



Charting Croatia's Blue Economy Pathways

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Abbreviations

BAU	Business as Usual
BE	Blue Economy
BEDF	Blue Economy Development Framework
BESF	Blue Economy Sustainability Framework
BFT	Blue Fin Tuna
CBD	Convention on Biological Diversity
CBS	Croatian Bureau of Statistics (Central Bureau of Statistics)
CCI	Clean Coast Index
CFP	Common Fisheries Policy
CGT	Compensated Gross Tonnage
CMR	Center for Marine Research
COP	Conference of Parties
CRS	Croatian Registry of Shipping
DFN	Drift and/or Fixed Netters
DIVA	Dynamic Interactive Vulnerability Assessment
DRB	Dredgers
DTS	Demersal Seiners/Trawlers
EBRD	European Bank for Reconstruction and Development
EBSA	Ecologically or Biologically Significant Marine Area
EC	European Commission
EC EMFF	European Commission European Maritime and Fisheries Fund
ECAP	Ecosystem Approach to the Management of Human Activities
EEZ	Exclusive Economic Zone
EGD	European Green Deal
ESG	Environmental, Social and Governance
ETS	Emissions Trading System
EU	European Union
EUMOFA	European Market Observatory for Fisheries and Aquaculture
EUNETMAR	European Networking Group for Maritime Policy
EUSAIR	EU Strategy for the Adriatic-Ionian Region
EWG	Eurogroup Working Group
FGD	Focus Group Discussion
FLAG	Fisheries Local Action Group
FRA	Fisheries Restricted Area
FTE	Full-Time Employment
GDP	Gross Domestic Product
GES	Good Environmental Status
GFCM	General Fisheries Commission for the Mediterranean
GHG	Greenhouse Gas
GNI	Gross National Income
GVA	Gross Value Added
HDI	Human Development Index
HOK	Vessels Using Hooks
HTZ	Croatian Tourist Board (Hrvatska turistička zajednica)
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICMA	International Capital Markets Association
ICT	Information and Communication Technology
ICZM	Integrated Coastal Zone Management
IFC	International Finance Corporation
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
IT	Information Technology
IUCN	International Union for Conservation of Nature
LAU	Local administrative unit

LNG	Liquefied Natural Gas
LOA	Length Overall
LSF	Large-Scale Fleet
LSI	Land-Sea Interaction
MAP	Mediterranean Action Plan
MARPOL	International Convention for the Prevention of Pollution from Ships
MCSD	Mediterranean Commission for Sustainable Development
MESD	Ministry of Economy and Sustainable Development
MPA	Marine Protected Area
MPPCSA	Ministry of Physical Planning, Construction and State Assets
MRDEUF	Ministry of Regional Development and EU Funds
MSFD	Marine Strategy Framework Directive
MSP	Marine Spatial Planning
MSPD	Marine Spatial Planning Directive
MSW	Municipal Solid Waste
NACE	Nomenclature of Economic Activities (European statistical classification of economic activities)
NAPNAV	National Project of Irrigation and Land and Water Management in the Republic of Croatia
NECP	National Energy and Climate Plan
NGO	Nongovernmental Organization
NLRAP	National Loss Reduction Action Plan
NPRR	National Plan for Recovery and Resilience
NSDP	National Spatial Development Plan
OECD	Organization for Economic Co-operation and Development
OG	Official Gazette
OIEH	Project of the Association of Renewable Energy Sources of Croatia
PPA	Physical Planning Act
PS	Purse Seiner
PV	Photovoltaic
R&D	Research and Development
RBD	River Basin District
REMPEC	Regional Action Centre for the Prevention of Sudden Pollution in the Mediterranean, Malta
RES	Renewable Energy Source
SBE	Sustainable Blue Economy
SDG	Sustainable Development Goals
SME	Small and Medium – size Enterprise
SOLAS	International Convention for the Safety of Life at Sea
SRIA	Strategic Research and Innovation Agenda
SSCF	Small-scale Coastal Fleet
STD	Sustainable Tourism Development
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TBT	Tributyltin
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Program
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UWWTD	Urban Wastewater Treatment Directive
VAT	Value Added Tax
VMS	Vehicle Monitoring System
WBG	World Bank Group
WFD	Water Framework Directive
WSS	Water Supply and Sanitation
WTTC	World Travel and Tourism Council
WWF	World Wildlife Fund
WWT	Wastewater Treatment
YLL	Years of Life Lost





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Abstract

With an accessible and attractive coastline of untouched natural splendor, Adriatic Croatia is a strategic driver of national economic development. It boasts rich cultural heritage and biodiversity and abundant coastal and marine resources providing the country with high socioeconomic value. A decade of strong growth of maritime tourism has fueled stable economic development in the coastal zone. Despite this progress, Adriatic Croatia faces multiple environmental challenges stemming from anthropogenic pressures and climate change. Negative impacts from over-tourism, urbanization, and pollution underline the urgency of adopting a sustainable maritime economy approach. The demographic decline and the lack of economic diversification could diminish future economic opportunities of Adriatic Croatia to grow sustainably and provide new jobs. The emerging challenges call for close attention in the context of the national development goals, sustainable development commitments and Croatia's aspiration to achieve blue growth. This report discusses the concept of blue economy while trying to understand and define the impacts of current challenges on the Republic of Croatia's transition to blue economy.

Executive Summary

What is 'Blue Economy' and Why is it Important for Croatia?

Blue economy (BE) is a concept referring to the economically, socially, and environmentally sustainable use and development of marine resources. The term 'blue economy' has been actively promoted internationally by the European Union (EU) through its Blue Growth Strategy¹ and the Integrated Maritime Policy². As defined by the World Bank, "the Blue Economy concept seeks to promote economic growth, social inclusion, and the preservation or improvement of livelihoods while at the same time ensuring environmental sustainability of the oceans and coastal areas." Blue economic development is not only dependent on governments but emphasizes the sustained and active engagement of all stakeholders at all levels of government, regional and international actors, civil society, and the private sector.

The blue economy provides countries with an avenue for sustainability and inclusive socioeconomic development of the coastal and maritime space. In 2019, together with the European Commission, the World Bank launched the Blue Economy Development Framework (BEDF). The BEDF is a tool for countries to aid them in identifying the challenges, opportunities, and priority investments for the sustainable use of marine natural capital. The BEDF seeks to shift the focus from growth to the sustainable use of natural capital in how the blue economy approach values non-market goods and services provided by oceans, aiming to break sectoral silos and invest in innovative blue economy sectors. The BEDF has three key pillars: (a) knowledge management; (b) governance, fiscal reforms, and public investments that help create an enabling environment for sustainable private sector growth (de-risking growth); and (c) the promotion of private investment, all underpinned by several key cross-cutting considerations. The BEDF also aims to integrate blue economy principles into governance principles, fostering 'Blue governance' that seeks to enhance accountability, equity, inclusiveness, and stakeholder engagement in decision-making.

Croatia's coastline and maritime territory are key national assets vital to the country's economy. Croatia's rugged coastline of breathtaking landscapes and more than 1,200 islands stretch along 6,000 km of stunning natural beauty with towering rocks and cliffs, beautiful archipelagos, and scenic roads. Over one-third of the Croatian population is concentrated on the Adriatic Coast, with the marine economic sector supporting the livelihoods of over 160,000 people. These maritime jobs are a vital part of Croatia's economy, representing 8 percent of the national gross value added (GVA) in 2019, which is the highest contribution to the national economy in any EU country.³

The ecosystem of the Adriatic Sea is under growing stress from anthropogenic pressures, potentially eroding the natural capital that can fuel sustainable growth. Stressors stem from a range of man-made factors such as overfishing, marine pollution, and wastewater, which are occurring due to urbanization of the coast and the large tourism sector. Climate change is exacerbating these issues. It is estimated that in Croatia the environmental degradation accounts for 2–3 percent of the annual gross domestic product (GDP), costing around €21 million annually in damage to marine ecosystems, with a significant part of negative impacts stemming from the tourism sector.

¹ <https://www.europeanfiles.eu/wp-content/uploads/2017/06/The-European-Files-Blue-Growth-Strategy-June-2017-Issue-47.pdf>.

² <https://www.europarl.europa.eu/factsheets/en/sheet/121/integrated-maritime-policy-of-the-european-union>.

³ European Commission 2022. The EU Blue Economy Report 2022. Luxembourg: Publications Office of the European Union. <https://data.europa.eu/doi/10.2771/793264>.

The Croatian maritime space offers vast opportunities for sustainable growth, but change is needed to put development on a sustainable growth path in line with EU strategies. All the current growth sectors entail medium- to long-term externalities that degrade the environment. Hence, Croatia needs to explore new sustainable growth solutions for reversing current trends and protecting the coastal and marine ecosystems. This report aims to inform policy makers and stakeholders of sustainable maritime opportunities by examining the established and potential maritime sectors in Croatia, identifying their challenges, analyzing the policy environment, and charting the pathways for becoming a sustainable blue economy in line with the EU Blue Economy Strategy.

Socioeconomic Profile of Adriatic Croatia and Established Blue Economy Sectors

Economic growth in Adriatic Croatia has remained stable, despite recent demographic concerns.

In 2000–2020, the GDP of the coastal counties of Croatia has grown steadily. However, GDP per capita remained below the national average, standing at 89 percent of national GDP figures. These counties are challenged by demographic decline due to outmigration, with their population being 8 percent lower than in 2011. The declining population is due to overall aging trends in the country and a lack of job security. This stems from the seasonality of the tourism sector and the lack of employment in other sectors. At the same time, some counties are facing rapid urbanization. While in the 1960s, only an estimated 150 km of coastline was urbanized, in 2012 urbanization had spread to over 837 km of the coastline.

The economy of coastal Croatia is shifting toward service industries, but the share of coastal economy in the total GVA of Croatia remains relatively stable at around 30 percent. The fastest growing economic sectors in Adriatic Croatia (2000–2020) are construction (271 percent) and real estate (189 percent), both fueled by the growing wholesale and retail trade, transportation and storage, growing tourism accommodations and vacation homes, and food services sector (190 percent in 2000–2019). While this shift toward services has driven economic growth, it also exposes the coastal economy to global market fluctuations that can greatly affect the maritime economy of Croatia. Rapidly growing tourism also exposes the economy to potential challenges, including environmental and climate change impacts on marine ecosystems threatening the base of tourism and exacerbating the stressors on water, waste, and wastewater systems.

The established maritime economic sectors in Croatia are tourism, fisheries and aquaculture, maritime transport, shipbuilding and repair, and oil and gas. Traditionally, the tourism sector has dominated the country's maritime economy accounting for 22 percent of Croatia's annual GDP. Other notable maritime sectors include shipping, marine transport, port services, fishing and aquaculture, and oil/gas extraction, among others. Several of these sectors have been driven by the growth of tourism, notably maritime transport and port services. Other sectors, such as oil and gas, and shipbuilding, remain regionally concentrated, with shipbuilding and repair concentrated on niche markets in Europe (and beyond). Yet, the non-tourist sectors are smaller, responsible for only 2 percent of total employment in Croatia in 2019.⁴

Croatia could fully benefit from the abundant Adriatic natural resources by exploring more economic opportunities beyond the established maritime sectors. Croatia has untapped opportunities in the development of blue energy sectors. This includes increasing the use of offshore wind, marine biomass,

⁴ https://ec.europa.eu/oceans-and-fisheries/news/eu-blue-economy-report-ocean-economy-fuels-european-green-transition-2022-05-18_en. According to EU BE report established BE sectors in Croatia contributed to national employment with 9.9 percent. Within this number, 7.9 percent was related to coastal tourism.

marine thermal energy, and salient gradient energy. 'Blue energy' has received increasing interest in the EU member countries. However, for deployment of blue energy technologies more work is needed to remove the implementation barriers and to assess the relative economic potential of these technologies in the context of Croatia. Other promising opportunities are in the development of farmed seafood, including the production of seafood with low carbon footprint. To ascertain the feasibility of offshore technologies, Croatia may augment scientific research on policy and technical solutions with increased spending on research and development (R&D). Croatia's R&D spending is below the EU average and is predominantly focused on basic research. Currently, business sector investment in R&D is only 10 percent of the EU average and needs to be boosted to act as an enabler for the new economic opportunities in maritime space.

National and Regional Policy Framework for the Transition to Blue Economy

Croatia has aligned the national legislation and policies with EU policies, especially on environmental protection and conservation of marine ecosystems. In this respect, the key national documents are the Maritime Development and Integrated Maritime Policy Strategy, Agriculture and Fisheries Strategy, the 2030 Sustainable Tourism Strategy, The Nature Protection Strategy and Action Plan of the Republic of Croatia for 2017–2025, and the Transport Development Strategy, all of which prioritize environmental protection and broadly sustainable development in the maritime sector. Croatia has also developed well-functioning monitoring systems and regulations for ship-generated waste, wastewater treatment, and spatial planning to support sustainable maritime practices. Although several policies aligned with the Marine Strategy Framework Directive (MSFD) are well developed, a single national integrated Marine Spatial Plan is yet to be finalized. Still, more policy effort is needed for Croatia to align and implement all EU directives on maritime and water.

Croatia's climate-related strategies including 'Low Carbon Development Strategy 2030–2050', 'Energy Development Strategy 2030–2050', 'Integrated National Energy and Climate Plan', and 'Climate Change Adaptation Strategy' are well positioned to contribute to the country's transition to blue economy. The Climate Change Adaptation Strategy focuses on climate adaptation measures for reducing the vulnerability of key sectors—water resources, agriculture, forestry, fisheries, biodiversity, energy, tourism, and health—and two cross-cutting thematic areas—spatial planning and risk management. Croatia has made commitments to reach net-zero carbon emissions by 2050 and has joined the Global Methane Pledge.

Croatia is actively engaged in the European Union Strategy for the Adriatic-Ionian Region (EUSAIR). EUSAIR unites nine coastal neighboring nations with a common aim of promoting blue growth, regional connectivity, environmental sustainability, and sustainable tourism in the region. On June 1, 2023, Croatia took over the presidency of EUSAIR until June 2024. As a regional leader, Croatia's efforts focus on enhancing research, innovation, and business opportunities in blue economy sectors; bolstering sustainable seafood production and consumption; and strengthening the governance of regional seas' basins. The sustainable blue economy approach proposed by the European Commission in 2020 aligns with EUSAIR's goals, reflecting a commitment to greener and more inclusive recovery. The act of Croatia's legal recognition of its Exclusive Economic Zone plays a pivotal role in advancing these objectives.

Threats to and Opportunities for Croatia's Maritime Economy

Current economic achievements and prospects of developing blue economy sectors will be under increasing pressures and user conflicts from maritime and land-based activity causing deterioration of ecosystems and the environment. Croatia is also vulnerable to climate change and extreme weather

events. The Mediterranean climate is characterized by hot and dry summers and mild and rainy winters. Climate change is altering the traditional weather patterns, which is affecting groundwater resources, rainfall, and sea levels. Water demands increase due to large influx of tourists in the summers and are further exacerbated by the climate pressures reducing the water flows. Many coastal communities lack adequate infrastructure for managing municipal wastewater and solid waste, which during the tourist season increases the pressures on the coastal environment. Lack of infrastructure, climate change impacts, and unsustainable tourist density need to be addressed to enable other maritime sectors to grow.

