions will each have their own difficulties and opportunities with tourism as it is affected by climate change. The map also shows the intensity of tourism using number of commercial beds as a metric. This shows that Budva is the most intensive and Municipalities of Gusinje and Plav the least.

Figure 17 Convenient geographic regions of tourism in Montenegro



Using GIS mapping of existing tourism product overlaid with climate forecasts for 2011-40 and 2041-2070, the following impact maps have been produced:

Figure 18 Heatwave Duration Indicators (HWDI) for the seven touristic zones 2011-2040

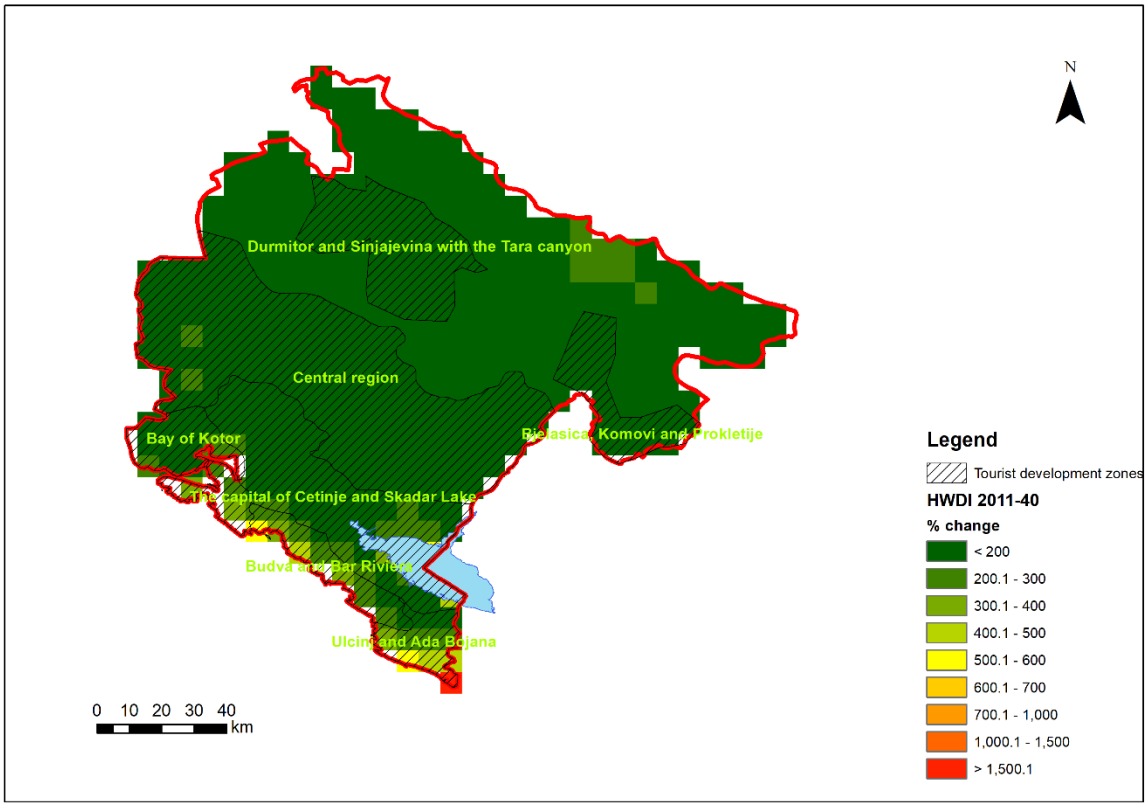
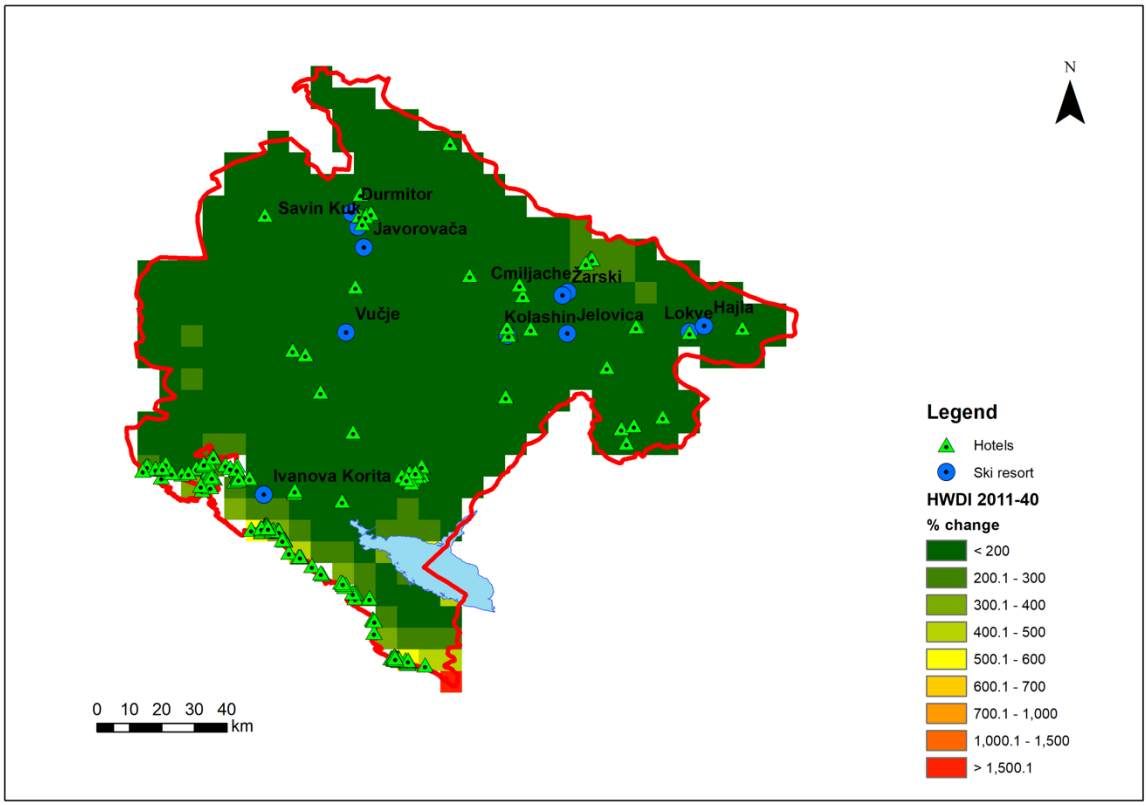


Figure 19 Spatial distribution of temperature change (HWDI) on ski resorts, hotels, existing tourist development zones 2011-2040



Figures 18 and 19 illustrate the significant changes in heatwave distribution over the immediate coming decades. These changes are amenable to adaptation measures and do not represent an existential threat to Montenegrin tourism, but they do emphasise the need for tourism product development and the need to develop new international markets.

Figure 20 Spatial distribution of temperature change (HWDI) on ski resorts, hotels, existing tourist development zones 2041-2070

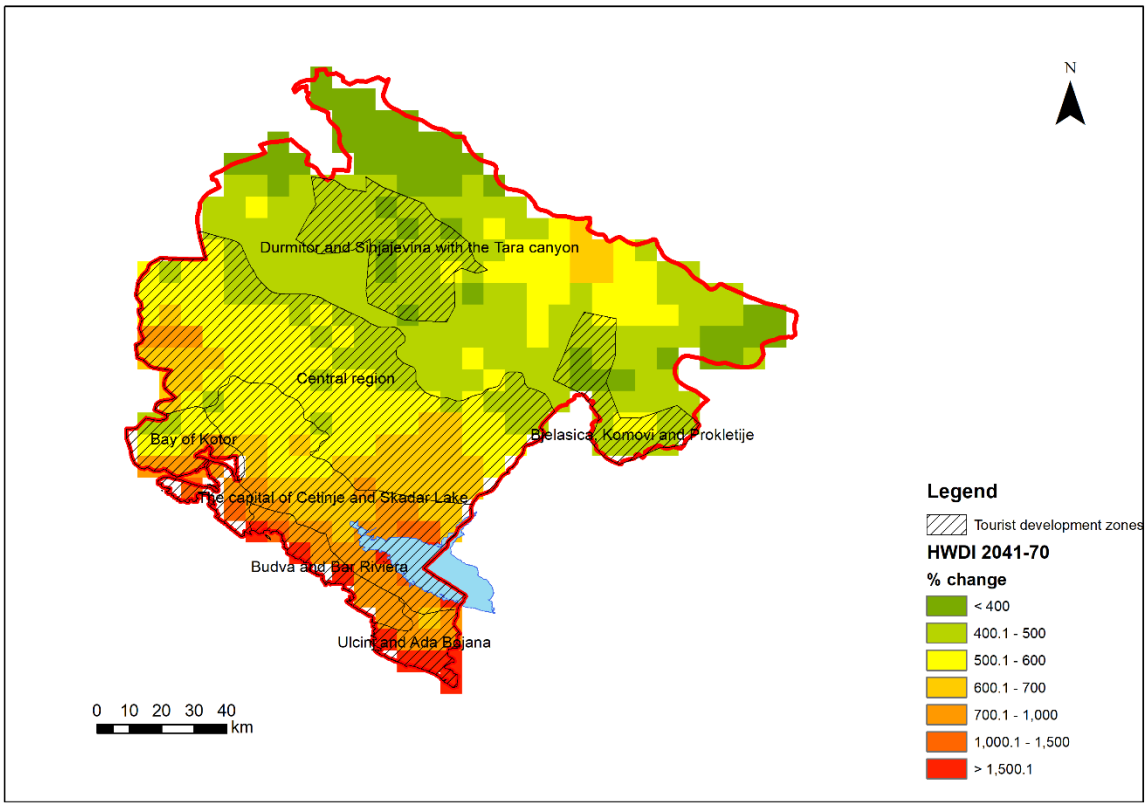


Figure 21 Spatial distribution of temperature change (HWDI) on ski resorts, hotels, existing tourist development zones 2041-2070

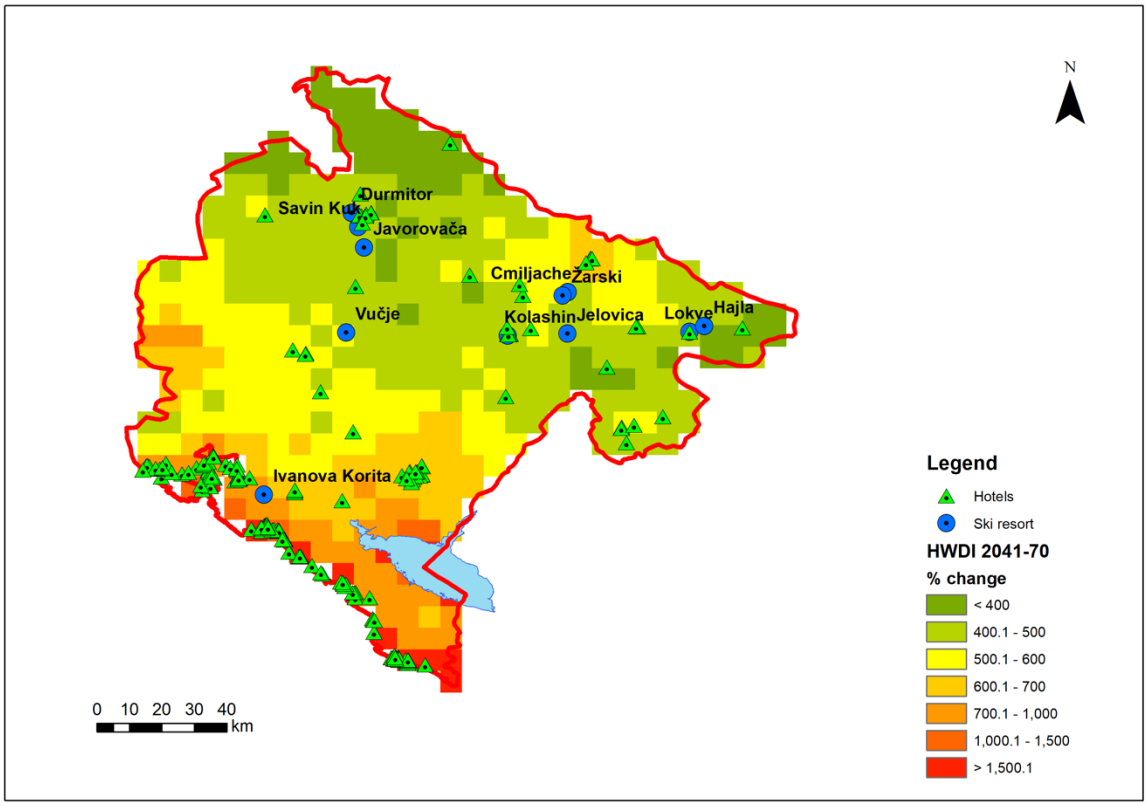


Figure 22 Figure Spatial distribution of winter snow and ski resorts 2011-2040

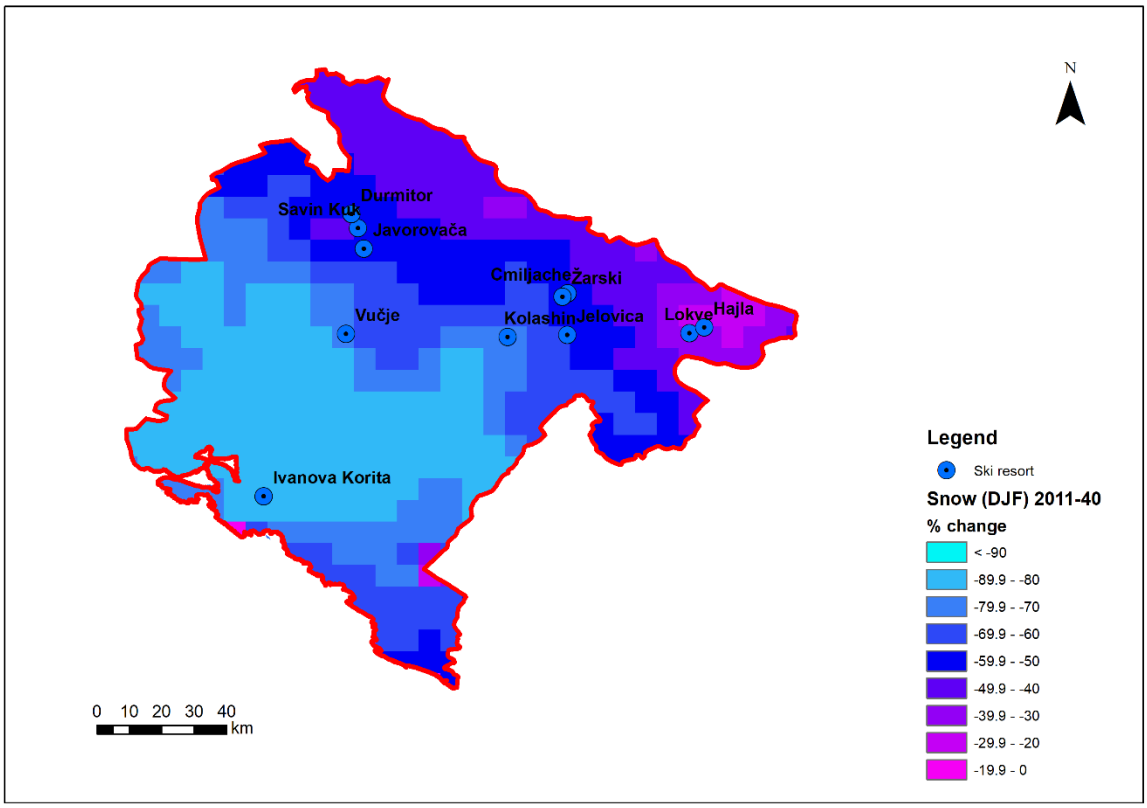
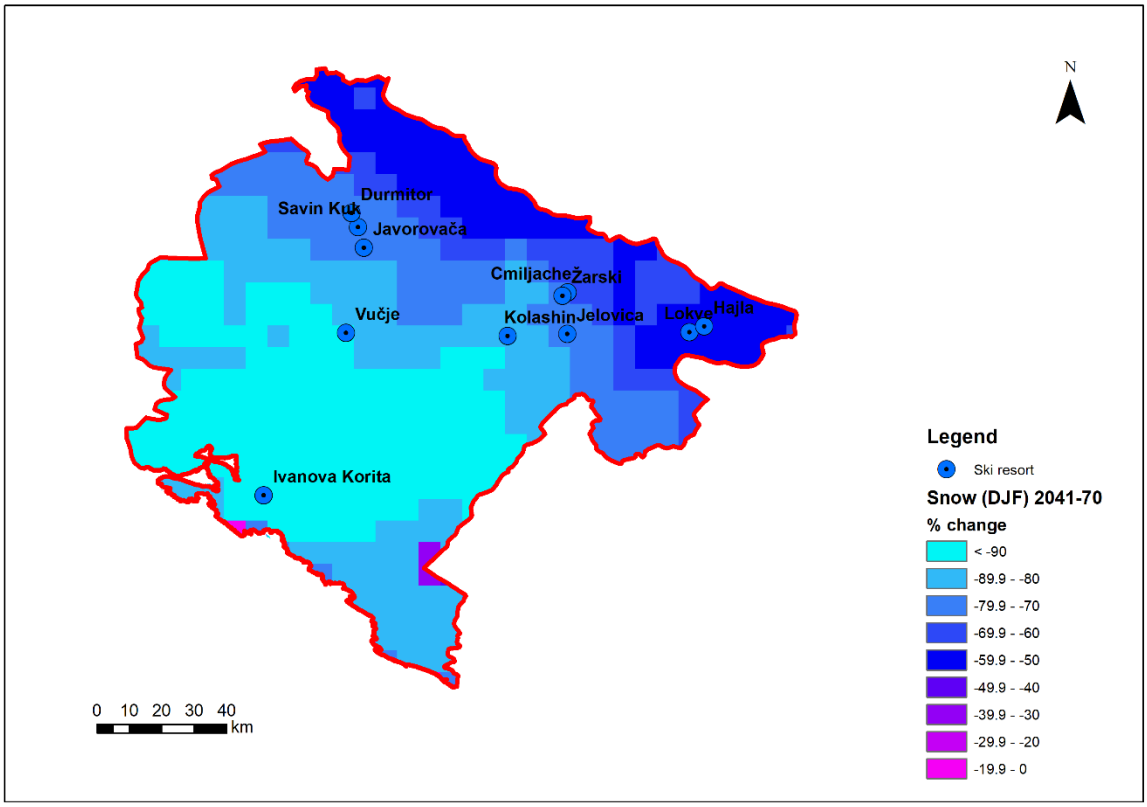


Figure 23 Spatial distribution of winter snow and ski resorts 2041-2070



The two figures immediately above indicate significant changes to snow patterns and its reliability calling into question the future viability of snow-based winter tourism. In this case, product development into adventure sports or switching of touristic season from winter to summer might be needed. Snow-making canon are not a simple solution. They are energy intensive, draw on (sometimes) scarce water supplies, and can form ice layers on top of flora thus disrupting bio-environments.

Figure 24 Tropical nights in relation to tourist development zones 2011-2040

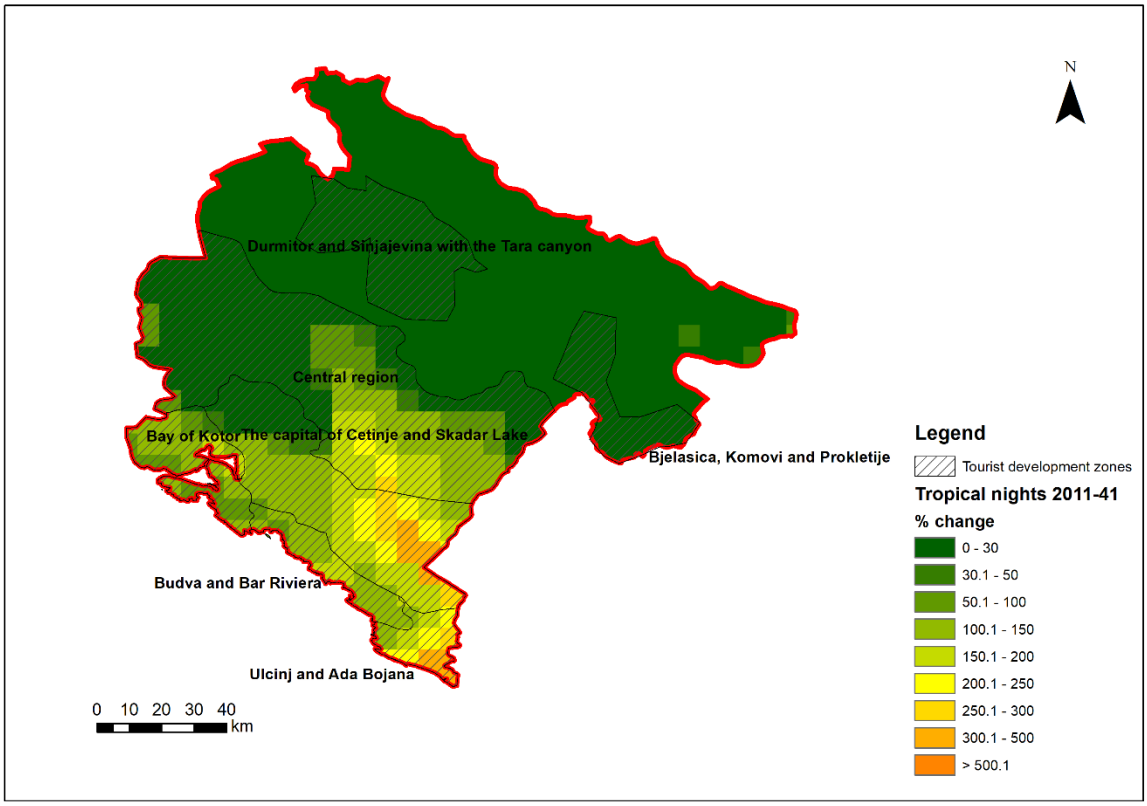
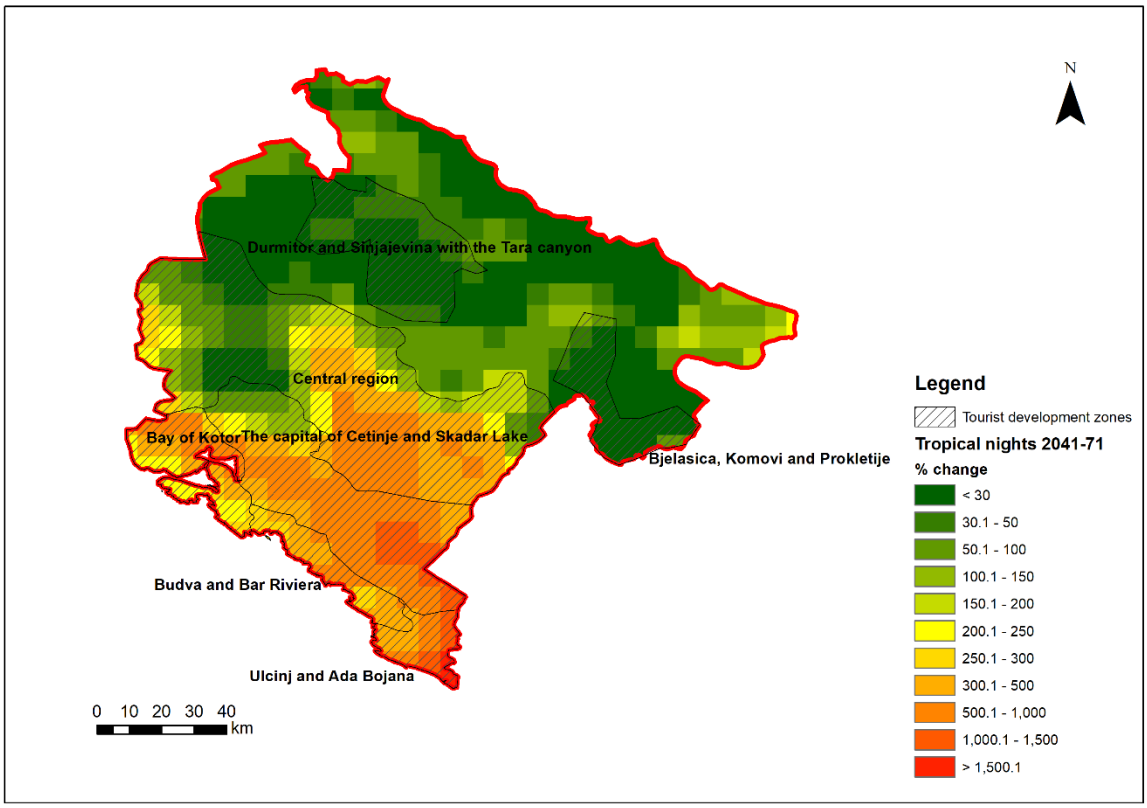


Figure 25 Tropical nights in relation to tourist development zonesm2041-70Brief explanatory narrative



The two Figures showing increases in 'tropical nights' are significant for tourism because of the increased energy costs resulting from increased air conditioning in tourist accommodation and attractions. Physical tourism superstructure (such as hotels) should, from now, be designed and built with increased temperatures as a focus. Informal accommodation (including unregistered) will suffer from the necessity to invest in air conditioning plant as well as the cost of running it.