There are several sectors foundational to the blue economy where new sustainable blue growth opportunities could be explored further:

- **Coastal and Marine Tourism:** This sector is well established within Croatia and as such provides a favorable climate for further development through existing human capital, attractive natural environments, tourist resources, and proximity to EU markets. However, the sector needs to be deconcentrated from the few coastal cities/destinations. More infrastructure investments are needed to address current challenges and make it sustainable. Actions and public sector investment could leverage EU funding as a potential source. Integration into the regional market value chains and more regional cooperation and development could help diversify the tourist supply.
- **Fisheries and Aquaculture:** This sector aligns closely with EU policies and is recognized to be well regulated. Wider application of good management practices in mariculture (shell and small-scale demersal) would increase the sustainability footprint of this segment. The segment of tuna farming has a long tradition in Croatia and has established sales markets in the EU and Japan. For the sector to grow further, there is a need to address the sector's low economic sustainability and overfishing, and to improve data collection and monitoring. Opportunities in this field relate to the synergies with tourism and innovative technologies to decrease operating costs through public investments and EU funds.
- **Fish Processing:** Within this sector, challenges are the low number of value-added products, a weak product portfolio, and the lack of producer organizations. With investments into innovation and novel techniques (such as online sales), the diversification of domestic market chains, and closer links with the tourism and hospitality industry, this sector could grow exponentially in Croatia.
- **Shipbuilding:** A traditional and important sector in Croatia that has seen a decline in recent years due to global competition, especially from East Asian shipyards. This sector will require large public support to bolster itself, both in terms of innovation clusters, funding for startups and small and medium enterprises (SMEs), and investments in education and infrastructure enabling implementation of innovations. Closer collaboration between emerging market segments such as maritime surveillance, the fishing industry, and the military sector, coupled with increased R&D collaboration could steer the growth of this sector.

Toward Sustainable Maritime Sector and Transition to Blue Economy

Investments are the enabler for realizing the economic opportunities of the blue economy transition, crucial to moving toward a sustainable maritime economy. Funding must be directed for general development, but also for 'Blue Finance', meaning projects and programs that have positive impacts on the maritime economy. As such, financing is needed within three distinct categories: (a) financing targeting general economic development; (b) projects that meet sustainable financing objectives such as those in the EU Sustainability Taxonomy and EU Sustainability Reporting Standards; and (c) financing to specifically target the quality and availability of water resources.

The Croatian financial market made some progress in general sustainable financing. However, the supply of sustainable financing is still at an early stage, with no financial intermediaries or companies currently offering Blue Finance Bonds. Across the economy, firms are subject to fluctuations in demand, prices, and other externalities, which creates uncertainties and makes it difficult for firms to secure financing. Traditional investors are often hesitant to explore other blue economy sectors beyond tourism due to perceived risks and the lack of collateral. The lack of reliable market information is another challenge for firms to identify investment opportunities and assess the risks of unsustainable growth. Croatia can use the financial markets to improve the sustainability of the economy, help economic diversification, and spur innovation. The impact of adopting sustainable policies by financial intermediaries could be significant. Nonetheless, it remains at the credit institutions' discretion to assess whether imposing blue finance use limitations and reporting requirements will be in their interest. Recognizing the benefits of strengthening the blue financing framework could advance the implementation of blue economy pathways in view of results achieved over time.

Financing for the blue economy in Croatia must be mobilized for a broad category of sectors and will require a combination of public and private finance. The investment needs of Croatia in Blue Finance-eligible sectors total €7.5 billion, of which €3.0 billion needs to be private-sector funded. The primary areas in need of funding are water supply and sanitation and seafood value chain investments (tourism is not considered a part of Blue Finance). For water supply and sanitation, Croatia requires approximately €7.0 billion to meet its obligations under EU Water Directives, with €2.6 billion yet to be funded through public financing. Meanwhile, the seafood value chain needs €0.5 billion in investments, with €0.27 billion sought from the private sector. These investments are required for improving water management, reducing non-revenue water losses, and enhancing the seafood sector in Croatia to move toward the blue economy while aligning with Sustainable Development Goals (SDGs) 6 and 14.

Demographic decline and the lack of economic diversification may diminish the economic opportunities of Adriatic counties to grow sustainably and provide jobs. The economy of Adriatic Croatia is heavily concentrated in coastal tourism, with most jobs being in or related to coastal tourism. This high concentration increases the fragility of the country's economy, as it becomes more susceptible to global economic shocks and the potential of being outcompeted by other tourist destinations.

Continuing unsustainable development trends and practices could undermine the value of Croatia's ample natural capital, limit opportunities for future economic diversification, and ultimately undermine the socioeconomic outcomes. Standing at a crossroads, Croatia's transition toward blue economy will be determined by three distinct directions and future policy choices. This report has identified the business-as-usual (BAU) course, which is a continuum of current trajectories based on growth inhibited by potential user conflicts and competition for economic space and marine resources. The two pathways which represent a shift from BAU will lead to different outcomes: (a) reduced environmental pressures and risks through higher level of compliance with EU environmental directives and (b) reduced pressure on the natural capital and transition of maritime economy onto sustainable blue economy based on sector synergies and integration of cross-sectoral development objectives.

The Business-as-Usual

The BAU course is characterized by the current development patterns continuing and culminating in increased environmental degradation and declining economic opportunities. This course entails further harmonization of national policies with the EU acquis, however, is marred by lagging implementation, lack of capacity and resources, and fragmented institutional responsibilities. Ineffectiveness in pollution prevention and control to adhere to water quality regulation persist, the marine spatial planning (MSP) remains fragmented, and there is little monitoring of solid waste.

Sector policies remain disconnected. The expansion of built-up areas in coastal counties and the rise in uninhabited housing units continues. Environmental quality in urban areas worsens, leading to ecosystem losses. Wastewater from nautical activities continues to rise, as does the air pollution from large cruise ships, harming the coastal environment. Competition over marine and coastal resources intensifies, coastal Croatia experiences limited socioeconomic benefits, and a sustainable blue economy is not achieved.

Toward Environmental Sustainability

The path leading toward Environmental Sustainability is an interim course with a horizon of about five years that reflects a higher degree of compliance with EU directives. It is characterized by the development of a National Blue Economy Strategy and a Roadmap. MSP is improved and expanded to cover the entire coastal area, and environmental monitoring sees enhancements. Major urban agglomerations in Adriatic Croatia develop investment plans for wastewater treatment plants, and beach water quality along the entire coast meets the highest standard. Although this scenario sees progress, there are socioeconomic challenges that remain, including unsustainable urban expansion and limited wastewater treatment. Sector environmental impacts are being addressed gradually. Still, this path can serve as a stepping-stone toward a blue economy transition.

Taking the Blue Economy Path

The blue economy path has a longer-term implementation horizon and signifies a major shift toward a holistic, integrated approach to management of marine natural capital, which replaces previous individual sectoral foci. Critical policy barriers are addressed while blue sector governance is promoted to improve accountability and transparency. This path includes a blue economy strategy which is implemented and checked with regular updates, full MSP adoption, and full sustainable ecosystem management. Effective coordination and integration of BEDF and national blue economy goals occur through interinstitutional mechanisms and cooperation across regional, national, and local levels. Research and development inform the blue economy policies and are a driver for the development of new economic sectors to benefit the coastal populations and Croatia as a whole. Urbanization growth is curbed and sustainable spatial planning and traffic solutions are developed to ease urbanization pressures along the coast. Resource competition is eased and new blue economy projects are actively pursued through private and public blue finance mobilization. Finally, EU funding opportunities are harnessed to support the transition to a sustainable blue economy in Croatia by addressing investment needs.

Choosing the blue economy path will chart new avenues for the country's economic development, but concrete action is needed to move away from the current unsustainable patterns in the maritime space. With a clear vision, integrated policies, and strategic investments, Croatia has the potential to harmonize economic prosperity with environmental stewardship and develop itself into a thriving maritime nation. By seizing blue economy opportunities while simultaneously addressing the environmental challenges, Croatia can lead the way in demonstrating that a sustainable blue economy is not just an aspiration but an achievable reality and set an example for EUSAIR and the wider EU region to follow.

Croatia could consider three priority blue governance areas for actions while charting the Blue Economy Vision and Roadmap. These are summarized in the following table:

Pillar	Priority	Action	Potential Lead Institution
Institutional	Short and medium term	Establish blue economy institutional structures that promote cross-sectoral coordination at the horizontal and vertical axis of the government at a sectoral/national-subnational level to ensure policy harmonization with relevant EU directives.	Ministry of Economy and Sustainable Development (MESD)
		Create and implement campaigns for raising the awareness of the blue economy in the private sector, civil society, and public sector.	MESD
		Design comprehensive data management and monitoring systems for blue economy management and reporting.	MESD
		Develop and systematically apply various education/information tools to increase awareness of the importance of the environment and ecosystem services at a sectoral/national-subnational level and with all stakeholders	MESD
	Long term	Strengthen the capacities of the institutions and stakeholders involved in the blue economy.	MESD
		Increase the active and responsible participation of the public in the implementation and planning of the blue economy.	MESD
		Strengthen and improve control mechanisms for the blue economy.	State Inspectorate
Policies	Short and medium term	Finalize policy harmonization with EU environmental acquis for the protection of marine resources and assets, including marine protected areas (MPAs).	MESD
		Develop a blue economy strategy and roadmap mainstreaming sustainability and economic diversification with a clear vision, sectoral actions, and indicators to monitor implementation.	MESD
		Carry out an assessment of marine ecosystem services and develop capacity for their monitoring	MESD
		Improve the physical planning process and implement MSP and Integrated Coastal Zone Management tools.	Ministry of Construction, Spatial Planning and State Property
		Map the competences needed to work in blue economy sectors and potential supporting institutions and develop strategies to meet skill needs.	Ministry of Science and Education
		Operationalize the Sustainable Tourism Development Strategy specifically focusing on the sustainability dimension and reducing pressure on marine and coastal resources.	Ministry of Tourism

Pillar	Priority	Action	Potential Lead Institution
	Long term	Harmonize national development strategies and sectoral plans (resource, sectoral, and territorial management) with the blue economy strategy and roadmap.	MESD
		Support and facilitate the development and application of innovation and R&D in the blue economy in both public and private sectors.	MESD and the Ministry of Regional Development and European Union Funds
		Improve existing educational programs at a sectoral/national-subnational level and develop schemes of education for new blue economy skills and competences within a lifelong education system.	Ministry of Science and Education
Financial	Short and medium term	Improve the investment climate and mobilize financing for the development of the blue economy and needed maritime support infrastructure.	MESD
		Cooperate with civil society and the private sector to discuss fundamentals for natural capital valuation and ocean accounting to support blue economy monitoring and reporting.	MESD
		Improve databases, data management, and data collection in terms of accuracy, and develop open-source data access for the private sector and civil society for research, financing, and business development purposes.	MESD
		Develop disclosure requirements for eligible blue finance projects and capacity for continuous reporting and disclosure in accordance with international standards.	Ministry of Finance and the Central Bank of Croatia
		Identify priority projects and develop a project pipeline for financing the development of the blue economy.	MESD
		Develop new financing mechanisms to support the development of the blue economy, such as blue bonds.	Ministry of Finance
		Enable counties, cities, and municipalities to support specific blue economy activities in their administrative units.	Ministry of Finance



Introduction

Scope and Methodology of the Report

The Report presents an overview of the maritime sectors and emphasizes the importance of integrated ecosystems approach in policy decisions supporting the development of blue economy (BE) sectors. The development objective of this Report is to inform Croatia's vision and strategy/roadmap for transitioning to blue economy by identifying the challenges and opportunities for shaping a development framework based on a holistic ecosystem approach to management of coastal and marine resources. While the blue economy concept is not new to Croatia, the Report aims to shift the attention on the reflection and understanding of the challenges to sustainability in the blue space. The approach to the analysis presented in the report is critical pragmatism and solutions based on the experience from other countries striving to transition to blue economy. The recommendations, however, are aligned with Croatia's aspiration for sustainable development and coherence with the blue economy paradigm of the European Union (EU). At the same time, the report aims to highlight avenues for striking a balance between the economic pursuits and protection of the natural assets emphasizing the sustainability pathways to the blue economy.

The Report is informed by a set of background analyzes including (a) a legal and institutional review aiming to assist policy makers in better understanding the respective roles and responsibilities of institutions engaged in managing activities in the maritime space and (b) a country-based analysis of the socioeconomic profile of Croatia's maritime sectors, issues, challenges, and alternatives, carried out by a team of researchers from the University of Split, Faculty of Economic, Business and Tourism that helped to enrich the scope of the analysis. Further, the Report was informed by a study of the World Bank Group (WBG) used for the discussion on financing of the blue economy transition. Other publicly available sources and literature pertinent to the topics under review have been used. The data used for the analysis relate to an area known as the Adriatic Croatia⁵ available at the level of local administrative units. Notwith-

standing data imitations, many of the findings regarding development trends and challenges are relevant for the coastal areas as well. The discussion on policy issues has benefitted from a series of consultations with public and private stakeholders from various sectors of the blue economy.

The Report is organized in six chapters. Each chapter following the Introduction starts with key takeaway points followed by a narrative summarizing the main areas and results of the analyses. The Introduction describes the objective, methodology, and key points which the Report aims to highlight including basic information of Croatia's maritime sectors. Chapter 1 elaborates on the context for the discussion on Croatia's blue economy by highlighting the key elements of the blue economy concept embraced by international organizations. Chapter 2 discusses the physical geography, socioeconomic context of Croatia's coastal and maritime space, including details of established blue economy sectors such as tourism, shipbuilding, fishery and aquaculture, maritime transport, oil and gas, and mineral extraction. This chapter also elaborates on the prospects for development of emerging maritime sectors and for strengthening the role of science and research to support Croatia's blue economy. Chapter 3 is key for understanding the threats and opportunities ahead and drivers of the blue economy sectors to steer transition to sustainable growth and makes specific recommendations for addressing environmental health issues and user conflicts while building on synergies. Chapter 4 presents an overview of the strategic, policy/legal, and institutional framework underpinning Croatia's transition to blue economy. Chapter 5 highlights the opportunities for innovative blue financing and avenues for mobilizing public resources for leveraging private finance to address critical environmental issues through infrastructure investments. Chapter 6 concludes the discussion by focusing on high potential areas that Croatia could act upon to ensure a smooth transition to sustainable blue development in the Adriatic coast. The business as usual and two progressive pathways which Croatia could pursue to achieve its blue economy aspirations are discussed in chapter 6.

5 Adriatic Croatia, statistical NUTS2 (Nomenclature of Territorial Units for Statistics) unit is defined according to the EU territorial standards.

Questions Which this Report Aims to Address

Croatia has already begun the transition toward greater environmental sustainability in the maritime space following the EU sustainable blue growth approach. To accelerate the transition from the current development path to sustainable development of the marine and coastal areas, Croatia will need to consider the current gaps in the national framework governing the maritime economy and cross-sectoral coordination. The key questions central to this pathway going forward which are discussed in this Report are as follow:

- **How can established and emerging sectors in the maritime space define Croatia's pathways toward sustainable growth?** The profound conceptual change in the governance of the maritime space calls for policies, legal, institutional, and governance frameworks, to fully introduce and operate a new model of maritime and marine governance in line with the EU Integrated Maritime Policy Framework and considering climate threats. This also includes a closer look at the solutions that take advantage of available financing, promoting 'green' growth in the blue space.
- **How to steer the country's substantial economic potential in marine and coastal areas optimally by improving the blue economy governance framework?** With population changes, shifts in economic activity, demand and allocation of coastal and maritime resources, and negative impacts on their quality, the transformation of the natural capital base could undermine Croatia's future development prospects. What is the promising alternative that could mitigate tensions between users of the blue space, protect marine ecosystems, and ensure sustainability?