Figure 26 TX25 (Summer days >TX25 (summer days >25^{0}C) 2011-2040

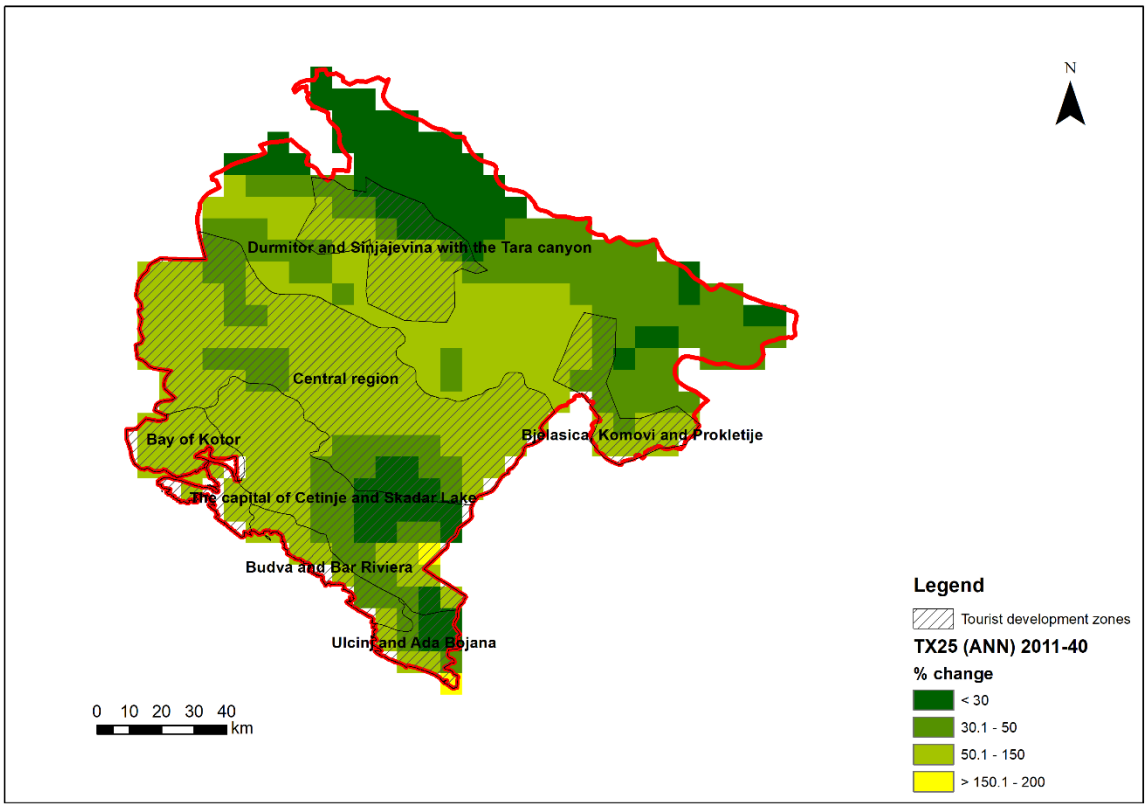
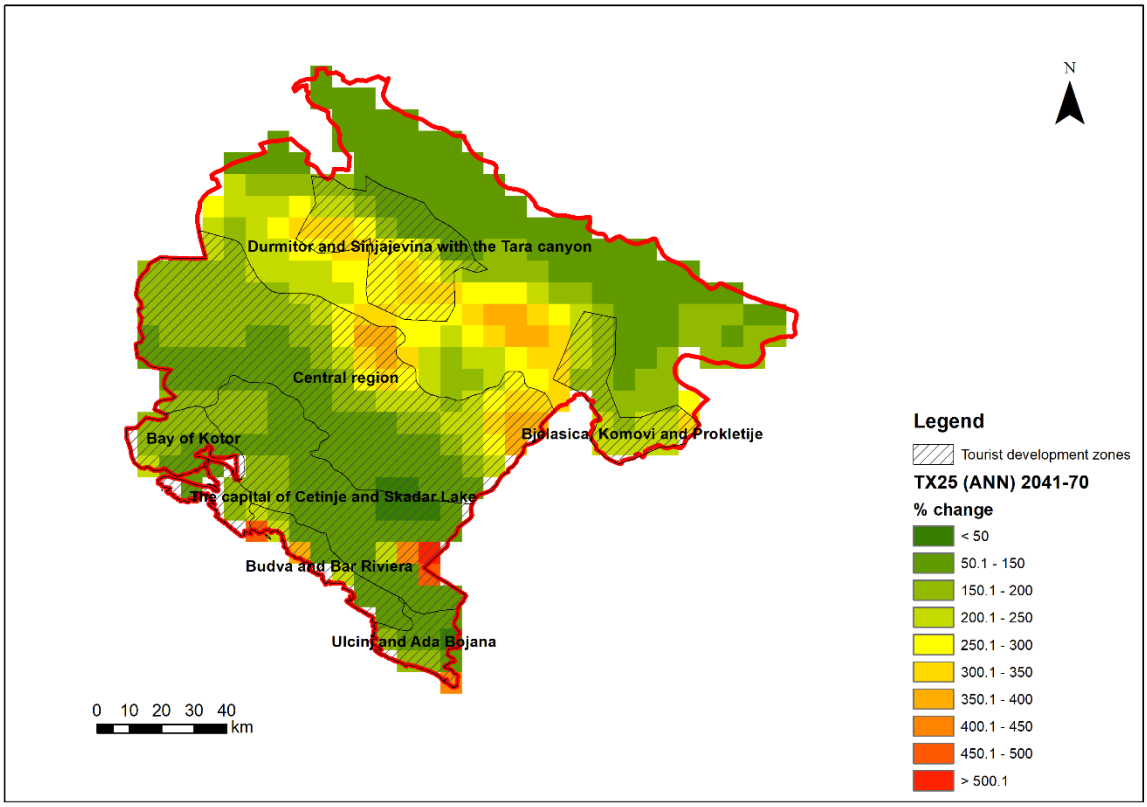


Figure 27 TX25 (Summer days >TX25 (summer days >250C) 2041-2070



The two Figures above indicate significant increase in annual days above 25C (TX25). Product development and adaptation will have to take place to ensure tourists remain comfortable in excessive heat conditions and have a variety of touristic options and attraction that help them to enjoy their vacation.

Figure 28 Sea level rise (SLR) – Budva and Bar Riviera

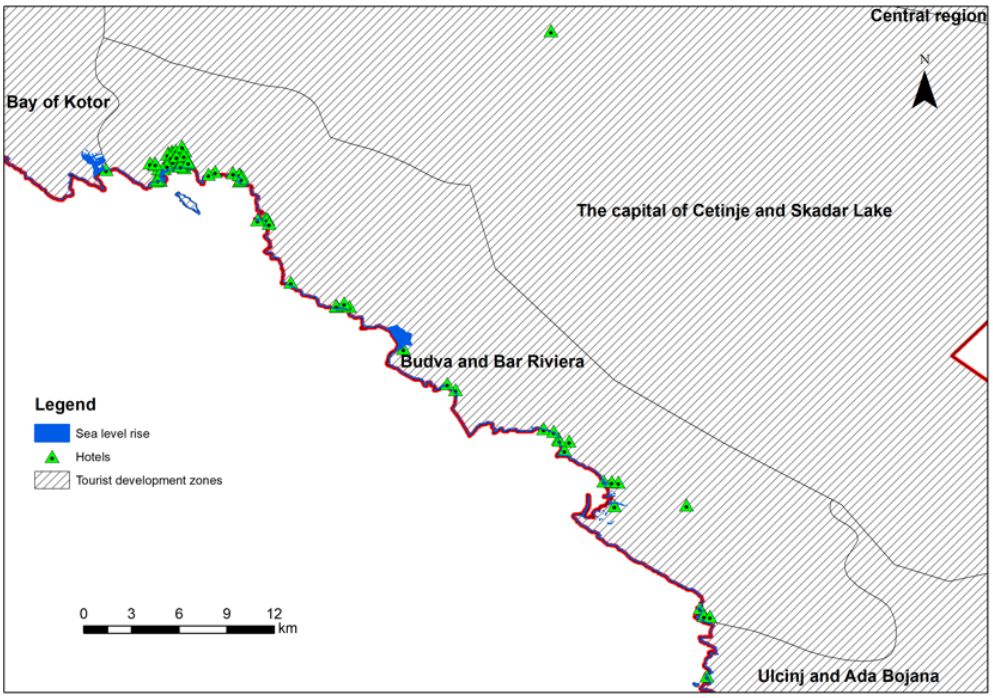


Figure 29 Sea level rise (SLR) – Bay of Kotor

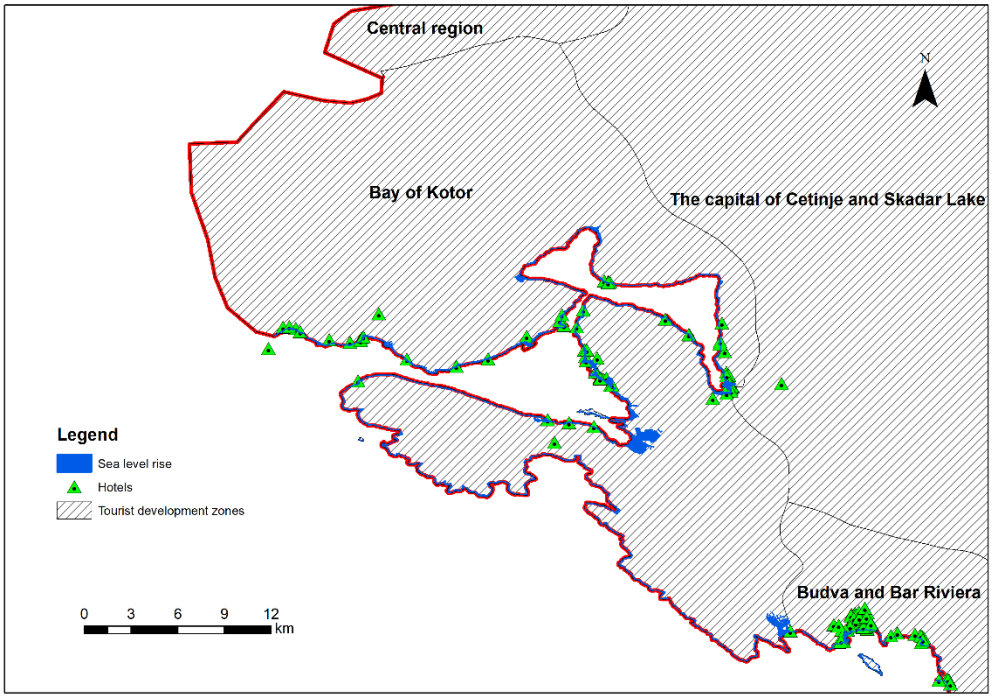


Figure 30 Sea level rise (SLR) Ucinj, Ada Bojana

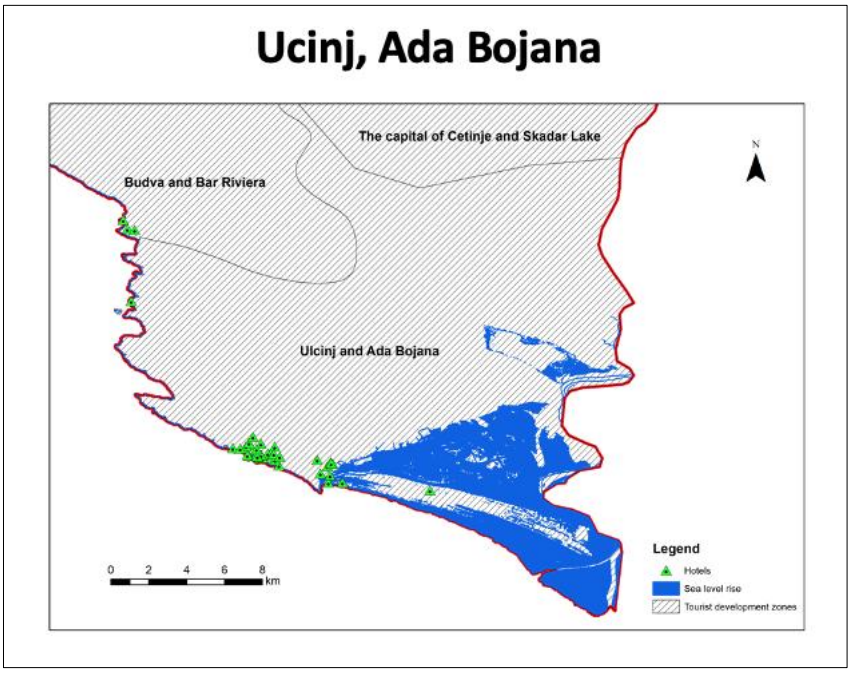
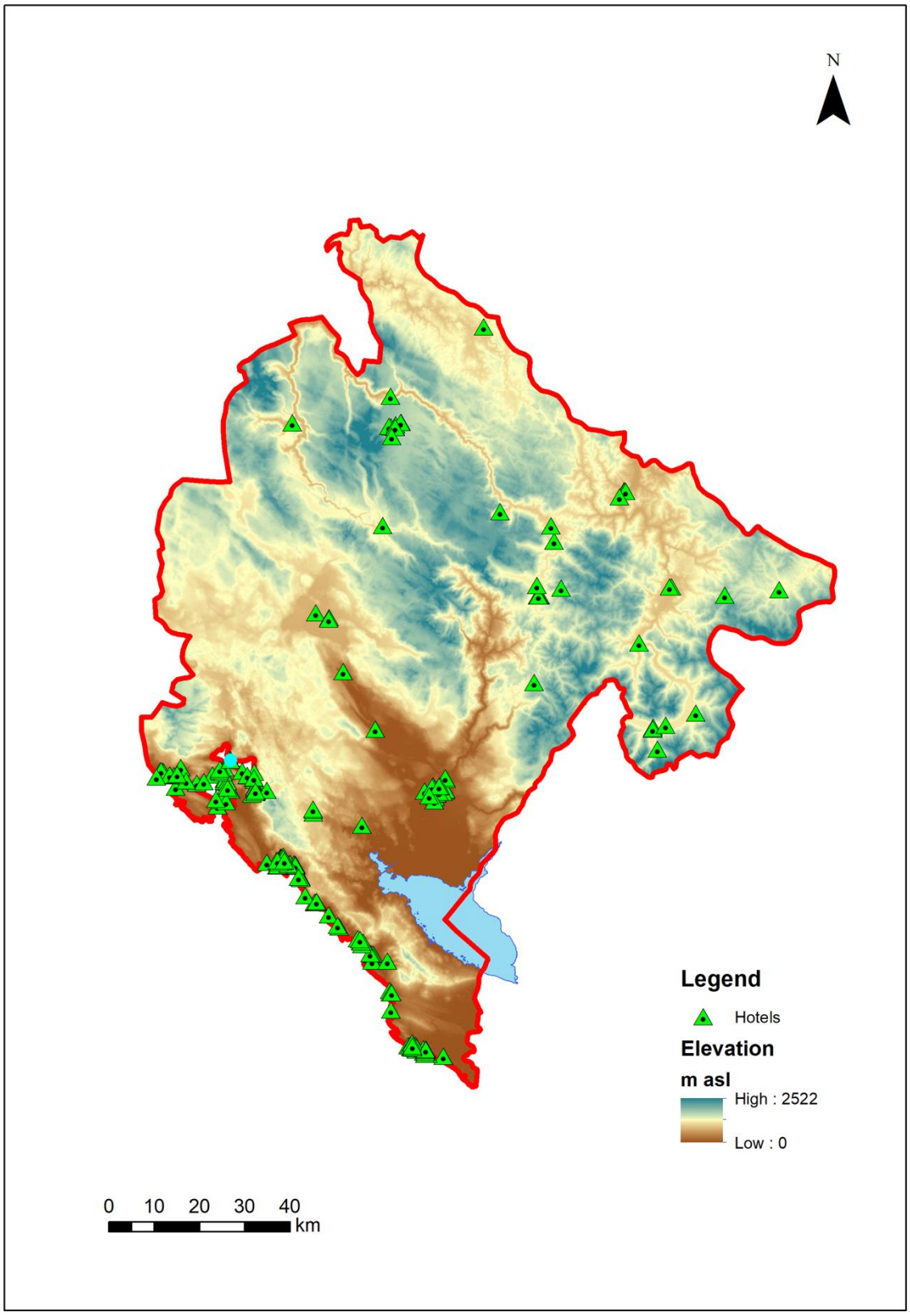


Figure 31 Elevation of hotels above sea level


N
Legend
Hotels
Elevation
m asl
High : 2522
Low : 0
0 10 20 30 40
km

By comparing the elevation of hotels with the predicted sea level rises it can be seen that certain coastal vulnerabilities arise. These can be managed through adaptive practices such as sea defences, but caution in planning and developing new coastal attractions and resorts must be taken.

Figure 32 Water scarcity by tourist development zones 2011-2040

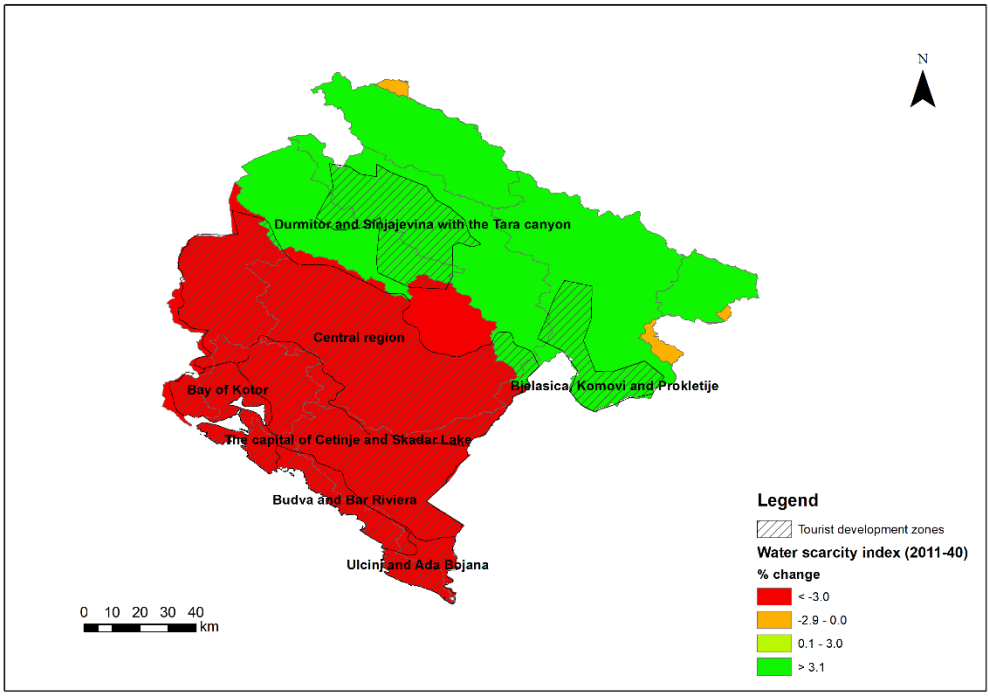
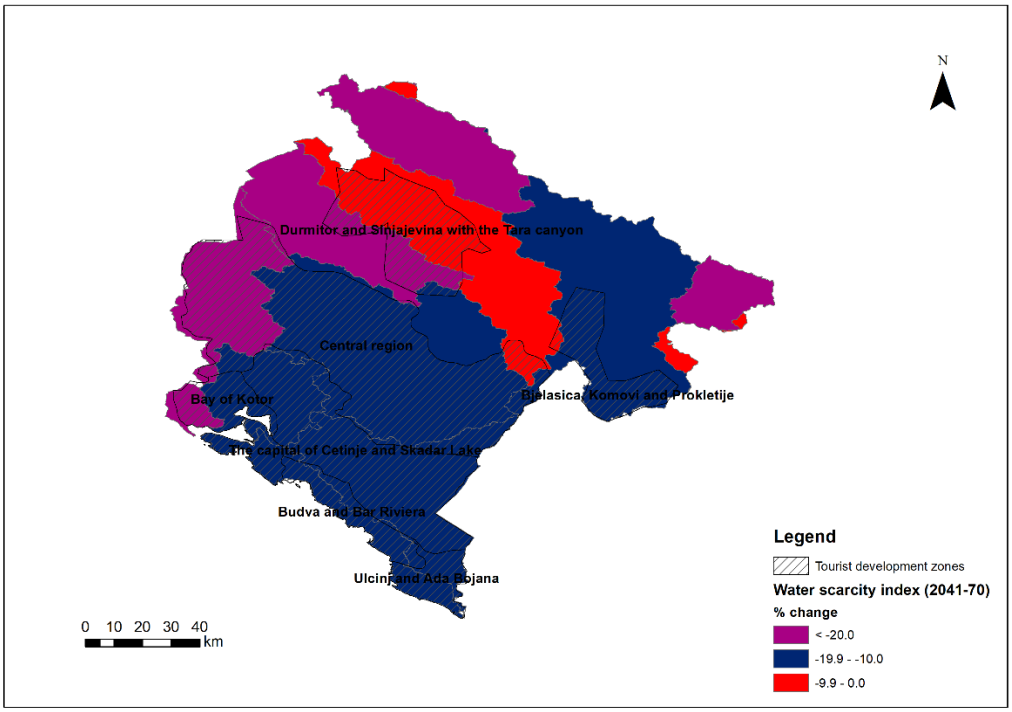


Figure 33 Water scarcity by tourist development zones 2041-2070Brief explanatory narrative



The two water scarcity maps (above) illustrate a serious problem for tourism that will require thoughtful management in both the use of water and planning for touristic attractions and accommodation. No doubt such planning will articulate with national water plans and strategies.

4.3. Risk metrics - criteria and indicators needed for the prioritization exercise

Table 12 Risk Matrix by hazard and geographic region

Risk Matrix by hazard and geographic region				
Climate variability & hazards	**Potential impacts (from Montenegro's 3rd TNC)**	**Risk**	**Geographic tourism regions potentially affected**	**Risk**
Increase in temperature	• Increased temperature of sea water	*may put off tourists from enjoying sea sports and swimming*	Kotor, Adriatic coast	Low
	• Increased air temperature/ heatwaves	*Beaches and towns become too hot for comfortable tourism/ leisure activities*		
	• Reduction of the functions of coastal ecosystems	*changes marine ecology and habitats may change sport and food fishing*	Kotor, Adriatic coast (and Lake Skadar)	Medium
	• **Increased demand on water system especially in summer when demand increases due to tourism**	*Businesses increasingly unable to meet service demands of tourists*	Northern Macedonia	High
	• Eutrophication and multiplication of aquatic plants	*Fresh water environments become unpleasant for leisure use*	Northern Montenegro Central Montenegro Lake Skadar	Medium
	• **Insufficient adaptation of tourism offers in line with climate change**	*Businesses fail to act on climate issues and business models are overtaken by climate change*	All areas	High
Decrease in precipitation	• Reduction of the amount of water available	*Businesses unable to meet basic needs during high season*	Kotor, Adriatic coast	High
	• Reduction in snow cover	*Winter snow tourism endangered; season cut short*	Central and Northern	High
	• Reduction of water levels in coastal wetlands	*Stable wetlands are essential in mitigating flash-flooding*	Adriatic coast (and Lake Skadar)	medium
Storm winds and storms	• Exacerbated soil erosion, damage to power lines, buildings, and structures.	*Businesses disrupted*	All areas	Low
	• Strong winds create high waves that can cause damage to ships, coasts, and coastal infrastructure, as well as disrupt maritime traffic	*Sea-based leisure activities and yachting disrupted; Loss of attractiveness of the coastal area – Loss of economic assets Decrease in tourist visits*	Kotor, Adriatic coast	Medium

Floods	• Intensified erosion processes	*Disruption to businesses*	All areas	Medium
	• Loss of attractiveness of the coastal area	*Disruption to touristic flows and patterns*	Kotor, Adriatic coast	Low
	• Direct loss of income and weakening of the national economy	*Weakened tourist economy with consequences for employment and tax base*	Central and northern Montenegro	Medium
Sea level rise (SLR)	• Infiltration of salt water into water systems – Flooding in low-lying area	*Businesses unable to meet basic touristic needs*	Kotor, Adriatic coast	Low
	• **Erosion of coastal zones and beaches**	*Tourist natural assets become unattractive*	Kotor, Adriatic coast	Medium

In purpose of identifying and defining the gender based vulnerable groups in 4 listed sectors in Montenegro a Multifactor analysis approach is needed due to the complexity and different nature of the factors which are defining the gender-based vulnerability (social, economic, climate, cultural).

As shown in the section **Gender profile in Montenegro in the context of water, tourism, agriculture and health** there are significant differences between women and men that have to be considered in order to clearly and precisely define the gender-based vulnerabilities in each of the sectors.

In other words, gendered vulnerabilities are resulting from multiple interactions of social (in wide meaning of the term) and biophysical factors. In that regard following aspects have to be cross-referenced in defining the gendered vulnerability:

1. Geographical (Central, Coastal and North if applicable, which means if regional data are available and if the vulnerability has regional characteristics)
2. Governance and institutional factor (adaptation measures with gender responsive dimension)
3. Household level (power relations, gender-based roles, control over resources, ownership)
4. Coping and adaptive capacity[51] (socio-economic factors, decision making processes)

The level of vulnerability will be measured by the following scale: Low, Moderate, High, Not known due to the fact that there are no sufficient sex-disaggregated data on one hand, and due to the fact that the nature of the indicators is different. Therefore, the cross-reference and measurement will be done upon above listed measurement scale in a form of a qualitative analysis.
Column “Sectoral vulnerability” lists the key identified sectoral adaptation vulnerabilities correlated with the “human” factor, meaning directly on indirectly endangering socio-economic, health, quality of living aspects.
The subjectivity of this Multi criteria analysis will be meet by its validation from the national stakeholders and relevant institutions.