Certain data limitations stem from accessing data sources in a relatively short time; pertinent administrative procedures limited the availability of more recent data. The authors had to rely on published data that do not provide insights into individual economic activities, whereas sector data was defined by the first aggregation of No-

menclature of Economic Activities (NACE). More information on the methodology and data is presented in Annex 2.

Croatia's Traditional Maritime Sectors and Economic Contributions at a Glance

The Adriatic Sea is strategically important for the economy of the Republic of Croatia. Safeguarding the natural values of the Adriatic marine resources for economic growth and improved livelihoods and jobs is central to the country's sustainability agenda. This Report examines the established maritime sectors which traditionally contribute to the economy of Croatia and the emerging opportunities to overcome current challenges and steer these sectors onto a sustainable path. The report aims to support policy makers and stakeholders in the quest for sustainable development in the maritime and coastal space of Croatia and in line with the EU Blue economy strategy. The discussion in the Report takes advantage of the views of numerous stakeholders, both from public and private sectors, and their valuable insights on the challenges, policies, and opportunities ahead.

Croatia's coastline and maritime territory are key national assets. Croatia's waters cover an area of 31,500 km² — one-third of the national territory. The country's coast is more than 6,000 km long, hosts 1,200 islands, rocks, and reefs (Kružić and Povh Škugor 2015, 7) and is among the most valuable parts of its national territory. The Adriatic Sea region is a unique and sensitive marine ecosystem, especially because of the wealth of its biological life, clarity, transparency, and landscape. Appropriately, it has gained the status of a special Mediterranean subregion. The Adriatic coast of Croatia is characterized by a high level of biological diversity, including many endemic species, and especially sensitive habitats and ecosystems. The region is also important for the country's economy and rich cultural and social life.






Croatia's coastal region is rich in cultural heritage. Situated at the crossroads of ancient Greek and Roman civilizations, Croatia is home to mul-

tiple medieval landmarks and more recent historical sites. Six monuments on the Adriatic coast have been recognized by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) for their cultural significance: the Old Town of Dubrovnik, Trogir, the Euphrasian Basilica in Poreč, the Cathedral of St. James in Šibenik, Diocletian's Palace in Split, and the Stari Grad Plain in Hvar. Additionally, there are many other heritage landmarks, such as the Vela Spila in Vela Luka on the island of Korčula, the Church of St. Donat in Zadar, and the Church of St. Euphemia in Rovinj.

The Adriatic coast and maritime space contribute significantly to the national economy.

One-third of Croatia's population lives along the coast, and the coastal and marine sectors in 2019 employed 160,000 persons (10 percent of national jobs) and generates around €3.6 billion in gross value added (GVA), which represented 8 percent of the national GVA and is the highest relative contribution to the national economy of all EU countries (BE Report 2022). The tourism sector is well developed along the entire coast with a few destinations that have a significant concentration of tourism activities. The coastal tourism sector alone contributed to approximately 18 percent of Croatia's annual gross domestic product (GDP) during 2000–2021, except during the COVID-19 period.

Figure 1. Overview of Important Maritime Sectors in Croatia

Maritime Sectors in Croatia	
Maritime Tourism	Maritime Transport
<ul style="list-style-type: none"> ■ 19.5% of GDP in 2022. ■ €9,121.8 million of revenue in 2022, but in a slight decline. ■ Concentrated in a few destinations (e.g., Dubrovnik). 	<ul style="list-style-type: none"> ■ Ferry services are high growth due to link with tourism. ■ Geographical position in the Adriatic Sea provides high economic potential for shipping. 
Shipbuilding	Oil and Gas
<ul style="list-style-type: none"> ■ In decline, but key national sector. ■ Includes new ships, repair, conversion, and offshore construction. ■ Uncertain future due to financial severe financial distress. 	<ul style="list-style-type: none"> ■ Occurs in the Northern Adriatic. ■ 20 operative gas platforms, and 230km of gas pipeline at sea bottom. ■ Future plans: New LNG terminal and 28 hydrocarbon exploration areas. 
Fisheries and Aquaculture	
<ul style="list-style-type: none"> ■ Estimated employment of 20,000 widespread across Croatia. ■ Direct production and related services exceed 1% of GDP. ■ Share of fishery production in aquaculture only 20%, but high growth potential. 	

Maritime Sectors – An Engine for Growth, but Are They Sustainable?

Croatia's coastal and marine resources have the potential to support sustained economic growth. If sustainably developed, they could define a new era of economic opportunity for the country. According to the Organization for Economic Co-operation and Development (OECD 2016)⁶, many ocean-based industries have the potential to outperform the annual growth of the global economy, thereby boosting employment. The same report projects that over the next 15 years through 2035, the ocean economy could more than double its economic contribution to GVA, or GDP equivalent. The rich maritime natural resources base that currently provides a significant contribution to Croatia's recurrent economic value can claim its identity for improving human well-being and social equity while also increasing environmentally sustainable economic opportunities.

Realizing the economic opportunities of maritime space will be important and challenging at the same time. So are the two parallel trends occurring in Croatia: an upward growth within the maritime economy (in terms of GVA and employment) and the growing pollution pressures that erode the natural capital on which economic growth is dependent and are further exacerbated by climate change. The Adriatic Sea, as part of the larger Mediterranean region is under pressure due to a range of man-made factors including over-fishing, pollution (effluents, plastics, and other solid waste) from the industrialization of the tourism sector and urbanization of the coast, and the climate change induced sea temperature rise and acidification, among other factors.

The cost of environmental degradation in Croatia is estimated at 2–3 percent of annual GDP,⁷ with a significant share of the negative impact linked to solid waste generated from tourism. However, the potential of tourism for economic advancement is significant, provided there are systematic national planning efforts (including enabling policy and greater investment) for

sustainable growth of Croatia's maritime economy. This would require minimizing the adverse pressures on the very natural capital on which maritime economic output, jobs, and growth depend.

Demographic trends indicate an increasing urbanization of Adriatic Croatia. Compared to other parts of the country the coastal areas offer more economic opportunities and have higher population density. Population movements from islands and the hinterland to the coastal strip resulted in intensive urbanization and high population density in the coastal counties. The highest density is recorded in Split-Dalmatia County (93 inhabitants per km²); counties of Primorje-Gorski kotar (74), Istria (69), and Dubrovnik-Neretva (55) are above the Adriatic Croatia average (53), while the central part of the coast—Zadar (44) and Šibenik-Knin (32) counties have lower population density. At the end, there is Lika-Senj County, the largest one in terms of surface, and the lowest in terms of population and density (in Croatia as well).⁸

Croatia has yet to cultivate and optimize its substantial economic potential of the blue and coastal space. Croatia's maritime area comprises 'internal waters and the territorial sea, air space above them and the respective seabed and sub-soil' as defined by the Croatian national law⁹. In February 2021, the Exclusive Economic Zone of the Republic of Croatia in the Adriatic Sea (EEZ) was declared by the Croatian Parliament following the United Nations Convention on the Law of the Sea (UNCLOS) and the Maritime Code. The current range of economic sectors are limited to conventional sectors such as tourism, fisheries, and aquaculture, and to a more limited extent, shipping, and port activities—all generating medium- and long-term externalities such as pollution, damaging the marine ecosystems. Such an effect on the marine environment is likely to slow the economic output and growth over time. While the blue economy in 2019 contributed 9.9 percent to the national economy in terms of jobs, blue economy jobs decreased 10 percent compared to 2009,

⁶ OECD (2016), The Ocean Economy in 2030, OECD Publishing, Paris, <https://doi.org/10.1787/9789264251724-en>.

⁷ World Bank. 2021. "Croatia: Cost of Environmental Degradation." <https://documents.worldbank.org/en/publication/documents-reports/document-detail/929211613036393029/croatia-cost-of-environmental-degradation>.

⁸ Croatian Bureau of Statistics (CBS). Population Census 2021.

⁹ Maritime Code of the Republic of Croatia (OG 181/2004, 76/2007, 146/2008, 61/2011, 56/2013, 26/2015, 17/2019).

increasing only in the fisheries/aquaculture and maritime transport sectors. Marine oil and gas and shipbuilding have lost a significant number of jobs compared to 2009 (98 percent and 54 percent, respectively).¹⁰

The employment rate in Croatia is one of the lowest in the EU: 69.7 percent in the age group 20–64 (2022) compared to EU27 average of 74.6 percent. The employment rate of women was also lower—65 percent compared to the EU27 average of 69.3 percent¹¹. Counties on the Adriatic coast make up 33 percent of total employment, but not

all industries are of equal importance. Accommodation and food service provide employment for 58 percent in the winter months rising to 67 percent of the Croatian employment for that industry in August. In the summer months in Adriatic Croatia, the number of employed in that industry rises by 64 percent and changes order by becoming the major employer on the Adriatic coast¹². The total employment in Croatia shows seasonal oscillation due to accommodation and food service activities, but most of the seasonal change in employment is generated on the coast.



¹⁰ EC (European Commission). 2022. The EU Blue Economy Report 2022.

¹¹ EUROSTAT. Employment and Unemployment (LFS) Database.

¹² CBS.



CHAPTER 1.

The Blue Economy Development Context

KEY TAKEAWAYS

- Sustainable use of ocean/marine resources for economic growth, improved livelihoods, and jobs while preserving the health of marine ecosystems are central to the blue economy concept. It offers a framework for realizing Croatia's transition to environmentally sustainable maritime economy with clear socioeconomic and ecosystem benefits. The Blue Economy Development Framework (BEDF) translates these principles into a tool for defining blue economy opportunities, constraints, and priority investments, adaptable to country-specific conditions.
- Timely transition to a sustainable maritime economy is an opportunity to address the economic, environmental, and climate challenges in Adriatic Croatia, to improve the stewardship of natural capital, and to diversify the maritime sector.
- Charting the blue economy in Croatia, with an emphasis on strengthened governance, has the potential to bring an array of nationwide benefits from enhanced protection of coastal and nearshore resources, increased resource use efficiency, and improved livelihoods of communities in Adriatic Croatia.

What is Blue Economy, and Does It Matter?

The 'blue economy' has emerged as an umbrella term related to the development of oceanic and maritime economic activities in an integrated and sustainable way. According to the World Bank, "the Blue Economy concept seeks to promote economic growth, social inclusion, and the preservation or improvement of livelihoods while at the same time ensuring environmental sustainability of the oceans and coastal areas" (World Bank¹³ and United Nations¹⁴). It emphasizes that 'blue' economic development depends not only on governments but also on the active and sustained engagement of all stakeholders, including national, regional, multilateral, and international organizations, the public and private sectors, civil society, and other relevant participants, as well as the effective management of knowledge.

The EU has been particularly active in promoting economic growth based on the sustainable use of oceans and seas (blue growth). The EU Integrated Maritime Policy¹⁵ (EC 2007) builds on the notion of the interconnectedness of industries and human activities centered on the sea. It promotes a holistic approach to all sea-related policies with a view to supporting sustainable sea and ocean

development and establishing coordinated and transparent decision-making processes in the EU's sectoral policies on seas and marine activities, including via its sea-basin and macro-regional strategies. Consequently, the EU's blue growth strategy (EC 2012) has identified five innovative, high-potential maritime sectors—blue energy, aquaculture, coastal and maritime tourism, blue biotechnology, and sea-bed mining—where great opportunities exist for exploitation by expanding industries in a sustainable way.

In December 2019, the European Commission (EC) adopted a new growth strategy based on the notion of decarbonization and sustainability by announcing the European Green Deal (EGD) for the EU and its citizens (EC 2019b). The EGD package of measures suggests a successful "transition towards digital, knowledge-based, decarbonized and more circular industry in Europe," thus aiming to make Europe the first climate-neutral continent by 2050 to improve the health of the planet, economy, and people. This means, for instance, that fossil-intensive maritime industries must decarbonize to keep their licenses to grow. Conversely, the blue economy is seen as a critical enabling vector for achieving the EGD objectives, including in mitigating and adapting to climate change.

¹³ <https://openknowledge.worldbank.org/bitstream/handle/10986/26843/115545.pdf?sequence=1&isAllowed=y> 1.

¹⁴ United Nations Development Programme. 2018. Blue Economy: Community Solutions. UNDP, New York.

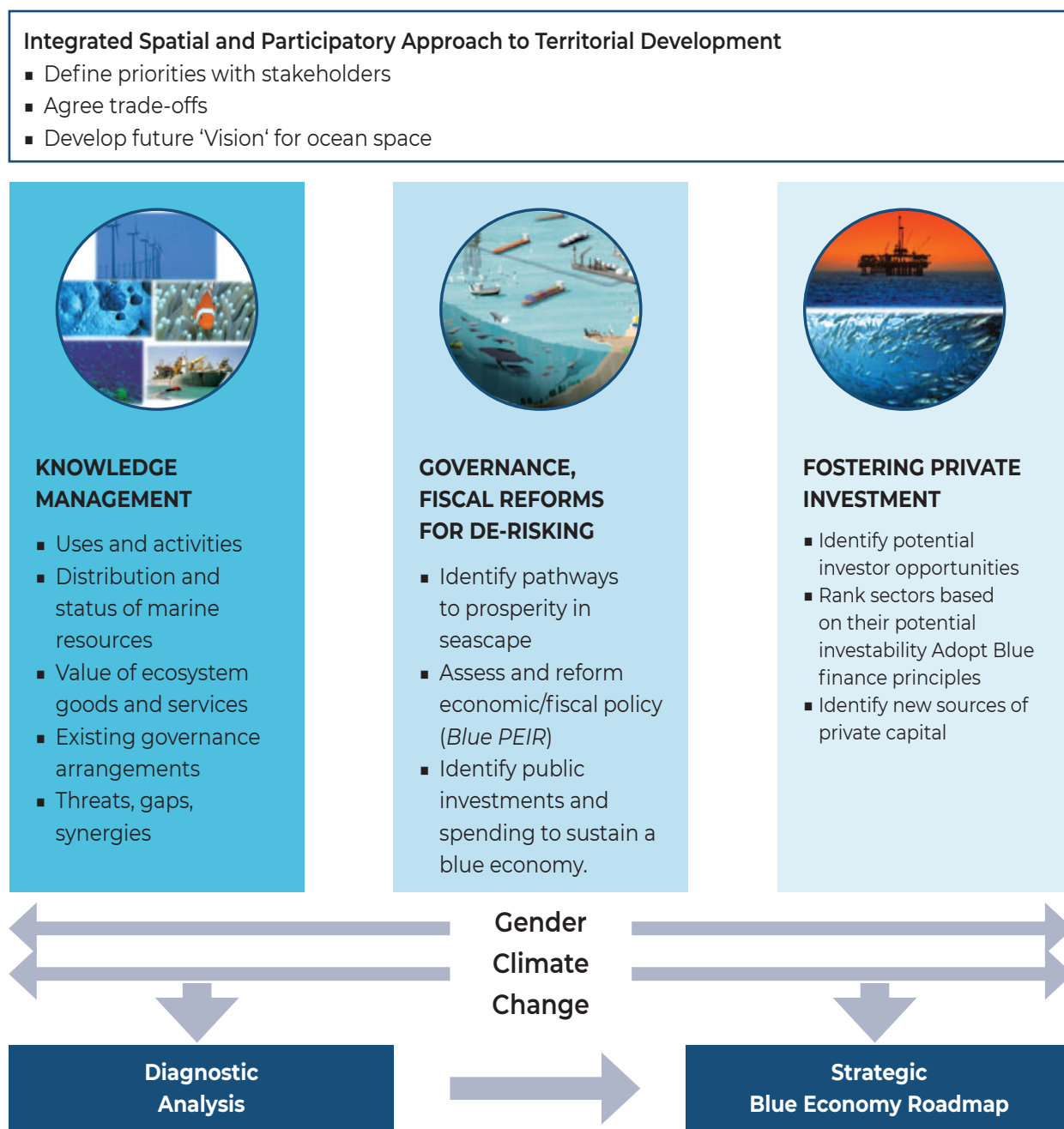
¹⁵ <https://www.europarl.europa.eu/factsheets/en/sheet/121/the-integrated-maritime-policy>; https://www.europarl.europa.eu/erpl-app-public/factsheets/pdf/en/FTU_3.3.8.pdf.