[51] Available data will be used as a criterion in the “General gender statistics” section

Table 13 Gender-based vulnerabilities multi-criteria analysis

Sectoral vulnerability	Geographical area (where applicable)			Household level Gender-based roles	Gender differences in exposure and hazards	Gender differences in the Coping and adaptive capacity	GENDER DISAGGREGATED IMPACTS[52]
	North	Coastal	Central				
TOURISM	Moderate	High	High	High	Moderate	Moderate	North region there are 118 male registered rural households against 30 female households,[53] South region the gender gap is smallest with 10 male and 4 female and 1 family registered rural households Central region there are 22 male and 4 female registered rural households
Degradation or loss of natural and cultural heritage assets that attract tourists (climate, ecosystems, beaches, snow) as well as damage to tourism infrastructure and destination communities[54];	Moderate	High	Moderate	Moderate	Low	Moderate	Men-owners of touristic capacities Women included in the family work Housewives are most represented in the inactive labour force in the North region with 21% from the total inactive rate
Increased climate sensitive tourism operator costs (energy, water, food) that will alter competitiveness;	Moderate	High	Moderate	High	High	High	Men-owners of touristic capacities Women included in the family work Holders of ownership over business entities in Montenegro women are in 8.7% owners of entities in the Food and beverage service activities sector, while in the category Accommodation their representation is 11,8%.
Reduced attractiveness of the tourism sector due to heat waves, extreme weather events and forest fires	Moderate	High	Moderate	Moderate	Moderate	High	
Reduced touristic products/offers due to changing climate (reduced snow cover, agro-tourism, adventure tourism etc.)	High	Moderate	Moderate	Moderate	Moderate	High	Men-owners of touristic capacities Women included in the family work Holders of ownership over business entities in Montenegro women are in 8.7% owners of entities in the Food and beverage service activities sector, while in the category Accommodation their representation is 11,8%.

[52] The Multi Criteria Analysis is populated by the RVA and was based on expert judgment, literature review, and exchange with the relevant stakeholders
[53] No official sex-disaggregated data is available on other touristic capacities
[54] https://ur.art1lib.com/book/75785906/38570d

Economic damage of loss of indirect income from tourism	Moderate	Moderate	Low	High	Moderate	Moderate	Men-owners of touristic capacities Women included in the family work Holders of ownership over business entities in Montenegro women are in 8.7% owners of entities in the Food and beverage service activities sector, while in the category Accommodation their representation is 11,8%.
Economic damage of job losses and rising unemployment	Low	Moderate	Low	Moderate	Moderate	High	Men-owners of touristic capacities Women included in the family Gender segregation of the labor in the accommodation and food services states that the rate of women`s employment is 48.7% in the category accommodation, and 38.4% in the category activity of preparing and serving of food and beverages, which implies that biggest burden in this sector is failing on men.**work**
Lack of adaptive capacity**	High	High	Not Moderate	High	Low	Not Moderate	This is an important aspect of gender-based vulnerability analysis, but there is no data to analyse or make expert judgement. Figure 35 (below) provides some useful detail; Section 4.5 (especially Table 16, below) provides a comprehensive framework (CVIT) for tourism into which gender aspects, once the data has been generated, can be integrated

*Vulnerability was assessed based upon the historic distribution of the climate extreme events + environmental and socio-economic determinants of participation in the tourism sector in the regions

** Section 6 of this report (below) "…Priority actions that address climate-driven vulnerabilities and gender disaggregated impacts" provides further information on adaptive capacity, whilst Section 3.1 makes the following commentary about adaptive capacity in Montenegro's tourism" In terms of adaptive capacity, Montenegro presents certain paradoxes. Whilst some parts of government are fully aware of and engaged with climate change and other environmental issues (some of which are framed by Montenegro's EU Accession obligations), tourism is not sufficiently integrated with the various government institutions; it remains something of an outlier.

Montenegro has a competent scientific community but one which has either failed to recognise the importance of the relationship between tourism, the natural environment and climate change or has not been incentivised to make this area a subject for empirical research. So, whilst scientific capacity certainly exists, the issue is one of awareness, communication, and subsequent action.

Building adaptive capacity is not something the tourism sector can tackle by itself. It will only be improved by sector awareness of the need for climate action at the business operations level, and a symbiotic, supportive relationship with the scientific, research, and policy making communities beyond the narrow confines of the tourism industry…"

4.4. Climate-driven vulnerabilities and gender-disaggregated impacts of the tourism sector Climate-driven vulnerabilities and gender-disaggregated impacts of the health sector

Montenegro's TNC to the UNFCCC[55] (April 2020) recognises climate vulnerabilities for tourism as follows:

- The sectors of agricultural, forestry, and tourism are the most affected by droughts in Montenegro. The occurrence and magnitude of droughts is expected to increase in the future, with decreasing rainfall and increasing temperatures, especially during the summer and autumn. (Page 166)
- A reduction in the annual amount of snow could have a negative impact on water supply through the earlier occurrence of the hydrological minimum at these sources (early August instead of September), so it may occur during periods of peak water use due to tourism (Page 185)
- According to the Tourism Development Strategy of Montenegro until 2020, almost 70% of the total number of overnight stays in the last years is recorded during July and August, and nearly 90% in the period June–September. Such a time distribution of visits through- out the year makes tourism revenue very sensitive to climate change, as coastal tourism in southern Europe is projected to decline due to high daily temperatures. In this respect, the vulnerability of coastal tourism cannot be assessed with certainty, since tourists may, themselves adapt to climate change. Although a further increase in air temperature in the main seasonal period could lead to a fall in the number of tourists, an improved offer of tourist activities in the pre- and post-season periods could increase the number of tourists (Page 213-4)
- (Table 5.13) mentions tourism vulnerabilities: 'insufficient adaptation of tourism offers in line with climate change' 'loss of attractiveness of the coastal areas- loss of economic assets and decrease in tourist visits' 'erosion of coastal zones and beaches' Page 214)
- (Table 5.19) thunderstorms can cause economic damage to tourism and cause increased vulnerability to the tourism economy (Page 226)

Table 14 below, shows a summary of identified vulnerabilities as does the narrative provided above in relation to the GIS climate forecast maps. The Montenegro National Drought Plan notes that reduction in the annual amount of snow due to an increase in air temperature is projected, which may have a significant effect on Montenegro's economy in future, particularly on tourism, having in mind that tourism is one of the main branches (Page 39). It goes on to say

"…Tourism plays a significant role in the Montenegrin economy, as it represents one of the most important development sectors. The entire tourism industry is highly dependent on climate and climate change, and expected drought could make it difficult to function and plan in tourism…

Drought can affect natural habitats and biodiversity, which are the main attraction of Eco tourists and nature lovers, and biodiversity loss would dangerously jeopardize eco-tourist attractions. Increased temperatures will affect activities of tourists that are related to the environment, such as bird watching and hiking in nature.

The change in the amount of precipitation and the hydrological cycle can affect the availability and quality of fresh water sources at the touristic destination. Also, drought can affect river flows and lakes level, which includes further impacts on recreational activities on the beach and sport fishing…" (Page 48)

[55] https://unfccc.int/documents/254489

The European Bank for Reconstruction and Development EBRD make several references to 'a pronounced need to diversify the economy away from 'sun, sand and sea' seasonal tourism…' and 'Diversify the sector beyond 'sun, sea & sand' tourism, including by lengthening the season, addressing regional disparities and focusing on backward linkages and upscale higher value added tourism…' including in the 'government reforms' section. Other EBRD comments emphasise the benefits of strengthened linkages between tourism and agriculture.

EBRD priority 3 states: 'continue to foster transition to a green economy including sustainable tourism' noting that '[EBRD] supported a series of projects to promote resource efficiency and environmentally sustainable practices in municipal and tourist infrastructure including a €24 million loan to the regional water supply company (RWSC) to improve water supply to coastal towns and facilitate sustainable tourism development…

Table 14 Tourism products ranged against climate vulnerabilities.

	Tourism product (seven touristic development zones from the 2025 tourism strategy)	Potential climate vulnerabilities/ impacts
NATURAL ENVIRONMENT	**Land-based** • Adventure tourism – rafting, zip line, canyoning, hiking, mountaineering, cycling, etc. hiking and mountaineering, cycling, camping, skiing, horseback riding, hunting etc. • Bird watching • Protected areas (national parks and nature parks) with a diversified offer • Winter tourism – ski centres	**Vulnerabilities** - Flash floods/ thunderstorms/ landslides - More forest fires - Decreased snow cover, increased snow-making costs, decreased ski season - Bird migratory patterns change - Heat makes coastal zone unattractive, reduced biodiversity - Water shortages **Positive impact** - Extended spring and autumn hiking/ adventure seasons
	Water/ coastal zone-based • Cruising/ nautical tourism • Swimming/ diving tourism • Fishing and sport-fishing tourism • Protected areas • Sports and recreational tourism (kite surfing, windsurfing, wakeboarding, paragliding and surfing, camps for athletes, sports schools • Health and wellness tourism (Women's beach, healing mud) • Bird watching	**Vulnerabilities** - Algae blooms in lakes - Water temperature changes fish stock profile; reduces biodiversity - Sailing/ yachting dangers from storms and high winds - Bird migratory patterns change - Sea Level Rises (SLR) **Positive impact** - Extended spring and autumn seasons
CULTURAL HERITAGE	**Tangible/ experiential assets** • Cultural tourism – museums, castles, religious buildings, archaeological sites, authentic architecture • Touristic village attractions/ annual festivals • Rural tourism – rural households and cottages	**Vulnerabilities** - Archaeological/ outdoor sites too hot to visit comfortably - Food agriculture/ viticulture patterns negatively impacts food and wine - Summer season too hot for rural/ ecotourism villages - Landscape aesthetics diminished

	• Cultural tourism (events, cultural heritage, legends; pirates, slave square, etc.), Spanish author Miguel de Cervantes • Salt in Ulcinj salt works • Gastronomic and wine tourism	**Positive** - Extended spring and autumn season - Extended specialist food growth season

In general, the tourism-gender literature tends to portray women as victims with no agency[56], but this is changing somewhat. Whilst tourism is guided and framed by policy, it is delivered by the private sector, and in some respects monitored by third sector and academic actors. But whilst Montenegro has issued recently a very useful gender equality report (UNDP, 2020)[57] it can be seen from the above that there is very little empirical evidence about the status of women in tourism in Montenegro either as entrepreneurs, managers, or employees. To compensate for this deficiency, table 1 frames the way gender enquiries can be made of tourism:

Table 15 Critical Questions in Considering Gender-Tourism Dynamics[58]

Individual Level	Interactional Level	Institutional/Sectorial Level
Socialization, personality, construction of one's identity and self-perception	Stereotypes, social roles, expected behaviour, cognitive biases	Beliefs, ideology, power, resource distribution, institutionalized structuring, macro factors
• Are there intrinsic characteristics that define feminine and masculine identity in the tourism industry? • Which values and beliefs are involved in feminine and masculine identity when dealing with travel and leisure? • How does gender influence self-concept or self-satisfaction from a leisure perspective? • What constrains does gender imply in individual tourism decisions or in the specific analysed tourism issues? • Is gender identity linked with stages in life cycle?	• How have men and women internalized gender roles? • How is gender created through social interaction in tourism? • How do gender roles influence individual behaviour in the particular tourist issues and scenarios? • Could you identify different behaviours in the interaction with others in various tourism situations (both consumers and workers)? • How do individual families define gender roles in tourism? (are there trends?)	• Does gender affect tourism job opportunities, wages, conditions? • How does gender affect success? • What is the relevance of gendered organization in tourism? • What gendered stereotypes are established in the tourism industry? (Do these stereotypes create differentiated gender treatment?) • Does gender affect leisure activities in tourism? • Do socio-cultural factors (society patriarchal or matriarchal, age, family life cycle sage, education and self-concept) determine travel decisions?

[56] Roomi, M.A., and Parrot, G. (2008). Barriers to development and progression of womenentrepreneurs in Pakistan. The Journal of Entrepreneurship, 17(1), 59–72.; Brindley, C. (2005). Barriers to women achieving their entrepreneurial potential: women and risk. International Journal of Entrepreneurial Behaviour and Research, 11(2), 144–161; Moore, D.P., and Buttner, E.H. (1997). Women Entrepreneurs: Moving Beyond the Glass Ceiling. Thousands Oaks, CA: Sage Publications; Blanchard, L., Zhao, B., and Yinger, J. (2008). Do lenders discriminate against minority and woman entrepreneurs? Journal of Urban Economics, 63, 467–497.

[57] https://www.me.undp.org/content/montenegro/en/home/library/womens_empowerment/GEI2019.html

[58] https://www.emerald.com/insight/content/doi/10.1108/JTA-02-2019-0009/full/html

Source[59]

Getting industry, government, and various non-state actors to address the questions raised above will generate useful ideas on how to progress the issues. International organisations have undertaken substantial work on gender and climate. For example, UNDP has identified 'gender-specific inequalities that contribute to women's disproportionate exposure and vulnerability to the adverse effects of climate change as well as women's positive contribution to the climate effort' More powerfully, they go on to say 'Gender-based inequalities in law and in practice, gender-defined roles in society and sociocultural constraints render women disproportionately vulnerable to climate change.'