Snippets of the Blue Economy Development Framework for Sustainable Growth of Maritime Space

In 2019, the World Bank and the EC launched the **Blue Economy Development Framework (BEDF)** promoting a holistic view of the ocean economy and maritime ecosystems in policy design (Figure 2). The entry point of the framework is economic development that is attuned to the changes in the flow of blue natural capital as inputs to the economy

over time and aims to reduce the negative outputs, such as pollution and marine litter, that undermine the quality of the ocean's natural capital. The BEDF promotes a multisectoral, integrated, and participatory approach to coastal and marine development at multiple levels. Central to the framework are (a) knowledge management; (b) governance, fiscal reforms, and public investments that help create an enabling environment for sustainable private sector growth (de-risking growth); and (c) the promotion of private investment, all underpinned by a number of key cross-cutting considerations.

Figure 2. Blue Economy Development Framework



The World Bank, similar to the EU, defines the blue economy as the “sustainable use of ocean/marine resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystem.” The BEDF translated these principles into a tool for aiding countries in the development of a systematic and scalable approach to defining a country's blue economy opportunities, constraints, and priority investments, adaptable to the blue economy development paradigm and country-specific conditions. Marine spatial planning (MSP) is an essential BEDF instrument which helps national authorities in the blue economy transition by creating a framework for evidence-based and inclusive maritime spatial plans. It can also help assess the future spatial needs of maritime sectors, including of the emerging blue economy sectors. The other features of BEDF are facilitating knowledge transfer from research to business, promoting technology innovations and skills development in the labor force to apply the new technologies, producing better and more relevant data and information, and developing initiatives that facilitate and streamline investments, including risk funding for innovative maritime technologies.

‘Blue governance’ is defined as the formal and informal processes of collective decision-making, planning, deliberating, and capacity building by government, market, and civil society actors connected to marine and coastal environments. Blue governance integrates blue economy with governance principles and encompasses structures and processes that are designed to ensure accountability, transparency, responsiveness, rule of law, stabil-

ity, equity and inclusiveness, empowerment, and broad-based participation. The transition to a blue economy in Croatia, with an emphasis on strengthened governance, has the potential to bring an array of benefits related to the enhanced protection of coastal and nearshore resources and increased resource use efficiency, improving the livelihoods of local communities.

The blue economy concept shifts the development paradigm from a sole focus on growth to sustainable use of natural capital based on green economy principles. By doing so, it could potentially drive a transformative change and address the underestimated value of natural capital. The traditional method of using GDP to measure outputs in the ocean economy does not account for the changes to natural stocks and future benefit streams that they provide. Conversely, economic valuation methods that measure the value of blue assets overcome this limitation by measuring the contributions of non-market goods and services provided by the natural systems. By measuring the value of blue assets, the blue economy approach overcomes the challenge of using them as a ‘free good’ and seas and oceans as a cost-free repository space. This in turn means (a) shifting current economic planning trends that negatively affect the quality of coastal and marine resources and livelihoods, (b) investing in the human capital required to harness employment and development benefits, (c) investing in innovative blue economy sectors, and (d) adequately valuing the marine resources and ecosystem services provided by the oceans to break the silos of isolated sectoral management and investments.



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CHAPTER 2.

Maritime Economy, Growth Drivers, and Natural Capital

KEY TAKEAWAYS

- The Croatian maritime economy is a key contributor to the overall economy and employment of Croatia, with several well-established maritime sectors, accounting for 30 percent of national GVA. Established blue economy sectors include maritime transport, shipbuilding, fisheries and aquaculture, oil and gas, and coastal tourism.
- Croatia's coastal and marine ecosystems play a fundamental role in determining the economic outputs. At the same time the coastline is facing rapid urbanization. While in the 1960s, only an estimated 150 km of the coastline was urbanized, in 2012 more than 837 km of the Croatian coastline had been urbanized.
- The maritime sectors support the livelihoods of 160,000 people in Croatia (10 percent of national jobs), with coastal tourism accounting for 79 percent of all jobs and 81 percent of all GVA in the sector, further underscoring the importance of the maritime sector in Croatia.
- The GDP of the coastal counties of Croatia has grown steadily. However, this growth remained below the national average, standing at 89 percent of the national GDP per capita. The aggregate employment of the Adriatic counties comprises 33 percent of the total employment but not all industries contribute equally.
- Tourism dominates the coastal economy of Croatia, and coastal tourism accounts for more than 95 percent of total tourism numbers in Croatia. Tourism accounts for around 20 percent of Croatia's annual GDP, indicating that the economy of Adriatic Croatia is shifting toward the service industry. Croatia is among the leading tourist countries in the world recording 19.5 million visitors and 91 million overnight stays in 2019 (pre-COVID-19 numbers), and 17.5 million visitors and 90 million overnight stays in 2021. Nonetheless, Croatia's tourist traffic remains seasonal and concentrated in the summer months. Despite the positive economic results, the tourism in Adriatic Croatia may face future challenges potentially constraining its long-term sustainability and performance.
- The direct share of fisheries in the GDP of Croatia ranges between 0.2 percent and 0.7 percent. The sector's real contribution seems underrated as the direct economic contribution of the fisheries, fish farming and processing, with accompanying activities exceeds 1 percent of GDP annually. Croatia has aligned its fishery policies with the principles of the new General Fisheries Commission for the Mediterranean (GFCM) 2030 Strategy and has adopted temporal and spatial restrictions for catches of certain species during their spawning periods.
- Marine aquaculture is a traditional segment of the fisheries industry in coastal Croatia. It will remain as such, thus contributing to higher level of environmental protection, quality food supply, employment, and economic growth. Croatia is among the EU member states where the value of fish exports exceeds imports with prospects for further growth of mariculture exports.
- Croatia's maritime port infrastructure is well developed. However, almost every Croatian port except Rijeka face infrastructure problems which relate to accessibility of ports and effective use of space.
- The shipbuilding sector is economically and socially important for the local and regional economy but will need investments for green transition.
- Croatia made considerable strides to improve the performance outcomes in the maritime sector. Exploring further the full economic potential of the blue economy could go beyond the existing maritime sectors to take advantage of the untapped economic potential in the emerging blue economy sectors.

Physical Geography and Socioeconomic Profile of Croatia's Adriatic Coast

Croatia has the second-longest coastline in the Mediterranean region (Duplančić Leder et al. 2004). The population in the Adriatic coast is 1,298,522 which is 33.54 percent of the total population of Croatia (2021 census). Compared to 2011, the population decreased by 8 percent (113,413 people). The highest decrease of 16.1 percent was recorded in the County of Lika-Senj. This downward trend is consistent with the overall demographic trends in Croatia. The studies showed that the reason behind this is the aging population, declining birth rates, and fewer women of reproductive age, high unemployment, job insecurity, and negative migration after Croatia joined the EU in 2013 [Čipin, Klempić Bogadi, & Međimurec, (2017); Šterc, (2018); Boromisa, i dr., (2017); Čipin, Zeman, & Međimurec, (2017); Komušanac, (2017); Kozić, i dr., (2020)]. Population in the retirement age in the coastal areas has increased by almost 20 percent compared to 2011, which is higher than the average for Croatia (14.58 percent). Furthermore, the 2021 census indicates an outflow of younger population and an inflow of older populations. Negative demographic trends could pose significant challenges in future

to achieving sustainable economic growth in the Adriatic coastal areas.

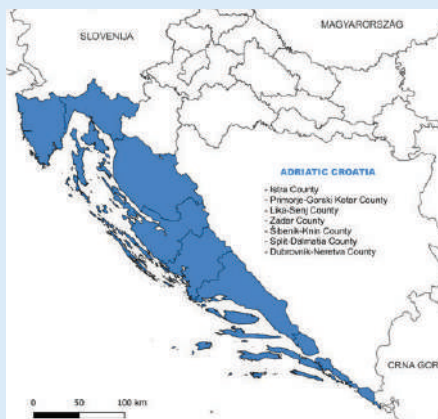
The downward demographic trend is accompanied by growing coastal urbanization. In search of better jobs and living conditions, people move from islands and the hinterland to the coast. Sources estimate that in the 1960s only 150 km of coastline was urbanized while in 2012 the urbanized area stretched over 837 km of the coastline. Coastal developments and new construction for second residences and weekend houses or tourist apartments are growing. The Regional Development Strategy of the Republic of Croatia 2014–2020¹⁶ identifies the urban areas in the coast as follows: urban agglomerations—Split and Rijeka; larger urban areas—Pula, Zadar, Šibenik, Dubrovnik; smaller urban areas—Rovinj, Pazin, Gospić, Knin, Makarska, Metković. The 2021 population census indicates that 38 percent of the total population lives in the coastal county centers—in counties of Zadar and Šibenik-Knin 44 percent and Primorje-gorski kotar 41 percent.

According to the United Nations Development Program (UNDP), Croatia's Human Development Index (HDI)¹⁷ in 2021 was 0.858; that classifies as 'very high human development category'. While it is above the global HDI, it is still lower than those of Germany, Austria, or Ireland (countries of emigration).

Box 1. Croatia's Adriatic Coast

Adriatic Croatia		Total		Percentage	
Surface land (km ²)		24,705		43.65 (of total land surface)	
Surface-sea (km ²)		31,479		39.91 (of total)	

County	Surface (km ²)	Population	Population density (pop /km ²)	No of LAUS
Istria	2.813	195.237	69,41	41
Primorje- Gorski kotar	3.588	265.419	73,97	36
Lika-Senj	5.353	42.748	7,99	12
Zadar	3.646	159.766	43,82	34
Šibenik-Knin	2.984	96.381	32,30	20
Split- Dalmatia	4.540	423.407	93,26	55
Dubrovnik - Neretva	1.781	115.564	64,89	22
ADRIATIC CROATIA	24.705	1.298.522	52,56	220



Source: Kružić, Povh Škugor, 2015; CBS

16 https://razvoj.gov.hr/UserDocsImages/O%20ministarstvu/Regionalni%20razvoj/razvojne%20strategije/Strategija%20regionalnog%20razvoja%20Republike%20Hrvatske%20za%20razdoblje%20do%20kraja%202020._HS.pdf

17 HDR21-22_Statistical_Annex_HDI_Table.xlsx (live.com)

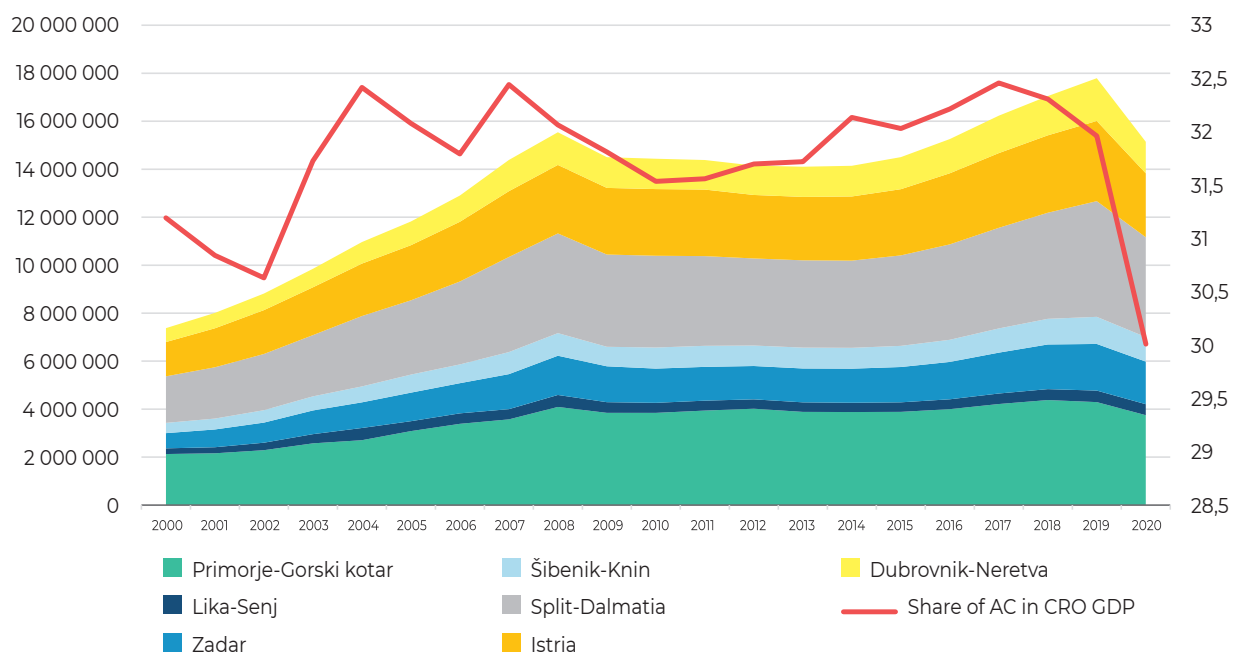
Since 2013, when Croatia joined the EU, the national economy has been growing on a stable path, despite the demographic concerns. During 2000–2020, the GDP growth of coastal counties of Croatia has also stabilized at about 32 percent of national GDP. Among the coastal counties, the highest GDP was attained in Split-Dalmatia County, Primorje-Gorski kotar, and Istria. Taken altogether, they make over 70 percent of the total GDP generated by Adriatic Croatia.

The coastal counties posted a demographic decline reflecting the national trends characterized by decreasing numbers of working-age population, decreasing young people in relation to elderly, as well as migration. The population of coastal counties in 2021 declined by 8 percent compared to 2011. At the same time, the coastal

counties, and the coastline in particular, are facing rapid urbanization. Contrary to that, rural areas remain poorly inhabited (due to migration to coastline).

The GDP per capita varies by county based on the population numbers and density. The highest GDP per capita was posted by Istria (€16,000), followed by Primorje-Gorski kotar (€13,590) and Dubrovnik-Neretva (€10,714), all of which were above the national average. The most populated county the Split-Dalmatia County has lower GDP per capita than the average for Adriatic Croatia. However, the level of GDP per capita in Adriatic Croatia is still below the national average, standing at 89 percent of national GDP per capita (Figures 3 and 4).