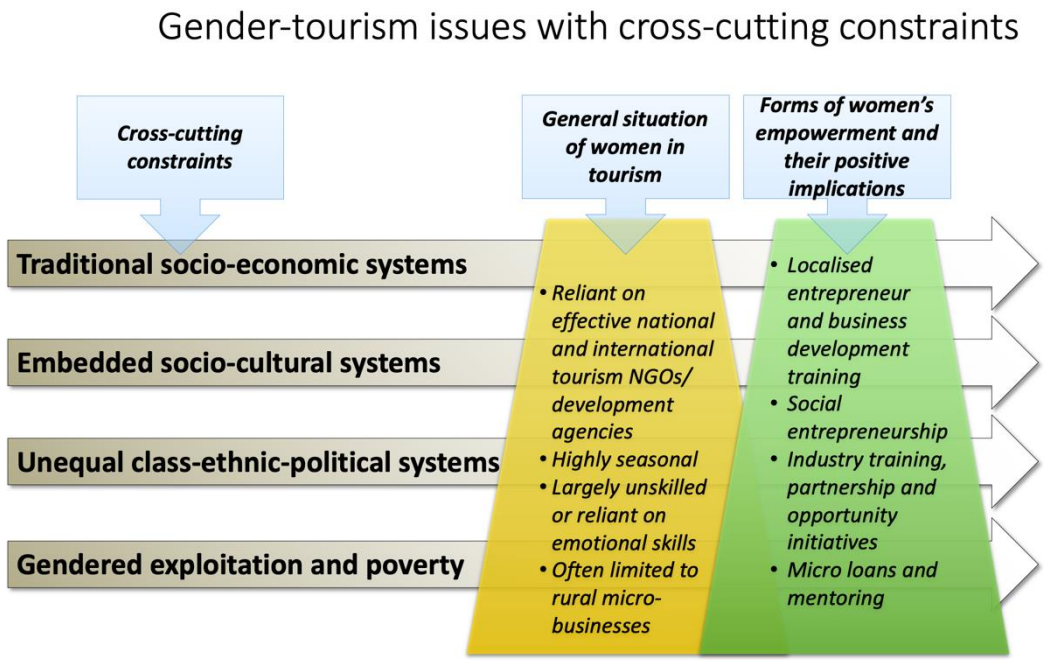


Figure 34 Gender-tourism issues

The Figure above also provides a framework for gender-tourism-climate vulnerability thinking that can be adapted and applied to the case of Montenegro when more detailed data emerges.

[59]Figueroa-Domecq, C., Segovia-Perez, M. (2020) Application of a gender perspective in tourism research: a theoretical and practical approach. Journal of Tourism Analysis: Revista de Análisis Turístico 27(2)

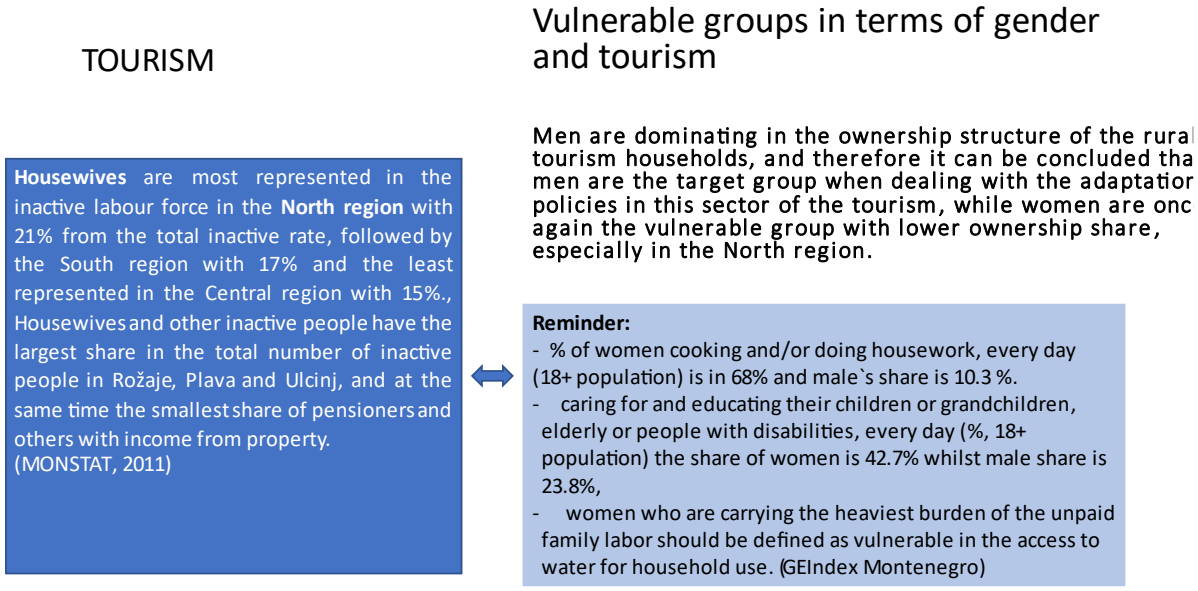


Figure 35 Gender-based vulnerability in correlation to the unpaid labour in the sector of Tourism

It can be concluded that a comprehensive and unified gender analysis is needed in the tourism sector in purpose of unifying the gender data and sex-desegregated available data.
On the other hand, the gender-perspective should be vertically and horizontally incorporated into the tourism-based strategies, action plans and other policy and project documents to properly address the gender-based vulnerabilities, not just in adaptation processes but in general in the strengthening the position of women in this sector, and unified analysis in purpose of creating of realistic policy and program measures.

4.5. Vulnerability indicators

The most comprehensive and rigorous set of indicators is the 'Climate Change Vulnerability Index for Tourism' (CVIT) developed by Scott, Hall, and Gossling 2019), which is shown below asTable 16. It comprises 27 indicators with a brief description of each and a published source to show provenance for the indicator. Indicator selection was based on their comprehensiveness, relevance as perceived by expert opinion, data availability, as well as comparison with existing indices. There are still some gaps that are, frankly, too complex to identify accessible data sets, including: insurance costs, degradation or loss of natural and cultural heritage sites, decline or loss of tourist attracting species, and beach loss and nourishment costs. The selected indicators are described in Table 16 and are integrated into six index dimensions representing:

1. **Tourism assets [TA]** (five indicators) - degradation or loss of natural and cultural heritage assets that attract tourists (climate, ecosystems, beaches, snow) as well as damage to tourism infrastructure and destination communities;
2. **Tourism operating costs [TOC]** (five indicators) – impacts on climate sensitive tourism operator costs (energy, water, food) that will alter competitiveness;
3. **Tourism demand [TD]** (six indicators) – impacts that alter domestic and international markets (economic growth), including mobility costs (mitigation policy) to reach destination countries;

4. **Host country deterrents [HCD]** (three indicators) - impacts that deter destination choice of international tourists (weather disasters, and health and security risks);
5. **Tourism sector adaptive capacity [TSAD]** (five indicators) – capacity of the tourism sector in a country to adapt to climate change;
6. **Host country adaptive capacity [HCAD]** (three indicators) – capacity of the destination country to adapt to climate change and maintain tourism assets, infrastructure and socio-political conditions conducive to international tourism.

Table 16 Table Climate Change Vulnerability Index for Tourism' (CVIT)

Climate Change Vulnerability Index for Tourism' (CVIT)			
SUB-INDEX COMPONENT	**INDICATOR**	**DIMENSION OF VULNERABILITY OPERATIONALIZED AND ASSUMPTIONS**	**UNITS AND DATA SOURCE**
TOURISM ASSETS (TA)	Climate suitability for tourism	The extent to which climate suitability for general tourism is projected to change (positively or negatively).	Tourism climate index score (2050) (Amelung, Nicholls, & Viner, 2007)
	Ecotourism impact (terrestrial)	Greater ecosystem change will degrade ecotourism attractions.	Biome distribution score (% land area projected to change biome type by 2070–2100)[60] (ND-GAIN, 2016)
	Ecotourism impact (marine)	Greater biodiversity change will degrade ecotourism attractions.	Change in marine biodiversity score (species turnover by 2050) (ND-GAIN, 2016)
	Coastal/beach tourism impact	Greater land area exposed to sea level rise and storm surge will increase beach and coastal tourism infrastructure damage and loss.	% land area below 4 m above sea level exposed to storm surge with 1 m SLR (ND- GAIN, 2016)
	Ski tourism impacts	Reduced ski season length, increased snowmaking costs, and greater travel distances will reduce winter sports tourism	Change in ski season and snowmaking costs – scores averaged from survey of experts
TOURISM OPERATING COSTS (TOC	Water competition and costs	Greater competition for water means cost increases and restrictions. Changes in precipitation adversely impact water resources leading to face cost increases and use restrictions	Current water stress (all sectors) (World Resource Institute, 2016); Change in water stress (2050) (Schlosser et al., 2014)
	Energy costs	Electricity grids more dependent on fossil fuels will see greater decarbonization transition costs. Marginal costs increase with greater GHG emission reduction ambitions.	% electricity from fossil fuels (World Bank, 2016a) National emission reduction ambitions (UNFCCC, 2019)
	Food cost	Fewer local food supply options may degrade cultural/food tourism, and increase sensitivity to price volatility	Food import dependency (ND-GAIN, 2016
TOURISM DEMAND (TD)	Climate change influence on international arrivals	Changes in climate at destinations and source markets will alter the pattern of international tourism.	% change in international arrivals (Hamilton et al., 2005)
	Economic growth in country's top 5 international markets	Reduced economic growth (GDP) adversely affects disposable income for tourism.	Change in GDP from climate change (2050) (Burke et al., 2015)
	Distance to country's top 5 international markets	Long haul destinations have higher travel costs and are at greater exposure to price increases resulting from emission reduction policies.	Average distance (km) from destination country to its top 5 markets – calculated based on arrival data (UNWTO, 2012)

[60] https://www.sciencedirect.com/science/article/pii/S0160738319300817/

	% international leisure arrivals	Leisure tourists are more likely to change destinations because of climate change impacts than business of friends/family travellers.	% of international arrivals for leisure tourism (UNWTO, 2012)
	Climate change influence on domestic departures	Changes in climate at destinations and source markets will alter the pattern of international tourism.	% change in domestic departures (Hamilton et al., 2005)
	Economic growth in country (domestic GDP)	Reduced economic growth (GDP) adversely affects disposable income for tourism	Change in GDP from climate change (2050) (Burke et al., 2015)
Host Country Deterrents (HCD	Weather disasters	Extreme weather events are widely recognized as one of the greatest impacts of climate change and can damage tourism infrastructure and destination communities, deterring travellers during recovery and creating reputational damage[61]	Climate risk index score (GermanWatch, 2018)
	Security impacts	Civil unrest, political strife and conflict are strong deterrents for tourists. Fragile State Index measures proximity to state failure.	Fragile state index score (Fund for Peace, 2018)
	Health impacts	Disease outbreaks and presence of some disease vectors deter tourists	Change in vector born disease (malaria by 2050) (ND-GAIN, 2016
Tourism Sector Adaptive Capacity (TSAC)	Tourism competitiveness	Higher multifaceted competitiveness provides greater adaptive capacity	Travel and tourism competitiveness index score (World Economic Forum (WEF), 2015)
	Country image and brand attractiveness	Stronger global tourism brand provides greater destination rebranding capacity to overcome adversely impacts on tourism assets.	Country brand ranking (tourism edition) (Bloom Consulting, 2018)
	Outbound market size	Outbound international tourists could convert to domestic tourists if travel cost structures or attractions change.	Number of international departures (UNWTO, 2016)
	Wealth distribution	More equal wealth distribution increases the number of potential domestic tourists. Social inequality degrades overal capacity to adapt.	GINI index (most recent year available) (World Bank, 2018)
	Quality of transport infrastructure	Higher quality transport systems provide greater accessibility throughout a country (destination substitution) and are less prone to prolonged disruption	Trade and transport infrastructure score (ND-GAIN, 2016)
Host Country Adaptive Capacity (HCAC)	Socio-economic conditions that support adaptation	Countries with more developed education, infrastructure, and health systems have greater adaptive capacity. Multi-criteria analysis indicates the Human Development Index outperforms other indices as a national-level metric of social vulnerability to climate change (Füssel, 2010).	Human development index score (UNDP, 2016)
	Governance quality Sustainability	Governance systems characterized by political stability, regulatory quality, and control of corruption, provide greater adaptive capacity.	Combined rank score of six World Governance Indicators (World Bank, 2016c)

[61] https://notsobudgetbackpacker.com/sightseer/you-asked-why-tourism-is-vulnerable-to-climate-change.html

	governance and performance	Stronger sustainability performance is supportive of adaptive capacity among ecosystems vital to tourism.	Environmental Performance Indicator score (Yale University, 2016)

5. Economic impact assessment of the climate change impact on the health sector

Methodology

In **the tourism sector**, there were considered the negative effects of climate change that will occur due to the reduced number of tourists, which will directly lead to a decrease in income on this basis. In order to do this, it was necessary to:

- Collect appropriate statistical data on tourist activities (number of tourists, number of overnight stays, etc.), as well as on the realized income from tourist activity in the previous period;
- Process and analyse collected data, as a basis for further projections;
- Project revenues from tourism, for the baseline scenario - the scenario "without climate change";
- Assess quantitative damage - reduced number of guests, caused by climate change in accordance with established climate scenarios;
- Based on previously collected and processed data, perform calculation and projection of economic damages caused by climate change in this sector.