Figure 3. GDP in Adriatic Croatia 2000-2020



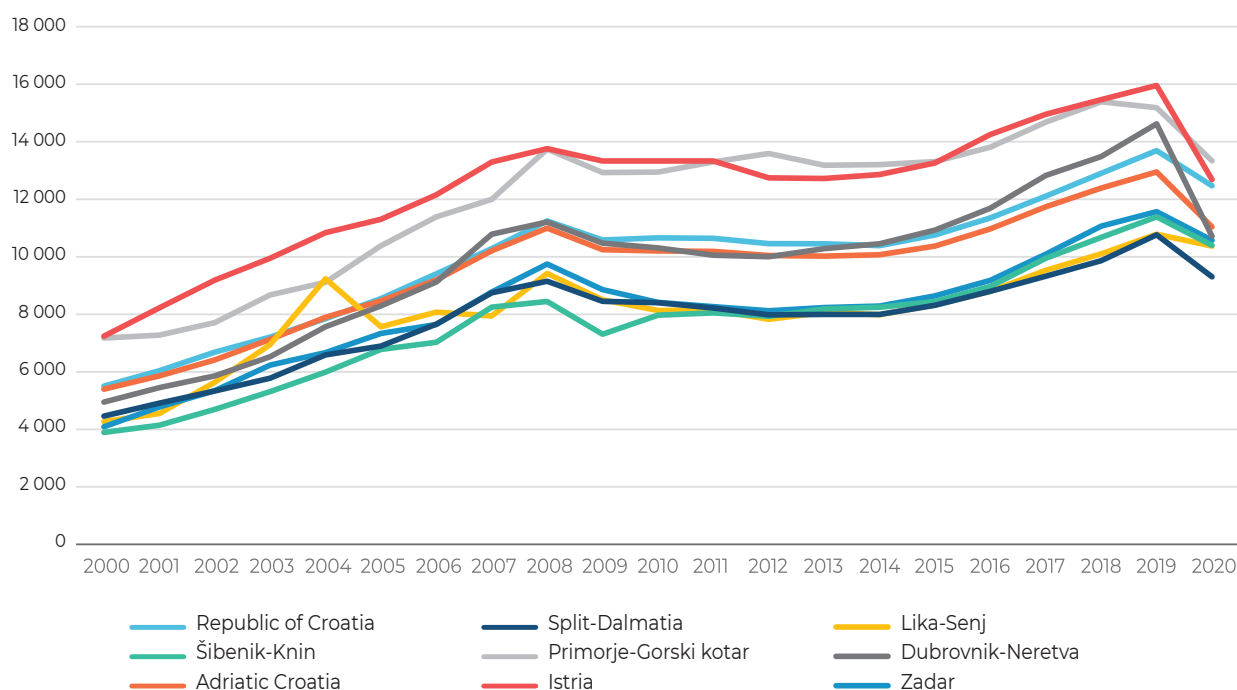
Source: Croatian Bureau of Statistics (CBS).

In 2022, the value of Croatian exports was €23.9 billion and that of the imports €41.6 billion (at fixed exchange rate of HRK 7.5345 = €1¹⁸). The Adriatic region contributed to 13 percent of the national exports and 11 percent of imports. The value of net export of the region reached €1.5 billion in 2022.

Looking forward, virtually every facet of the economy of Adriatic Croatia will be touched by the opportunities linked to blue growth. The local administrative units (LAUs) would have to identify those opportunities while taking advantage of and building upon the regional strengths, natural assets, and marine industry.

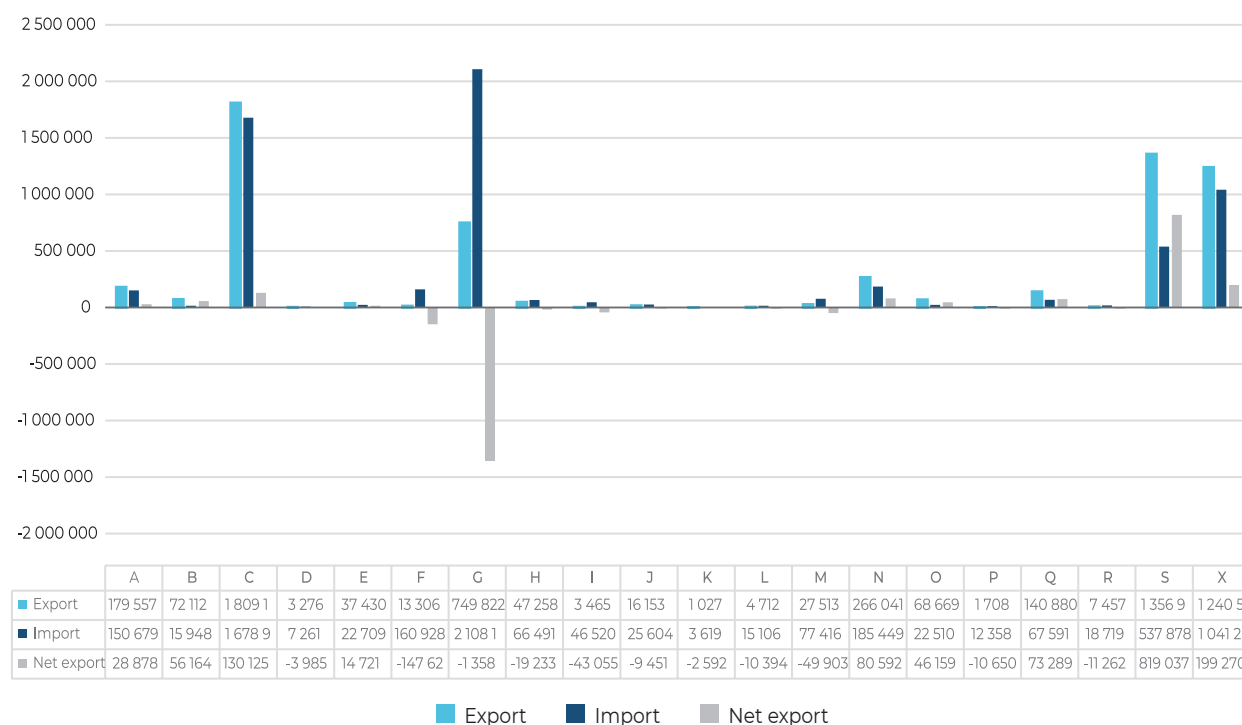
¹⁸ Croatia entered the Eurozone in 2023; according to the EU Council Regulation 2022/1208 of July 12, 2022, conversion rate was set at HRK 7,53450 per €1, with effect from January 1, 2023 (<https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32022R1208&from=EN>).

Figure 4. Adriatic Croatia GDP Per Capita (2000–2020)



Source: CBS.

Figure 5. Exports, Imports, Net Exports of Economic Sectors* in the Adriatic Croatia in 2022 (€'000)



Source: CBS 2022.

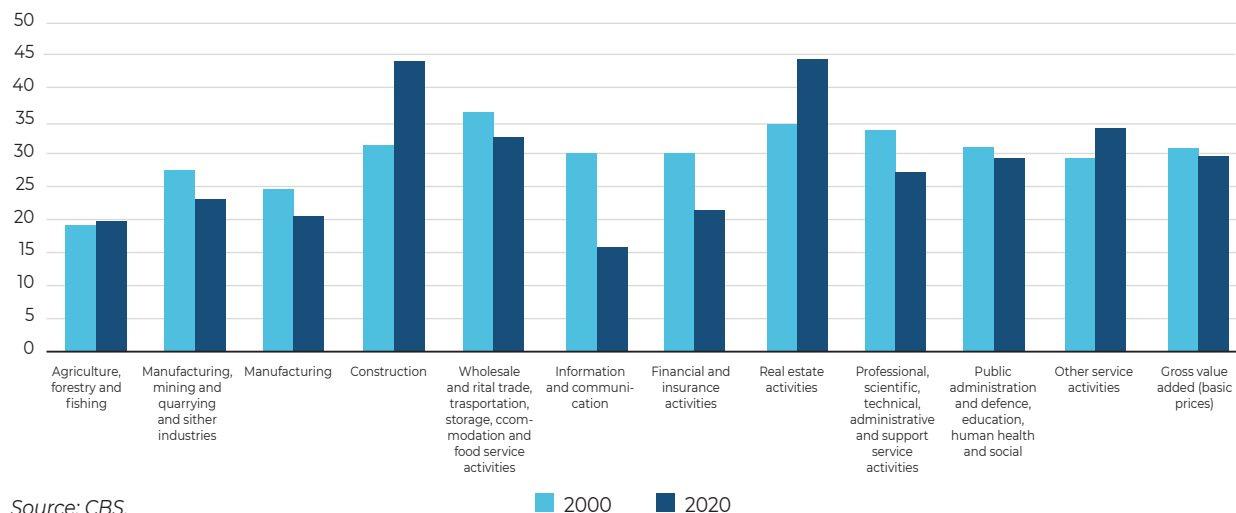
Note: * A – Agriculture, forestry and fishing; B – Mining and quarrying; C – Manufacturing; D – Electricity, gas, steam and air conditioning supply; E – Water supply; sewerage, waste management and remediation activities; F – Construction; G – Wholesale and retail trade; repair of motor vehicles and motorcycles; H – Transportation and storage; I – Accommodation and food service activities; J – Information and communication; K – Financial and insurance activities; L – Real estate activities; M – Professional, scientific and technical activities; N – Administrative and support service activities; O – Public administration and defense; compulsory social security; P – Education; Q – Human health and social work activities; R – Arts, entertainment and recreation; S – Other service activities; X – Unclassified.

Coastal and Maritime Economy, Structure and Trends

The economy of Adriatic Croatia is shifting toward the service industry, but the share of the coastal economy in the total GVA of Croatia remains relatively stable at around 30 percent of the national GVA (2020). More precisely in 2000–2020 the fastest growing economic sectors in Adriatic Croatia were construction (271 percent) and real estate (189 percent), both fueled by the growing wholesale and retail trade, transportation and storage, accommodation, and food services sector (190 percent in 2000–2019), the majority of which is

related to tourism and the tendency to acquire a second residence. While this shift toward services has driven economic growth, it also exposes the coastal economy to global market fluctuations that can greatly affect not only the economy of Adriatic Croatia (particularly BE sectors), but the economy of Croatia as a whole. Rapid growth of tourism and tourism-related sectors (transport, construction, food production) could also expose the economy to potential environmental pressures and climate change impacts on marine ecosystems threatening the very base of tourism, as well as increasing the stressors on water and wastewater systems (Figure 6).

Figure 6. Share of Adriatic Economy in the National GVA of Croatia, Per Sectors in 2000 and 2020 (%)



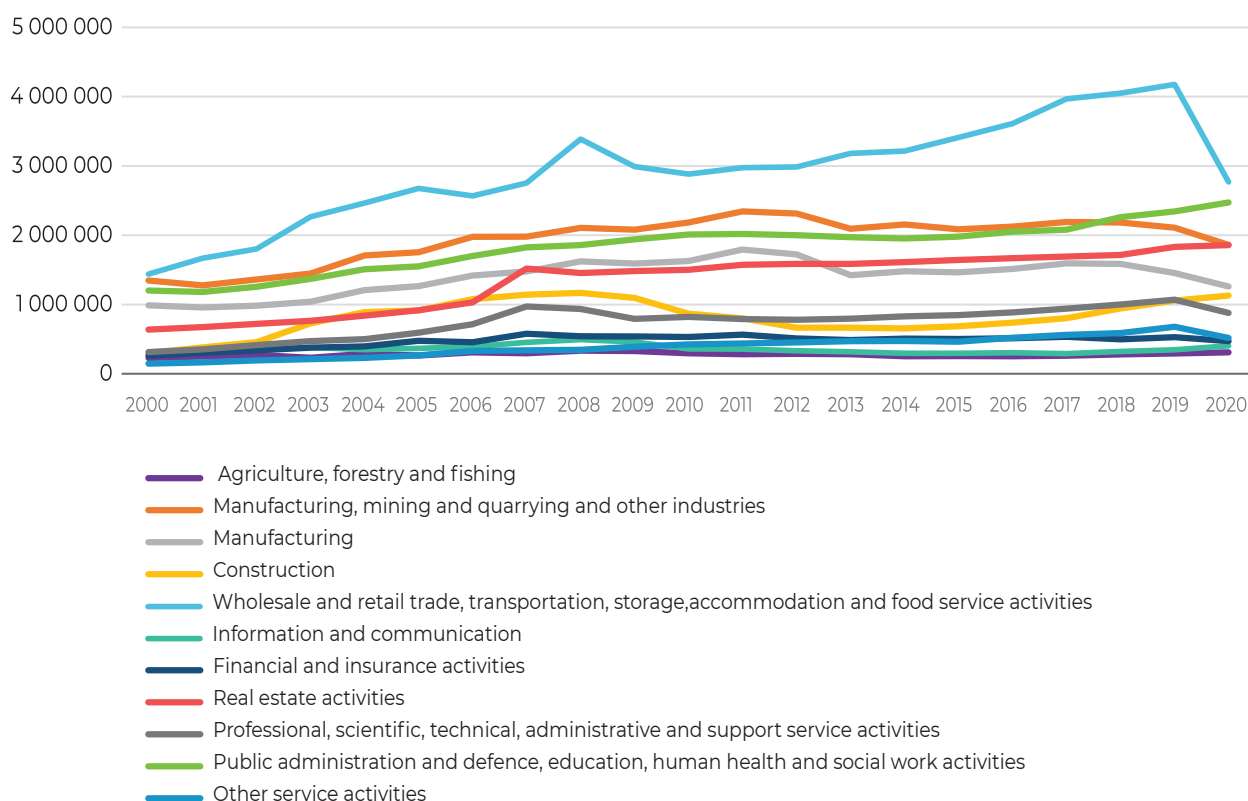
Source: CBS.

The established maritime economic sectors in Croatia include tourism, fisheries and aquaculture, maritime transport, shipbuilding and repair, and oil and gas. Tourism dominates the coastal economy of Croatia and accounts for 22 percent of Croatia's annual GDP. Traditionally, the established sectors—a backbone of Croatia's maritime economy, which are driven by the growth of tourism, are maritime transport and port services. Other sectors, such as oil and gas and shipbuilding, remain regionally concentrated, with shipbuilding and repair concentrated on specific niche markets in Europe and beyond. Yet, the non-tourist sectors are rather small, accounting for only 2 percent of total employment in Croatia¹⁹.

The share of the coastal economy per sector in the total national GVA remained relatively stable despite a small decrease in 2020. Due to the COVID-19 pandemic lockdown, tourism, transport, and trade slumped, pointing to their relative importance in Croatia's maritime economy. The share of agriculture, forestry, and fishing in the total GVA had increased, while it had decreased in the coastal economy. This trend points out to the importance of these sectors, even though their share in the coastal economy is relatively minor (compared to the faster growth of other economic activities). It also emphasizes the interconnectedness of their value chains with maritime tourism. Construction and real estate activities have not only recorded high growth rates in the Adriatic coast but have also boosted their share at the national level (approximately 45 percent of GVA in each sector) (Figure 7).

¹⁹ Ibid 13 p 19.

Figure 7. GVA Per Sector in the Adriatic Economy During 2000–2020 (€, Thousands)



Source: CBS.

National employment levels in Croatia are influenced by seasonal variations in employment on the coast.

Croatia has one of the lowest employment rates in the EU with 69.7 percent in the age-group 20–64, compared to the EU27 average of 74.6 percent (2022). The share of employed women is 65 percent, lower than the EU27 average of 69.3 percent. There is no significant gender gap in employment, however, women on average are paid lower wages than men. The gender pay gap was 11.1 percent in 2021 which is less than the EU27 average of 12.4 percent (Eurostat).

The aggregate employment in the Adriatic counties is 33 percent of the total employment,²⁰ but not all industries contribute equally.

Employment in accommodation and food services stands at 58 percent in winter months and at 67 percent in August. During the summer months accommodation and food services employ 64 percent of the workforce, thus becoming the major employer in the

coastal areas. There are seasonal oscillations due to accommodation and food service activities, which explains the seasonal change in employment generated on the coast (Figure 7). The average labor cost per hour in Croatia in 2022 was €12.1 which is only 40 percent of the EU average, with only Bulgaria, Romania, and Hungary having lower hourly rates (Eurostat).

Despite rising wages and government efforts to lower taxes, Croatia's net earnings remain less than a half of the net earnings in Germany—the main destination of Croatian labor emigration.

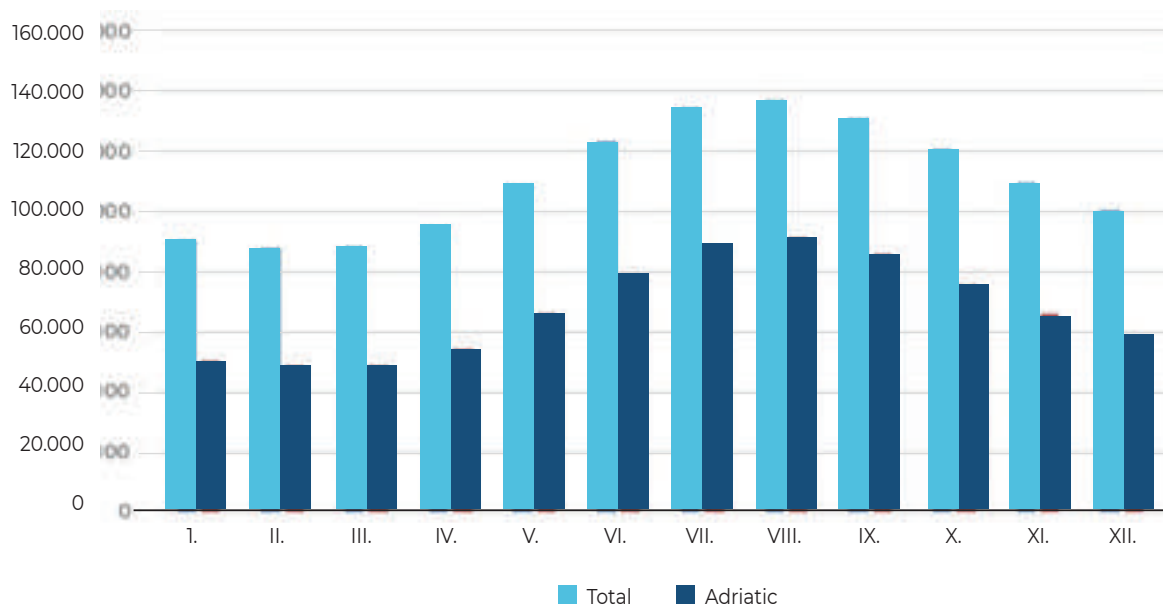
Notably, since Croatia joined the EU single labor market, unemployment rates started to fall. At the beginning of 2023, unemployment (of domestic workforce) has been historically low, that is, below the average unemployment rate of the Eurozone, hence it does not represent a problem anymore. Yet, finding workers has been a challenge for Croatian employers, not only regarding seasonal jobs

20 <https://podaci.dzs.hr/2023/hr/58023>.

in tourism, but also regarding skilled labor in other industries of the maritime and coastal sector (for example, craftsmen in shipbuilding, energy production and transmission, aquaculture; and highly skilled people in R&D). The EU policies for revamp migration and asylum policy introducing immigra-

tion quotas of foreign labor force, and future demand for labor, especially in blue jobs and traditional maritime activities, Croatia's blue economy (BE) strategy could benefit from a more in-depth analysis of the possible labor market trends and social impacts.

Figure 8. Seasonal Changes of Accommodation and Food Service Activities in Croatia and Adriatic Countries



Source: CBS.

Blue Natural Capital

Marine ecosystems play a fundamental role in determining the economic outputs in Adriatic Croatia. Croatia's rich biodiversity and protected areas have been recognized for their natural and ecological values in Europe. National policies emphasize heightened attention to environmental protection, preservation, facilitation of recovery of marine and coastal environmental systems, protection of biodiversity and sustainable use of the sea and the coastal area. One-third of Croatia's territory is part of the European network of nature protection areas, Natura 2000. There are 1,191 protected areas in total in Croatia with a surface area of 25,954 km²—38 Special Protection Areas (Birds Directive)

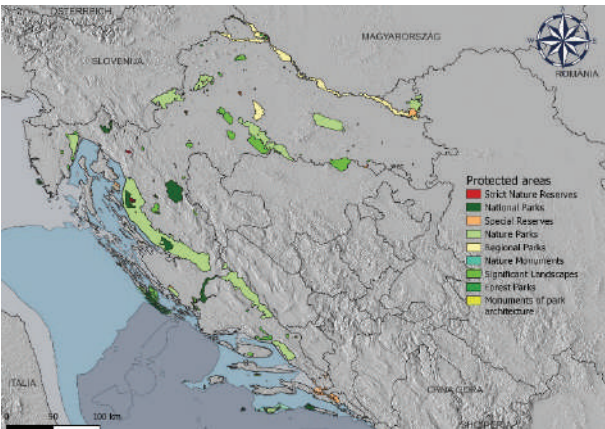
and 745 Sites of Community Importance (Habitat Directive)—as well as 408 sites designated under the national laws.²¹ Croatia has established 248 Natura 2000 marine protected areas (MPAs) covering a total sea surface of 5,279 km² (Ministry of Economy and Sustainable Development [MESD] 2023). The areas included in the EU's network of protected areas, Natura 2000, comprise 36.8 percent of the land territory and 9.3 percent of the marine territory of Croatia.²²

There is no specific definition of MPA in the Republic of Croatia's Nature Protection Act, but there are different categories of protected areas that include marine areas (Table 1). These categories are largely consistent with the International

21 <https://biodiversity.europa.eu/countries/croatia> (accessed November 10, 2023); <https://www.eea.europa.eu/data-and-maps/dashboards/natura-2000->
22 <https://biodiversity.europa.eu/countries/croatia>.

Union for Conservation of Nature (IUCN) categories for protected areas. In consideration of its high ecological value, in 2014, the Jabuka/Pomo pit was declared²³ an 'Ecologically or Biologically Significant Marine Area' (EBSA)²⁴, according to the criteria adopted by the Ninth Conference of Parties (COP) of the Convention on Biological Diversity (CBD)²⁵. Later, in 2017, the Jabuka/Pomo pit in the Adriatic Sea, was established as a Fisheries Restricted Area (FRA)²⁶ banning demersal fisheries²⁷.

Figure 9. Nature Protected Areas in Croatia



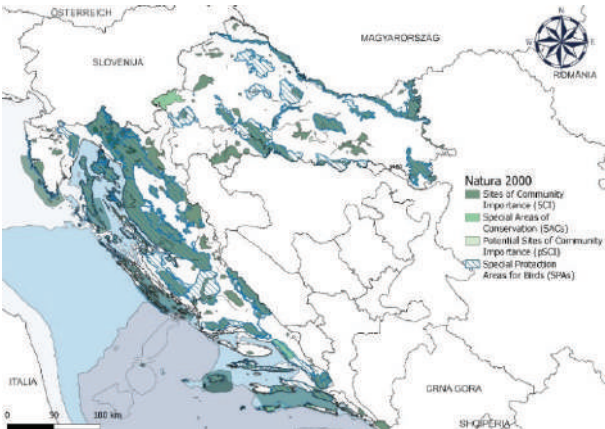
Source: *bioportal.hr*, *Web Feature Service*, produced by authors.

By adopting effective area-based conservation measures Croatia will contribute to the global and EU goal of reaching 30 percent protection of valuable marine habitats. In that sense, Jabuka/Pomo pit is a good example from the Adriatic Sea which shows Croatia’s dedication to sustainable fisheries while preserving marine biodiversity. This approach not only ensures the long-term health of fish stocks but also supports the sustainability and prosperity in the Adriatic region. Such initiatives should be promoted and replicated to further enhance the environmental and economic resilience of the area.

Table 1. National and Nature Parks in Croatia That Include Marine Areas²⁸

National Park	Nature parks
■ National Park Brijuni	■ Nature Park Lastovo Archipelago
■ National Park Kornati	■ Nature Park Telašćica
■ National Park Mljet	

Figure 10. Natura 2000 Sites in Croatia



Croatia has abundant water resources and forest land. In the EU, Croatia recorded the highest volume of freshwater resources (with a long-term average of 27,330 m³ per inhabitant) (Eurostat, 2017). However, according to The River Basin Management Plan up to 2027 (OG, 84/2023) the trans-boundary dependency ratio of Croatia is 77 percent, which together with the low population density adds to the high-water resources’ availability per capita. Croatia’s overall water resources amount to 111.66 billion m³/year. Water availability in the Adriatic River Basin District (RBD) is lower at 20,738 m³/person/year.²⁹ Namely, Adriatic RBD is poorer

23 <https://www.cbd.int/doc/decisions/cop-12/cop-12-dec-22-en.pdf>.

24 <https://www.cbd.int/doc/decisions/cop-12/cop-12-dec-22-en.pdf>.

25 <https://www.cbd.int/doc/decisions/cop-09/cop-09-dec-20-en.pdf>.

26 On October 17, 2017, at its 41st session, through the Recommendation GFCM/41/2017/3 on the establishment of FRA as per the GFCM.

27 <http://www.fao.org/gfcm/data/reporting/frjabukapomopit/en/>.

28 IUCN definition of protected areas includes six management categories (one with a subdivision): I-a Strict Nature Reserve; I-b Wilderness area; II National Park; III Natural monument of feature; IV Habitat Species Management Area; V Protected Landscape or Seascape, and VI Protected areas with sustainable use of natural resources. More on the IUCN definitions in the 2008 Guidelines for applying protected area management categories can be downloaded at: www.iucn.org/pa_categories.

29 The River Basin Management Plan up to 2027 (OG, 84/2023).

in surface water but is believed to hold significant groundwater flows through the karst aquifer systems.

The total forested land in Croatia is 2.75 million hectares, or 47.7 percent of the total land area.

State-owned forests comprise 76 percent of the total forest area in Croatia, and private forests 24 percent. The forest vegetation of Adriatic Croatia is subdivided into two main groups. In the areas with higher average annual temperature and less precipitation, in the southern part of the coastal region, predominant vegetation is the evergreen forest vegetation belonging to the Orno-Quercetum ilicis and the Quercetia ilicis class (Horvat, Glavac, and Ellenberg 1974). In the areas with lower average annual temperature and more precipitation, in the northern part of the coastal area, the deciduous forest vegetation belongs to the Carpinetum orientalis and Seslerio-Ostryetum associations and to the Querco-Fagetea class³⁰ (Horvat, Glavac, and Ellenberg 1974).

With more than 1,200 islands and a rugged coastline of nearly 5,800 km, the Croatian Adriatic coast makes up about 9 percent of the entire Mediterranean coastline.

Croatia has a long tradition in fisheries, an ample source of income throughout the year for coastal and island communities. In addition to providing healthy food, coastal fisheries add value to Croatia's vibrant tourism. The main fish stocks include sardine (*Sardina pilchardus*), European anchovy (*Engraulis encrasicolus*), hake (*Merluccius merluccius*), mullet (*Mullus barbatus*), Norway lobster (*Nephrops norvegicus*), octopus' species (*Eledone* spp.), breams (*Pagellus* spp.), and various flatfish. Sardine and anchovy stocks are probably fully exploited. Although 110 species are caught commercially in Croatia, four species account for more than 89 percent of the total landing weight: European pilchard, European anchovy, red mullet, and hake. Atlantic bluefin tuna (*Thunnus thynnus*) is the targeted species in the tuna fishery, governed by the International Commission for the Conservation of Atlantic Tunas (ICCAT) recommendations in terms of season, size and quota.

Marine ecosystem services are the product of healthy natural habitats. The capacity of natural capital to provide ecosystem services is directly linked to the health of marine habitats, pressures, and management regimes aiming to achieve good environmental status (GES). The interconnected seascapes of the Adriatic-Ionian basin are under multiple natural and anthropogenic pressures potentially causing deterioration of marine ecosystems. Despite some progress in mapping and assessment of ecosystem services Croatia does not have a comprehensive assessment of the marine ecosystem services³¹. Understanding the value of natural capital and ecosystem services and their inputs to the economy will be essential for charting Croatia's transition to blue economy.



³⁰ Stancic, Zvezdana, Andreja Brigic, Zlatko Liber, Gordana Rusak, Josip Franjic, and Zeljko Skvorc. 2008. "Adriatic Coastal Plant Taxa and Communities of Croatia and Their Threat Status." *Acta Botanica Gallica* 155 (2): 179–199. doi:10.1080/12538078.2008.10516103.

³¹ <https://biodiversity.europa.eu/countries/croatia/maes>; Maes, J. et al, Mapping and Assessment of Ecosystems and their Services: An EU ecosystem assessment, EUR 30161 EN, Publications Office of the European Union, Ipsra, 2020, ISBN 978-92-76-17833-0, doi:10.2760/757183, JRC120383

This transition can be hampered by public policies lacking a resource perspective and trade-offs across the sector development goals.

Valuation of marine natural capital and related ecosystem services is a central policy tool in the blue economy concept. The ecosystem approach communicates the importance of marine ecosystem values, reduces the impacts on those values, and creates a context for promoting market-based policy instruments, such as taxes, fees, and subsidies reducing the ecosystem pressures. Public policies and regulations using the ecosystem approach can help improve marine resource governance and enhance the effectiveness of public investments in the maritime space. Natural capital valuation can also inform investment decisions toward sustainable growth of marine-based industries by considering all costs and benefits, both internal and external.

Established Blue Economy Sectors

Coastal Tourism

Traditionally the tourism sector has dominated the coastal economy of Croatia. With over 13 million tourists in 2021 (with 93 percent of overnight stays spent for 'sun, sea, sand' (3S) tourism), tourism clearly dominates the blue economy of Croatia. If developed sustainably, Adriatic tourism has high potential to remain the mainstay of maritime economy as identified by the national authorities.

The tourism sector in Croatia directly employs more than 132,000 people in over 21,000 companies.³² A large part of the tourism services is provided in Adriatic Croatia. The average gross salary in accommodation and food services is €1,111.³³ In 2022, the sector contributed €9,121.8 million to the national GDP, which is 15.9 percent of GDP.³⁴ While these results indicate that in 2022, tourism still ex-

perienced the echoes of the COVID-19 lockdown, the early estimates for 2023 point out that tourist numbers will exceed the pre-COVID-19 numbers for 2019, reaching the highest recorded numbers thus far.

Croatia is among the leading tourist countries in the world recording 19.5 million visitors and 91 million overnight stays in 2019 (pre-Covid-19 numbers), and 17.5 million visitors and 90 million overnight stays in 2021.³⁵ In 2022, the commercial accommodation facilities recorded 17.8 million tourist arrivals and 90.0 million overnight stays. Compared to 2021, there was an increase of 39.1 percent in tourist arrivals and a 28.3 percent increase in nights spent. When compared to pre-pandemic data from 2019, there were 9.2 percent fewer tourist arrivals and 1.3 percent fewer nights spent. More than 80 percent of the tourists are foreigners from central and western Europe, with an increasing number of tourists from both the United States and Far East countries.