Defining the time frame for observation/analysis was the next important step. Climate change is a phenomenon that occurs slowly and not so noticeably, so its consequences, namely negative effects, cannot be adequately assessed for shorter periods of time (e.g. up to 20 years), which is common for different types of economic analysis. For this reason, and based on research and recommendations from numerous documents, especially the document "IPCC Special Report, Emission Scenarios" (Intergovernmental Panel on Climate Change, WMO and UNEP, 2000) it was decided to assess economic damage as a consequence of climate change for:

- The period of the near future, until 2050 (Near Future) and
- The period of the distant future, up to 2100 (Far Future).

In the scope of the further analysis, and due to the impossibility to precisely define at this moment the extent of impact on the climate which will occur in these defined periods, and therefore what negative consequences these changes will cause, it was decided to observe two scenarios - more favorable and less favorable, within each period of time. The number of scenarios can certainly be higher, but it is estimated that for the sake of clarity of the analysis, and also its objective (to determine the preliminary approximate level of considered adverse effects), this number of scenarios is sufficient.

Ideally, further analysis would imply that within each considered sector, adverse effects are quantified by defined categories of analysis, for both time frames and for both climate scenarios. Given that this is very difficult at the moment, since adequate researches are scarce, as well as data in Montenegro on it, the experiences in analysis and research in Europe and the world were considered. Data and assumptions in these sources vary, so only those which served to define the criteria for this analysis are presented below.

Within the document *"The Economic Impact of Climate Change in Montenegro"*(UNDP, 2010), the assessment of economic damage for individual sectors was performed on the basis of the following assumptions:

- For the period up to 2050, 2 scenarios: losses of 3% and 8%;
- For the period up to 2100, 2 scenarios: losses of 8% and 15%

Researches abroad have mainly focused on predicting adverse effects on the total national GDPs as a result of climate change. Thus, for example, in a document prepared by the Swiss Re Institute, *"The*

Economics of Climate Change: No Action not an Option" (April 2021) the expected impact on global GDP by 2050 was presented, according to four different scenarios, as compared to the world "without climate change". Those are the following scenarios for Europe:

- Decrease of GDP of 2.8%, if the goals of the Paris Agreement are achieved (increase in temperature well below 2 ° C);
- Decrease of GDP of 7.7%, if further mitigation measures are taken (temperature increase of 2 ° C);
- Decrease of GDP of 8.1%, if some mitigation measures are taken (2.6 ° C increase in temperature);
- Decrease of GDP of 10.5%, if mitigation measures are not taken (temperature increase of 3.2 ° C).

As it can be seen, harmful effects by 2050 are estimated in the range from about 3% to approximately 10% for the period until 2050.

The third document that served as a basis for further analysis is the official document of the International Monetary Fund from 2019, *"Long-Term Macroeconomic Effects of Climate Change: A Cross-Country Analysis"* (International Monetary Fund, 2019). In this document, there is analysis of negative impact of climate change on GDP, by countries, grouped in relation to their geographical location and economic situation. The analysis showed that these damages, for a group of countries including Montenegro, would be the following:

- for the period up to 2050: losses of 2.18% and 3.11%;
- for the period up to 2100: losses of 6.05% and 8.25%

It is obvious that the predicted adverse effects within this document are somewhat lower than in the previous ones, which only confirms the view that their prognosis is not simple and depends on numerous input assumptions. Therefore, in order to cover the broader framework of analysis and future estimates, within this document the analysis was performed for all considered sectors with the **following scenarios**:

1. Near future, damage level by 2050 5% (Near Future 1, NF1),
2. Near Future, damage level by 2050 10% (Near Future 2, NF2),
3. Far future, damage level by 2100 10% (Far Future 1, FF1),
4. Far Future, damage level by 2100 15% (Far Future 1, FF2).

Projections of individual economic categories are made relying on certain growth rates based ither on historical data, or on the fluctuations of a certain category in the past period, or using official GDP growth rates, or certain sectoral rates or a combination of all mentioned above with appropriate estimates of sectorial experts.

In this particular case, some historical rates are not fully relevant due to the atypical 2020. This also applies to the GDP growth rate, which dropped significantly in 2020. For that reason, it was decided to follow the precautionary principle with moderate growth rates, in relation to the initial state. For tourism we decided for increase of 1.5% per year.

Economic vulnerability assessment

Many types of tourism depend on the weather, and therefore on the climate, so it is very likely that climate change will sooner or later affect the development of tourism. Climate change can reduce snow cover, increase or prolong heat waves, or change annual precipitation patterns, for example. Climate change is a relatively slow process, so the changes may not be so obvious in the short term,

but for many countries and regions in Europe, studies have been conducted on longer heat waves, reduced snow cover, extreme rainfall and drought, which will all inevitably reflect on tourist activities.

The impacts of climate change on tourism are likely to manifest in a number of different ways, depending on local conditions. More frequent periods of extreme heat, reduced clouds and increased exposure to harmful sun radiation will cause inconvenience in many seaside resorts, while winter tourism will be affected as these tourist destinations will have less snowfall and shorter ski seasons.

All this together can lead to a decline in the number of tourists, and to significant negative economic effects on the Montenegrin economy.

Tourism is an extremely important component of the national economy of Montenegro and is one of the most important activities that has significant potential for economic growth and development, with many multiplicative effects. Therefore, tourism is one of the most promising activities in the future economic development of Montenegro, because in addition to a direct contribution to the national economy, it is an activity that generates the development of other, complementary activities.

It is completely clear that the negative consequences of climate change would directly affect the tourism sector, in the form of reducing the volume of work (number of tourists, number of overnights), which would then lead to a reduction in direct and indirect income generated by this activity.

Assessment of the economic impact of climate change in the tourism sector in Montenegro would be conducted through assessment of effects of climate change on the number of tourist arrivals (foreign and domestic), which would then be reflected in reduced revenues in this sector. Therefre, it is necessary to perform appropriate data collection (number of tourists, consumption, tourism revenues, etc.), their analysis, as well as projections for defined time periods. After that, it is necessary to perform a damage assessment, according to the appropriate scenarios, which creates the conditions for the assessment of total economic damage on this basis.

According to available data for 2019 (the last year for which official statistics are available), Montenegro has 406 facilities for collective accommodation of tourists. There are 20,882 accommodation units in these facilities, of which the largest number of rooms (17,329), then apartments (2,635), then campsites (918). There are 48,837 beds in these accommodation units, which is an increase of about 5% compared to 2018[62].

Regarding individual accommodation, the latest available data are for 2016, and based on them, there are 49,910 accommodation units. The largest number of rooms (47,316), then apartments (2,309), then campsites (285).

The following table shows the change of the number of tourist, domestic and foreign, as well as the number of overnight stays in the period 2016-2020. Data on the number of tourists and the number of overnight stays were obtained on the basis of available data from the Statistical Office - Monstat.

Table 17 Changes of the number of tourists and the number of overnight stays (2016 – 2020)

Structure	2016	2017	2018	2019	2020
Domestic tourists	151,696	122,797	128,053	135,592	97,933
Foreign tourists	1,662,121	1,877,212	2,076,803	2,509,625	521,319

[62] Statistical Office-Monstat, Turizam, Smještaj, https://www.monstat.org/cg/page.php?id=45&pageid=45

Total tourists[63]	**1,813,817**	**2,000,009**	**2,204,856**	**2,645,217**	**619,252**
Annual growth rate of the number of tourists	5.88%	10.27%	10.24%	19.97%	-76.59%
Overnights, domestic tourists	721,530	483,184	486,524	522,382	378,823
Overnights, foreign tourists	10,528,475	11,470,132	12,443,810	13,933,538	3,851,245
Total overnights[64]	**11,250,005**	**11,953,316**	**12,930,334**	**14,455,920**	**4,230,068**
Annual growth rate of the number of overnight stays	1.76%	6.25%	8.17%	11.80%	-72,36%
Average number of overnight stays by domestic tourists	4.76	3.93	3.80	3.85	3.87
Average number of overnight stays by foreign tourists	6.33	6.11	5.99	5.55	7.39
Average number of overnight stays[65]	6.20	5.98	5.86	5.46	6.83

As it can be seen, in the past five years, in the period before the pandemic, from 2016 to the end of 2019, Montenegro recorded a constant and intensive growth, both in the number of tourists and the number of overnight stays[66]. The number of tourists in the last three years of that period had a double-digit annual growth rate, and the growth in 2019 compared to 2018 was as much as 20%. In the structure of tourists, about 95% of them were foreigners, while the rest were domestic tourists. Tourists from European countries accounted for about 91% of the total number of foreign tourists, and most of them were from Serbia, the Russian Federation and Bosnia and Herzegovina. The number of overnight stays also had a noticeable increase in that period.

However, as is well known, in early 2020, Corona virus pandemic (Covid19) occurred, which had and still has a huge impact on the entire world, both in the way people live and in the global economy. The pandemic differently affected individual industries, most of them negatively, so that different activities, in relation to the nature of their business, more or less successfully adapted to the new situation. Tourism is certainly one of the economic activities on which the pandemic, especially in its first year, had the most significant impact. Restrictions on movement, travel, unhindered flow of people, but also goods, were directly reflected in the drastic reduction of tourist activities and the decline in the number of tourists (primarily foreign) in Montenegro in 2020. Unofficial data for 2021 show a significant recovery in tourism activities, so it is expected that this trend will continue in the future. For these reasons, data for 2020 will not be taken as relevant for further assessments of economic damage due to climate change in the future.

In addition to typical tourism, which includes the use of accommodation facilities, it is important to mention two other categories of the increasingly present form of tourism in Montenegro, which relate

[63] Statistical office - Monstat, Statistical Office, Arrivals and overnight stays, https://www.monstat.org/cg/page.php?id=44&pageid=44

[64] Ibid

[65] Author's calculations

[66] https://www.undp.org/sites/g/files/zskgke326/files/migration/me/1cd711dc25b5f99ed3cbde6a902c47c1ebfe109e141fd22c1ad2185b134e65c2.pdf

to: cruises of foreign ships and nautical tourism. The following table shows the changes of the number of passengers and the number of cruises (arrivals of vessels) in the period 2016 - 2020.

Table 18 Changes in number of passengers and cruises on foreign vessels (2016 – 2020)

Structure	2016	2017	2018	2019	2020
Passengers	540,445	532,337	506,198	649,038	3,007
Annual growth rate of passengers	22.41%	-1.50%	-4.91%	28.22%	-99.54%
Cruises	430	480	424	490	9
Annual growth rate of cruises	4.62%	11.63%	-11.67%	15.57%	-98.20

Changes of the number of passengers coming to Montenegro by foreign ships, observed in the past five years, is somewhat uneven, but it is clear that this number is increasing, except for the year of the pandemic, and that it is another category of tourism that is increasingly important.

The following table shows the changes inf the number of arrivals of foreign vessels and the number of visitors in the category of nautical tourism, in the period 2016-2020.

Table 19 Changes in the number of arrivals of foreign vessels and the number of visitors in the category of nautical tourism (2015 – 2019)

Structure	2016	2017	2018	2019	2020
Arrivals of foreign vessels	4,384	4,598	4,710	4,775	1,858
Annual growth rate of the number of arrivals of foreign vessels	9.11%	4.88%	2.44%	1.38%	-61.09%
Number of passengers	21,554	23,001	27,685	28,562	7,458
Annual growth rate of the number of passengers	3.33%	6.71%	20.36%	3.17%	-73.89%

Tourism is a very important segment of the national economy of Montenegro, but it is also a sector whose importance cannot be most accurately quantified precisely because it is related to almost all aspects of society and which directly and indirectly affects the growth of gross domestic product.

The direct contribution of tourism to the Montenegrin economy is measured through its participation in the Gross Domestic Product. Tourism, in the previous period (except 2020) from year to year occupies an increasingly important place in the total economic development of Montenegro, so its share in total GDP in 2008 was 5.2%, in 2014 8.2% , while in 2019 the share of tourism in GDP was 9.5%.

The indirect share of tourism is much higher, because the importance of this activity is reflected not only in its direct contribution to the Gross Domestic Product, but also in the indirect, more widely generated, through other complementary activities. Therefore some countries create satellite accounts for tourism, which provide an overview of all the economic effects of tourism. The purpose of these accounts is to analyze in detail all aspects of demand for goods and services that can be associated with tourism in the national economy. Montenegro has done these calculations only once so far, in 2009 and the results of these calculations showed that the GDP of tourism activities through TSA (Tourism Satellite Account) accounted for 10% of GDP in 2009, compared to the officially registered 6.2% share in GDP.

These data certainly cannot serve as a basis for further determining of future revenues from tourism, but in any case they are a clear indicator that tourism contributes to the total economy of Montenegro significantly more than as presnted by published statistical indicators expressed through GDP.