In Adriatic Croatia the number of tourist accommodation units is constantly growing. The accommodation units have increased by 48 percent, from 56,720 in 2012 to 108,614 in 2019. About 94 percent of the total number of tourist accommodations is located on the Adriatic coast of Croatia (CBS; Eurostat). About 88 percent tourist arrivals and 95 percent of overnight stays in 2022, were realized in the Adriatic coast of Croatia. The highest number of tourist arrivals and overnights were recorded in the Istria County, with 4.6 million arrivals (25.8 percent of total arrivals) and 27.7 million overnights (30.8 percent of total nights in commercial accommodation). Following Istria County, in 2022 Split-Dalmatia County recorded 3.2 million arrivals and 17.1 million overnights, and Primorje-Gorski Kotar County had 2.9 million arrivals and 15.5 million overnights.

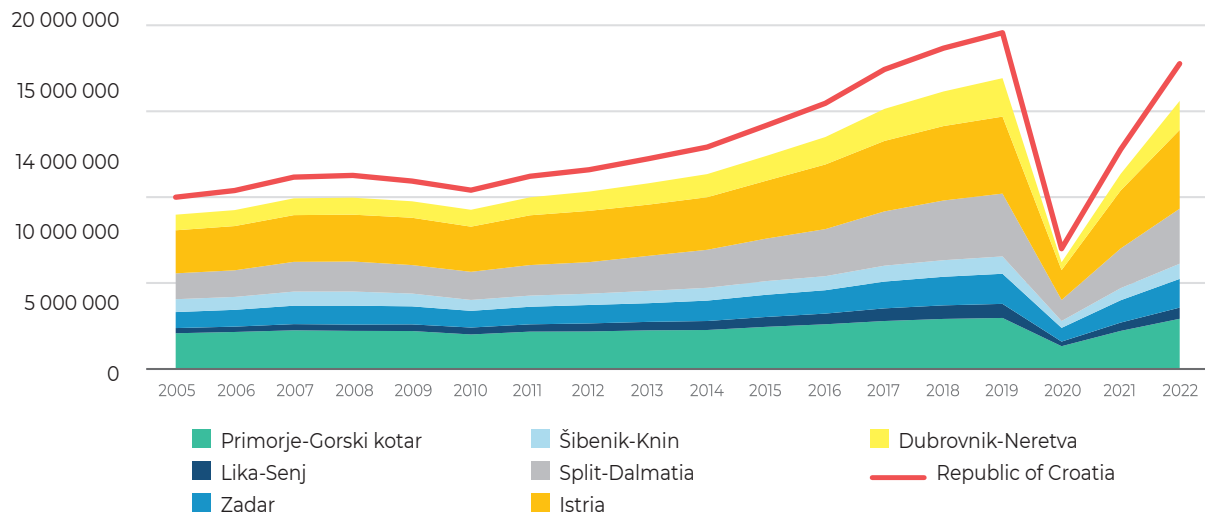
³² CBS, Population Census, 2021.

³³ CBS 2022.

³⁴ Croatian National Bank, Official data, 2023.

³⁵ CBS 2022.

Figure 11. Tourist Arrivals in Commercial Accommodation Establishments in Adriatic Croatia, 2005–2022



Source: CBS 2023.

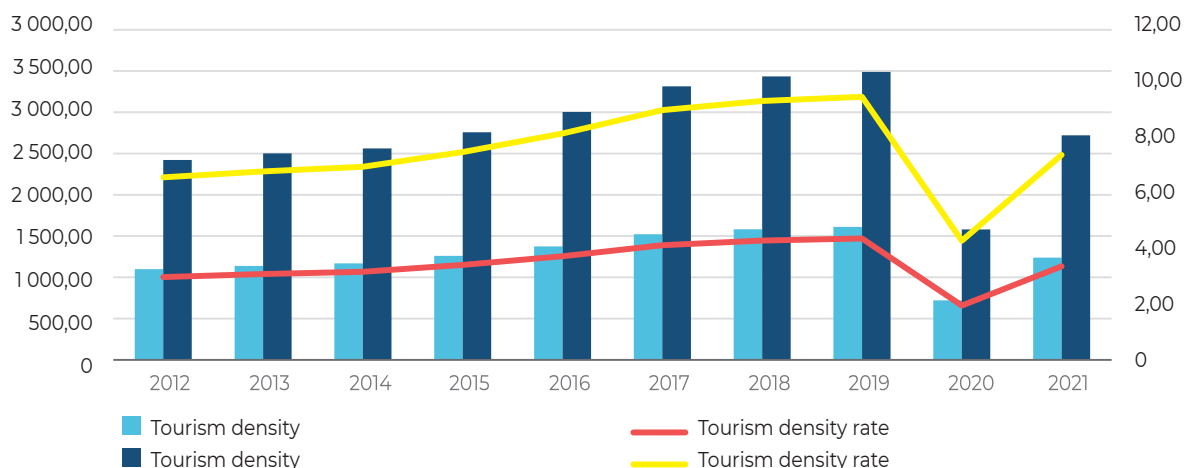
The high tourist density in the Adriatic coast of Croatia signals potentially high anthropogenic pressures on the marine and coastal resources.

Compared to the national average, the tourist density is twofold higher (Figure 12). This is especially worrisome with regard to the pressure on utilities and infrastructure (for example, transport, electricity, water, and wastewater management). High volumes of tourist activities could also change the population's perception of tourism prospects, linking it to potentially negative impacts on marine and coastal resources, living conditions and culture.

Nonetheless, Croatia's tourist traffic remains seasonal and concentrated in the summer months.

Nationally, 62 percent of the tourism activities are realized within the two summer months—July and August, while for the Adriatic counties, 88 percent of the tourist traffic is during the period June–September. Similarly, the coastal tourism annual expenditure across EU peaks in the summer to around 41 percent of the total.³⁶

Figure 12. Tourism Density: Number of Nights in an Area Unit (km²) and Tourism Density Rate (Number of Overnight Stays Per Diem in an Area Unit (km²)) in Adriatic Croatia and Croatia, 2005–2022



Source: CBS 2023.

³⁶ EC. 2020. "Characterisation of Tourism Expenditure in EU regions." European Week of Regions and Cities October 13, 2020.

Despite the positive economic results, tourism in Adriatic Croatia may face future challenges potentially constraining its long-term sustainability and performance.

Due to the inherent seasonality of services, the sector is particularly vulnerable to the impacts and high pressures on road and port infrastructure during the peak season. Current accommodation structure demands more investments in accommodations that will increase the sector's competitiveness. Such investment could offer opportunities for economic growth and employment, while at the same time expanding the capacity of the sector to compete by offering quality travel experiences for tourists. Investment policies in the sector should promote accommodations for high-value visitors who spend above average and offer diversified tourism products that could significantly contribute to the extension of the tourist season. In the same vein, the lack of transport connections outside the main season, particularly air and railway transport, are other obstacles that need to be tackled to attract more sector investments.³⁷

Nautical Tourism

The nautical tourism segment has large growth potential. The National Strategy for Nautical Tourism Development for 2009–2019, envisioned the creation of new moorings and construction of high-quality marinas.³⁸ This is premised on Croatia's comparative advantages determined by clean sea and coastal settlements, attractive natural scenery, mild climate, hospitality, modern marina amenities, and overall image of Croatia as a safe destination. During 2019, the pre-pandemic year, the nautical charter³⁹ recorded 538,000 arrivals and 3.56 million overnight stays, which accounted for 2.7 percent of the commercial arrivals and 3.7 percent of commercial overnight stays at the national level.

In 2021, 210,071 transiting vessels visited Croatia's nautical touristic ports, representing an increase of 72.8 percent compared to 2020, when the arrival of vessels slumped due to COVID-19 lockdown worldwide. Sailboats account for the bulk of transiting vessels (61.6 percent), followed by motorized

yachts (31.4 percent) and other vessels (7.0 percent). In 2021, there was a 75.7 percent increase in sailboats, a 59.9 percent increase in motorized yachts, and an 82.0 percent increase in other vessels compared to 2020. In 2021, the number of vessels on permanent berths had increased by 3.4 percent compared to 2020. As of December 31, 2021, there were 14,805 vessels on permanent berths in nautical tourism ports, which represent a 3.4 percent increase compared to December 31, 2020. Of these, 81.3 percent utilized berths in the sea, while 18.7 percent utilized berths on land. In terms of vessel type on permanent berths in the sea, motor yachts accounted for the highest percentage (48.0 percent), followed by sailboats (46.8 percent), and other vessels (5.2 percent). Similarly, to vessels in transit, 33.8 percent of the vessels on permanent berths in the sea were of length between 12 and 15 m, followed by 27.5 percent of vessels between 10 and 12 m.

Croatia has 220 nautical ports⁴⁰ between Umag and Dubrovnik, which support the vibrant growth of nautical tourism.

These include 86 marinas (of which 21 land marinas), 85 anchorages, 16 berths, and 33 boat storages, covering a total water surface of 4, 793, 554 m² and 19, 105 moorings in 2022. In 2022, berths for land storage posted the highest increase by 12.5 percent and created 10 percent more jobs in comparison to 2021. Most of the nautical tourism ports are in the 'Dalmatian' counties (the four southern Adriatic counties), accounting for 70 percent of the marinas, while slightly less than 30 percent of marinas are located in the rest of the Adriatic counties. The average overall berth occupancy in nautical tourism ports in 2021 was 62.9 percent. The average berth occupancy in the sea was 70.3 percent, while on land it was 41.1 percent.

The revenue from the nautical ports tripled during 2005–2022.

In 2022, the total income from nautical ports was €143.5 million excluding value added tax (VAT), which is an increase of 14.4 percent compared to 2021. Overall, comparing the total income in 2016 to that in 2022, the rise of 40 percent was more than evident.

³⁷ World Bank. 2020. Croatia 2030: Roadmap for a Better Future. World Bank Group.

³⁸ EC. 2022. "MSP Country Information Profile Croatia – February 2022."

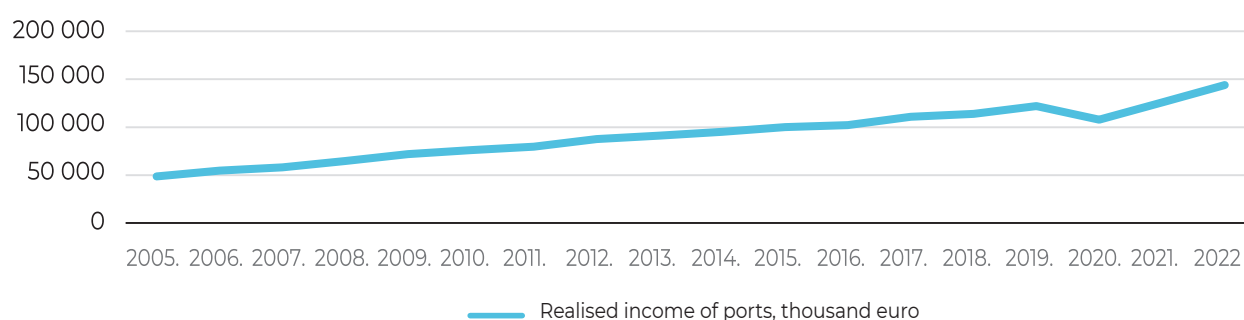
³⁹ The traffic of boaters on own vessels (non-commercial stays) is not statistically tracked, but statistical data is collected for the segment of nautical charter (commercial traffic). The nautical charter is monitored through the eCrew system of the Ministry of Maritime Affairs, Transport, and Infrastructure. The indicators from the eCrew system are integrated into the overall tourism statistics of the eVisitor system of the Croatian Tourist Board (HTZ).

⁴⁰ Nautical ports are classified according to the Ordinance on Classification and Categorization of Nautical Tourism Ports (anchorages, berths, boat storages and marinas).

Table 2. Capacity of Nautical Ports and Employment in 2021 and 2022

	2021	2022
Water surface area, m ²	4,643,877	4,793,554
Number of moorings, total	18,942	19,105
Length of shoreline equipped for mooring, m	73,705	75,171
Number of berths for land storage	6,137	6,906
Total surface area for land storage, m ²	741,049	796,555
Of that covered area, m ²	18,949	23,189
Number of employed persons, total	1,831	2,018
Of that with seasonal jobs	374	446

Source: CBS 2023.

Figure 13. Income Generated by Croatian Nautical Ports Excluding VAT, 2005–2022


Source: CBS 2023.

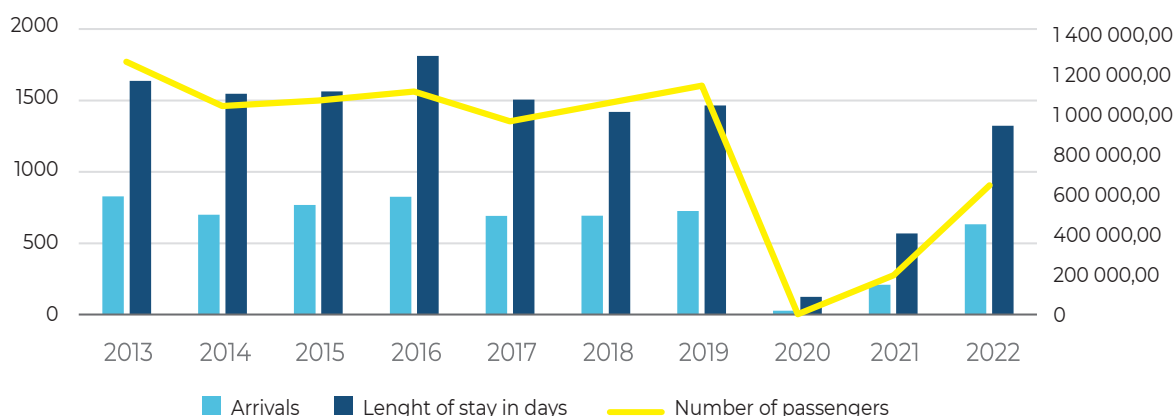
Nautical tourism is growing, especially in some coastal counties. As one of the most attractive nautical destinations in Europe and in the Mediterranean, the growth prospects of Croatia's maritime economy, particularly with regard to the development of new and existing nautical ports will depend on the availability of fully functioning infrastructure designated for this segment of transport. In terms of spatial development and siting, nautical tourism would need to prioritize the protection of exceptionally valuable natural assets like uninhabited, non-urbanized coasts, islands, islets, bays, and coves, that serve as an attraction and motivation for high value domestic and foreign boaters.

Cruise tourism is an important maritime activity. Compared to 2010, in 2021, the total number of cruise ships to Croatia's Adriatic has reduced while keeping almost the same number of passengers and increasing the average number of stops. The number of holiday days spent was twice as high as in 2021.⁴¹ The most important cruising destination in Croatia is the city of Dubrovnik, accounting for more than 70 percent of all cruise tourism in Croatia. However, the daily number of people is often beyond the city's carrying capacity and, in line with UNESCO recommendations, local authorities are limiting the daily number of passengers to the Port of Dubrovnik.⁴² Even though cruise tourism is a distinct part of the tourism sector, it does not feature in the new Strategy for the Development of Sustainable Tourism by 2030.