As a basis for the projection of income from tourism in the future, we will use the data from the Balance of Payments of Montenegro. Data on revenues from tourism in the balance of payments are presented within the Travel position, on the Services sub-account. This position includes the total consumption of goods and services by tourists during their stay of less than one year.

Changes of revenues from tourism in the period 2016 - 2020 are presented in the following table.

Table 20 Balance of payments, revenues and expenditures from tourism, 2015-2019 (000 EUR)

Structure	2016	2017	2018	2019	2020
Revenues from tourism	835,744	921,737	1,001,084	1,098,285	144,503

It is obvious that the growth trend of tourism revenues, as well as the number of tourists and the number of overnight stays, is constant in the period 2016-2019. In 2018, Montenegro exceeded the figure of EUR 1 billion in tourism revenues for the first time, and it is clear that this growth would have continued if there had been no pandemic. Official data for the first three quarters of 2021 show that the generated income from tourism was close to EUR 700 million (EUR 699,674,000), so it is realistic to expect that in the future the values already achieved by 2019 will be reached quickly. This served as a basis for further projection of revenues in the future, for longer term.

The projection of tourism revenues was made with the assumption that the record level from 2019 will be reached in 2025, after which moderate growth is predicted and this is shown in the following table:

Table 21 Projection of tourism revenues (EUR)

Year	Revenues from tourism (000) EUR
2025	1,098,285
2030	1,183,165
2035	1,274,605
2040	1,373,111
2045	1,479,231
2050	1,593,552
2055	1,716,708
2060	1,849,382
2065	1,992,309
2070	2,146,283
2075	2,312,156

2080	2,490,849
2085	2,683,352
2090	2,890,732
2095	3,114,139
2100	3,354,812

As it can be seen from the table, it is a realistic assumption that under the current climate, but of course all other existing conditions, Montenegro could earn up to almost 3.5 billion EUR from tourism in 2100.

After the projection of potential revenues, it is necessary to perform an expert assessment of the impact of climate change on tourism revenues, for different projected time periods, as well as for the appropriate climate scenarios. As in the agricultural sector, four scenarios were considered:

- Near Future, revenue reduction of 5% by 2050 (Near Future 1, NF1),
- Near Future, 10% revenue reduction by 2050 (Near Future 2, NF2),
- Far future, revenue reduction by 2100 by 10% (Far Future 1, FF1),
- Far Future, revenue reduction by 2100 by 15% (Far Future 1, FF2).

Based on the previously determined data, the estimation of economic damage in the tourism sector, due to the effects of climate change, is presented in the following table:

Table 22 Estimate of economic damage in the sector of tourism (000 EUR)

Year	NF1	NF2	FF1	FF2
2025	5,756	11,273	4,033	5,920
2030	16,609	32,662	11,623	17,082
2035	29,203	57,669	20,409	30,039
2040	43,750	86,763	30,536	45,009
2045	60,488	120,464	42,162	62,235
2050	79,678	159,355	55,465	81,990
2055			70,638	104,570
2060			87,898	130,309
2065			107,480	159,572
2070			129,650	192,767
2075			154,695	230,342
2080			182,937	272,792
2085			214,727	320,668
2090			250,455	374,574
2095			290,549	435,179
2100			335,481	503,222

Total	**1,007,738**	**2,001,392**	**9,252,231**	**13,793,916**

As expected, the economic damage in the tourism sector, due to the effects of climate change, could be significant. In the near future, these damages could be around € 80 to € 160 million per year on an annualized basis in the final year of observation, cumulatively amounting to around € 1 to € 2 billion for the total observation period. In the distant future, these damages in the final years would be from about 330 to about 500 million EUR per year, so the total amount of these damages for the total period up to 2100 would be from about 9.2 to 13.8 billion EUR.

6. Priority actions that address climate-driven vulnerabilities and gender disaggregated impacts

Montenegro's new tourism strategy emphasises greener, all year-round tourism. This is the right approach. However, it could be taken further. Tourism could take a much higher profile, even acting as a lead sector in conservation of nature (and culture); after all, tourism and the natural environment have an interdependent symbiotic relationship. Planners and policy makers can provide a lead through incentives and regulation whilst not harming business prospects and profitability. In such a case, tourism takes a lead in the climate challenge. Further general preliminary adaptation policy recommendations (scene setting or underpinning actions) are as follows:

- **Incentivise scientific research in tourism** generally and on the tourism-climate change nexus that will provide robust, empirical evidence to use as the basis for an awareness programme that sensitises the tourism sector management and employees into climate awareness. At present there is very little scientific research into tourism in Montenegro.
- **Facilitate future touristic developments along sustainable lines:** including installation of solar panels designed into the fabric of the building, heat exchange mechanisms, and appropriate building insulation to reduce energy costs. With IPCC AR6 predicting rises in temperature in the Southeast European region, the urgency for such measures is self-evident.
- **Adapt through diversification:** As the natural and climatic environment changes and causes tourism products and services to change, failures will occur in climate sensitive activities such as skiing, hiking and visits to assets of tangible heritage including archaeological sites. Adaptation measures should include diversification into activities more suited to emerging weather patterns
- **Conduct a detailed sensitivity and exposure assessment of tourist assets:** Cultural, environmental, and other national assets upon which tourism is dependent require climate and natural hazard risk assessments, where such assets have been assessed as part of national policy and climate reporting, they should be revisited to place them in their tourism context.
- **Facilitate sustainable development in and throughout the tourism sector:** Tourist developments/ infrastructure being planned should meet and exceed the highest standards for sustainability thus reducing vulnerability to increased energy costs and mitigating emissions. This process should be tracked throughout the value and supply and service chains (i.e., suppliers will have minimum carbon footprint and solid waste management is of the highest order) and
- **Incentivise and support private sector adaptation measures:** Provide incentives (e.g., tax remissions on any action to retrofit building, buy low emissions vehicles etc.), hold awareness briefings and practical workshops for the sub-sectors of tourism with a focus on bring together and sharing expertise between large and small enterprises (e.g., large international hotel brands sharing their expertise with small rural properties).
- **Development of national and local Business Development Services** for green and sustainable tourism, such as access to information, markets, training and exchange of experience. At local level, the activity should strengthen the links between networking enterprises (clusters, associations, cooperatives) operating within different communities, thereby creating profits generated by economies of scale, better forms of organization and increased representation and negotiation power for communities.

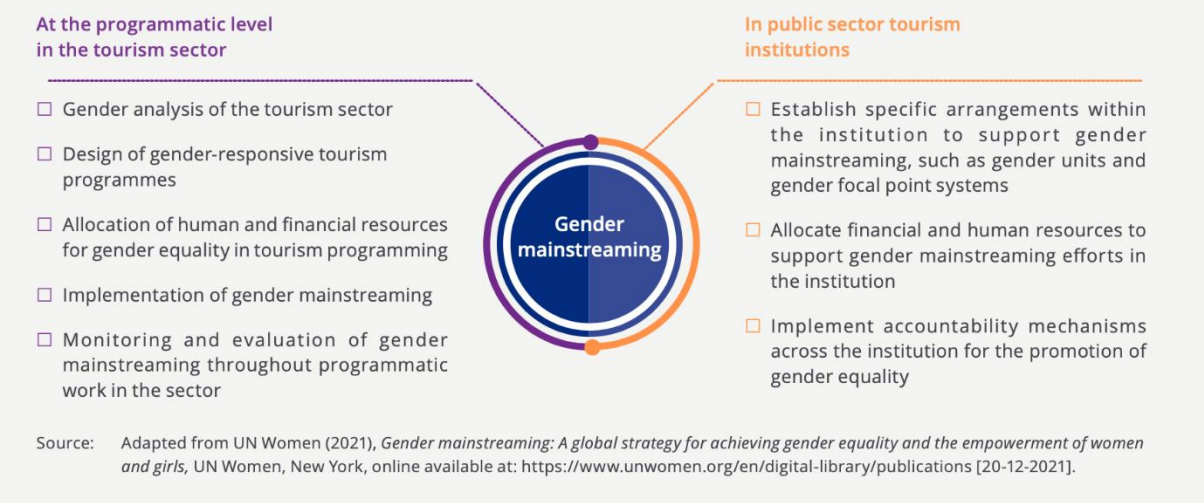
Specific gender- based actions in this sector are mostly related to empowering women in adaptive touristic solutions, such as:

- **Gender responsive coherence, governance and operational procedures in the tourism sector:** Horizontal and vertical incorporation of the gender perspective into the work of institutions and relevant stakeholders relevant for the tourism sector. Setting up an institutional and operational structure (procedures) for ensuring practicing of the gender

mainstreaming tools (collecting sex-disaggregated data, provision of a systematic gender analysis, ensuring gender-responsive policy design, monitoring and reporting).
Following specific measures can be applied:

- **Capacity building:** in purpose of systematic and synchronized development of the gender-responsive adaptive strategies in the sector, strengthening the institutional human capacities on gender perspective and gender mainstreaming (analysis, design, monitoring and evaluation).
- **Gender-balance and participation:** Inclusion of women in decision-making and consultative processes for development of realistic and sustainable adaptive strategies;
- **Gender-responsive incentive and support adaptation measures**: In correlation with the gender-responsive budgeting to design gender-responsive incentive and support adaptation measures targeted for gender-based vulnerable groups for improving the quality of life and the expansion (diversification) of economic activities focused on empowering women holders of touristic capacities in rural (and other) areas, as well as for unpaid family workers with focus on Nort region, and provision of supportive, climate-resilient solutions for women in the area of agro-tourism and in general to create and sustain climate resilient businesses in tourism;

On this theme, the UNWTO (World Tourism Organisation) published 'Mainstreaming Guidelines for the Public Sector in Tourism' (February 2022[67]) which may be summarized in the fillowing illustration:



Source: Adapted from UN Women (2021), *Gender mainstreaming: A global strategy for achieving gender equality and the empowerment of women and girls*, UN Women, New York, online available at: https://www.unwomen.org/en/digital-library/publications [20-12-2021].

Concerning recommendations, *Table 23* views adaptation recommendations and responses through a somewhat practical lens:

Table 23 Stakeholder Adaptation Aspect/ Action Matrix

Action / Aspect	Public Sector	Private sector and other stakeholders
Technical	• *Working with partners across government and industry to ensure green infrastructure, digital infrastructure, sustainable transport infrastructure* • *Scoping international technology trends in tourism management, marketing, and consumption*	• Tourism businesses: *snowmaking, retrofitting buildings, shading outdoor areas, reporting observable changes to their business operations caused by climate change* • Financial *investing in digital solutions*

[67] https://www.e-unwto.org/doi/epdf/10.18111/9789284423248

Action / Aspect	Public Sector	Private sector and other stakeholders
Managerial	• *Incentivising the growth and development of green/ sustainable tourism through guidelines and advice to businesses*	• Tourism businesses *developing and implementing climate monitoring and actions* • Tourism industry associations *scoping international sustainable management trends* • *Awareness building amongst member businesses*
Policy	• *Stakeholder consultation* • *Evidence based policymaking* • *Creating public awareness of sustainability, conservation and climate matters* • *Scoping international peers and organisations (EU/ WTTC/ UNWTO/ UNEP) for policy advances* • *Ensure commitments made by signing the Glasgow agreement on climate action in tourism are embedded in policy* • *Explore possibility of integrating tourism actions with REDD+ actions)*[68]	• Tourism industry associations *lobbying, international scanning for best practice* • *Prioritising sustainable investments* • *Engaging with environmental/ biodiversity NGOs to ensure articulation between sustainability needs, business plans, and lobbying*
Research	• *Funding and facilitating research into sustainable practices especially climate adaptation* • *Funding and facilitating literature reviews* • *Investigate potential for tourism research lab with special brief to ensure science support and underpinnings for the Glasgow agreement on climate action in tourism*	• Tourism businesses *identifying & communicating needs and knowledge gaps* • Research community *opportunity scanning, linking research to practical solutions via beneficial relationships with industry and NGOs* • *Communicating results beyond scientific community via policy briefs, press releases etc. as well as scientific papers*
Capacity Building/ public awareness actions	• *Scanning sectoral adaptive capacity; identifying adaptive deficiencies* • *Consulting with stakeholders, funding and facilitating environmental education & training* • *Consider need for public and consumer (tourists) awareness programmes*	• Tourism businesses *Identifying and communicating capacity needs* • Industry associations *set up annual green awards scheme to recognise and promote exceptional practice*
Behavioural	• *Incentivising good environmental business operations and climate actions through tax system* • Communicating with strategic partners across public and private sectors	• Tourism businesses *climate actions embedded in management* • Communities *partnering with private and public sectors with citizen-led and NGO climate actions*

Source: adapted from Mimura *et al.*, 2007

[68] *(see Annex 3 of Montenegro TNC pp249-250* https://www4.unfccc.int/sites/SubmissionsStaging/NationalReports/Documents/8596012_Montenegro-NC3-1-TNC%20-%20MNE.pdf