⁴¹ CBS 2023.

⁴² EC. 2022. "MSP Country Information Profile Croatia – February 2022."

Figure 14. Cruising Statistics in Croatian Coast, 2013–2022



Source: CBS 2023.

Pressures from cruise tourism vary in different market segments.

Relatively short distances between Croatian ports are well-suited for cruising, with smaller ships carrying approximately 200 passengers, as well as for adventure or barefoot cruises. In addition to smaller vessel size, this niche market is characterized by leisure sailing, shorter navigation times, longer stays in port, and higher-priced cruise services. With less time spent on board the ship and stronger focus on port amenities, the passengers in these categories prefer ports that can accommodate smaller vessels, particularly island ports with suitable facilities for guests.⁴³ Consequently, the pressures from many cruise ships on local infrastructures, water, and wastewater treatment port facilities, can challenge the overall environmental sustainability of cruise tourism. Cruise tourism with small ships can have a lower carbon footprint.⁴⁴ However, with upcoming International Maritime Organization (IMO) and EU regulations, national policies will need to ensure that the cruise industry invests in ships powered by zero-life-cycle-emissions fuels and energy. Starting in 2023, the EU will begin charging ships for their carbon pollution through the emissions trading system (ETS).

Fisheries and Aquaculture

The Adriatic-Ionian marine living resources support fisheries, aquaculture, fish processing, and distribution of fish products.

The direct share of fisheries in the GDP of Croatia ranges between 0.2 percent and 0.7 percent.⁴⁵ However, the sector's real contribution might be underrated as the direct economic contribution of the fisheries, fish farming and processing, with accompanying activities exceeds 1 percent of GDP annually. It is estimated that fisheries employs (directly and indirectly) around 25,000 people. The share of aquaculture in the total fishery production in Croatia is only 20 percent but it has a good potential for growth. Fish farming activities are widespread in all coastal counties, with the highest concentration in Zadar County.⁴⁶ Croatia's sea and inland waters offer perfect conditions for aquaculture development.⁴⁷

Marine fisheries

There are two types of marine capture fisheries in Croatia: commercial and non-commercial. Commercial fisheries comprises large-scale fisheries, but also the new category of small-scale coastal fishery, which is limited in terms of gears and operation. Af-

⁴³ Luković, T., A. Asić, I. Šperanda. 2015. "Destination Development for Cruising Tourism." DIEM 2 (1): 839–850. Available at: <https://hrcak.srce.hr/161671> (accessed May 5, 2023).

⁴⁴ Carbon dioxide per passenger kilometer (CO₂/pax-km).

⁴⁵ EC. 2022. "EMFF Croatia."

⁴⁶ EC. 2022. "MSP Country Information Profile Croatia – February 2022."

⁴⁷ EC. 2022. "Croatia Fisheries Factsheet."

ter the EU accession in 2013, the commercial fleet was downsized, as required by the EU framework directives. It especially applied to the reduction of large-scale fleet (scrapping). Non-commercial fishery at sea includes sport and recreational fishing. Croatia has already made commitments to sustainable fishing practices. This includes temporary and permanent cessation of fishing activities to help achieve balance between fleet capacity and fishing opportunities. The BE approach promotes optimizing fishing fleet and changing fishing gear to be more selective to reduce overfishing and promote more balanced catches.

More than 45 percent of Croatia's fishing vessels are registered as multipurpose vessels that use different gear during the year. According to Croatia's Annual report on the balance between fishing capacity and fishing opportunities for 2021,⁴⁸ the commercial fishing fleet comprises 7,757 vessels, out of which 6,235 were active. The commercial fleet is divided into the LSF (large-scale fleet) and SSCF⁴⁹ (small-scale coastal fleet). Large-scale fleet (in total 869 vessels in 2021), represented 14 percent of active fleet, and landed almost 98 percent in weight and 83 percent in value. Majority of LSF in Croatia is constituted of high-activity commercial purse seiners and demersal trawlers which are under a strict management regime. The majority of the Croatian operational fleet relates to vessels up to 12 m LOA (length overall), comprising a total of 93 percent.

Small-scale coastal fleet comprise 86 percent of the active fleet, but only 2.7 percent of the total landing weight. The analysis of effort and landing of the SSCF shows that DFN (drift and/or fixed netters) segment covers 56 percent of days at sea of small-scale fleet (SSF), over 53 percent of landing weight, and 51 percent of landing value in 2021 (Table 3). Although HOK⁵⁰ (vessels using hooks) vessels cover only 4.6 percent of the SSCF in terms of number of vessels, they are significant both in small-scale fleet landing value and total landing value. In 2020, the number of fishermen involved in small-scale coastal fishing was 3,552.⁵¹ The average age of the vessel license holder of SSF was 59. Interestingly, the younger population (the youngest vessels' license holder is 23 years old) owning gears suitable also for other activities such as fishing tourism or transport is well represented in this segment.

Exploring and promoting the synergies between small-scale fleet (SSF) that are predominantly nearshore and tourism sector could steer fisheries toward more efficiency and sustainability. SSF use a range of highly selective gears and are generally more flexible in terms of target species, area, and season. Additionally, SSF employ 25 times more people and use three-quarters less fuel than the industrial fishery sector to catch a similar quantity of edible fish (Jacquet J., D. Pauly 2008, Agnetta et al. 2022).

Table 3. Fleet Characteristics of Active Vessels by Fishing Activity in 2021

Fishing activity	Total no. vessels	Total GT	Total kW	Share in fleet	Share in days at sea	Share in landing weight	Share in landing value
LSF	869	23.214,26	125.505,57	13,9%	32,4%	97,3%	82,9%
SSCF	5.366	8.933,77	128.014,51	86,1%	67,6%	2,7%	17,1%

Source: Croatian Annual report on balance between fishing capacity and fishing opportunities for 2021 (Directorate of Fisheries, May 2022;)

48 Directorate of Fisheries, May 2022; https://podaci.ribarstvo.hr/files/CROATIA_Fleet-report-for-2021_FINAL.pdf

49 SF are generally considered more sustainable because they use fishing gears that have little impact on the environment (for example, the seabed) and incorporate traditional elements that are often in line with sustainability principles (FAO 2019).

50 Republic of Croatia. Fisheries Directorate of the Ministry of Agriculture, p. 62 (https://podaci.ribarstvo.hr/files/CROATIA_Fleet-report-for-2021_FINAL.pdf)

51 CSB 2021.

Figure 15. Fishing areas in the Croatian Adriatic maritime space



Source: Republic of Croatia OG 5/2011.

Croatian national fishery polices are aligned with the principles of the new GFCM 2030 Strategy⁵² and contribute to sustainable management of fisheries in the EU sea basins. Croatia is implementing the EC regulations on fisheries to ensure good status of fish stocks and has developed GFCM management plans and respective national regulations. This includes a catch-based management approach with regards to the Bluefin tuna (BFT quota), swordfish, small pelagic species in the Adriatic Sea, and red coral. While many of the management measures to achieve Croatia's commitments are in place, monitoring the fishing capacity requires systematic data on catches and fishing effort. Further efforts will be needed to carry out a quantitative assessment of current fleet capacity expressed in fishing inputs (number of vessels and days spent fishing at sea) and the fleet consistency with the target capacity—for example, if the current fleet is greater than the fish stock size.

Other management measures adopted by Croatia include temporal and spatial restrictions for use of certain fishing gears, engine power in certain areas, and closures for certain species during their spawning periods. Restrictions are permanent in some areas and cover significant parts of internal waters and territorial sea. The 2021 the national assessment of the overall status of the main segments of the fleet (and fisheries sector) indicated that out of 23 active segments, 13 are in balance and 10 segments are out of balance regarding the assessment of fishing opportunities. Segments out of balance are all purse seine (PS) fleet, demersal trawlers and/or demersal seiners (DTS), and dredgers (DRB) segments. For all segments of fleet (and fisheries sectors) deemed being out of balance, action plans until 2028 have been elaborated.

Fish Processing Industry and Markets

The main fishing harbors are Zadar, Split, Biograd, Pula, Rijeka, and Šibenik. The full list of the landing places is defined by the Ministry of Agriculture⁵³ and published in the OG and regularly updated. In 2023, 121 landing places for commercial fisheries in the coastal area were registered of which 21 are in Istria, 17 in Primorje-Gorski kotar, 3 in Lika-Senj, 19 in Zadar, 14 in Šibenik-Knin, 28 in Split-Dalmatia, and 19 in Dubrovnik-Neretva County (OG 39/2023).

All aspects regarding landings, marketing, warehousing, transportation, and distribution of fish products are regulated by the Marine Fishery Act and subsequent regulations. The quality of fishery products is attributable to marine environmental conditions, the vitality and diversity of marine habitats, as well as the variety of commercially important species.

Croatia has a long tradition in the fish processing industry and an established market for domestic fresh fish and shellfish. The Croatian fishing industry is export oriented. The export of tuna currently accounts for more than half of total fresh and frozen fish exports. Overall, the trade exchange is characterized by the import of higher

⁵² https://oceans-and-fisheries.ec.europa.eu/news/new-strategy-sustainable-fisheries-and-aquaculture-mediterranean-and-black-sea-2021-11-08_en.

⁵³ https://narodne-novine.nn.hr/clanci/sluzbeni/2023_04_39_679.html.

fish quantities with a lower market value and by the export of high-value products.⁵⁴ The EU and national support for modernization of the sector and business environment have created a momentum for expansion of the fish processing industry.⁵⁵ Croatia established regular sales channels to EU markets. These, however, are constrained by the lack of or insufficient value-added products and limited market infrastructure.⁵⁶ According to EUROSTAT, in 2020, the sector recorded a value added of €25.9 million covering 2.5 percent of the value added of all manufacturing of food products.⁵⁷ Overall, the total volume and value of exports of fish products show positive trends.

In 2019, the fish processing industry comprised 34 companies and 2,239 employees. In 2011, the industry had four segments which, in 2017, collapsed to three based on the number of workers (≤ 10 , 11–49, 50–249). The most important segment in the fish processing industry is the enterprise size category with 50–249 employees. This category posted the largest income and total value of assets as well as full-time employment (FTE). The 50–249 segment had 11 enterprises in 2011 and increased to

17 in 2019. People employed in this category correspond to 71 percent of total sector employment in 2011 and 2,041 (91 percent of total) in 2019. The main products of this segment are frozen sardines, anchovy, and canned sardine. The segment with less than 10 workers had 20 enterprises in 2014, which dropped to 10 in 2019. Small businesses often combine and shift their main activities between agriculture, fishing, tourism, hence the fluctuation in their numbers. Although small firms do not have a big economic influence on the fish processing industry, they are important for local communities from a social standpoint including for preserving the local tradition in fish processing. Apart from mass production, small family businesses innovate and tend to create unique products with added value, such as smoked fish. The main challenges in the fish processing sector are to sustain the source of domestic raw material throughout the year and to maintain the labor force on fishing vessels and in the processing enterprises. The total income of fish processing enterprises fluctuated between €3.0 and €5.0 million during 2016–2019 after hitting the peak of €15.5 million in 2015⁵⁸.



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54 European Commission. 2022. "Croatia Fisheries Factsheet."

55 Eurogroup Working Group (EWG) 21-14. "Economic Report on the Fish Processing Industry." <https://stecf.jrc.ec.europa.eu/ewg2114>.

56 EC. 2022. "Croatia Fisheries Factsheet."

57 Eurostat-PRODCOM; <https://www.eumofa.eu/en/croatia>.

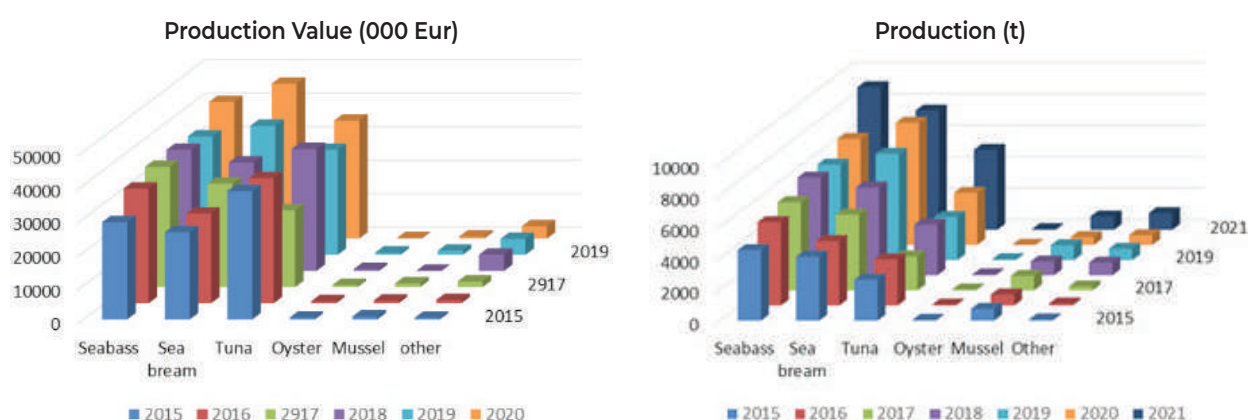
58 EWG 21-14. "Economic Report on the Fish Processing Industry." <https://stecf.jrc.ec.europa.eu/ewg2114>.

Marine Aquaculture

According to the European Commission European Maritime and Fisheries Fund (EC EMFF), aquaculture in Croatia will be a leading sector, contributing to higher level of environmental protection, quality food supply, employment, and economic growth.⁵⁹ An increase in the aquaculture production of over 17,000 tons, including over 1,500 tons of ecological production,⁶⁰ is expected by 2023.

Marine aquaculture is a traditional segment of the fisheries industry in coastal Croatia. Mariculture is based on demersal species (seabass, seabream mainly), tuna farming, and shells production (mussel and European oyster). In recent years, the breeding of meagre and scallop (Jacob's cap) has been on the rise. Mariculture dominates the Croatian aquaculture sector, with 87 percent of production and 95 percent of production value. Mariculture is present in all coastal counties, at approximately 400 locations. Fish farming is going on at over 60 locations, while the other locations have small shell production facilities.

Figure 16. Mariculture Production (Value €, Thousands) and Tons



Source: Republic of Croatia's National plan for aquaculture development until 2027.

Demersal species in floating cages are produced through a complete cycle from controlled spawning to a product ready for consumption. Most production capacities are in the Zadar County. The main markets for demersal species are Italy and domestic markets. Mariculture investments in modernization of existing and new production facilities has increased significantly to meet the growing demand domestically and globally.

Tuna farming in cages in open and semi-closed areas of the middle Adriatic is mostly in Zadar, Šibenik-Knin, and Split-Dalmatia counties. It is based on wild tuna catch (8–10 kg) and farming it up to a market size (30 kg and above). The main market for tuna is Japan. Recently, exports were recorded to the EU, USA, and other Asian countries.

Production volumes depend on the tuna quotas and availability of sardine as the main feed.

Shells production is mainly in small family farms, using traditional technologies and floating parks.

About 84 percent of the production of European oyster is in Mali Ston Bay and Malo more area in the Dubrovnik-Neretva County. Mussels are produced along the western coast of Istria, River Krka Estuary (Šibenik-Knin County), Velebit Channel, and Novigrad Sea (Zadar County). The production is based exclusively on harvesting milt from nature. All facilities are under strict monitoring, and the main market is domestic. Recently, some stagnation of production has been recorded due to an increase of predator species (seabream).

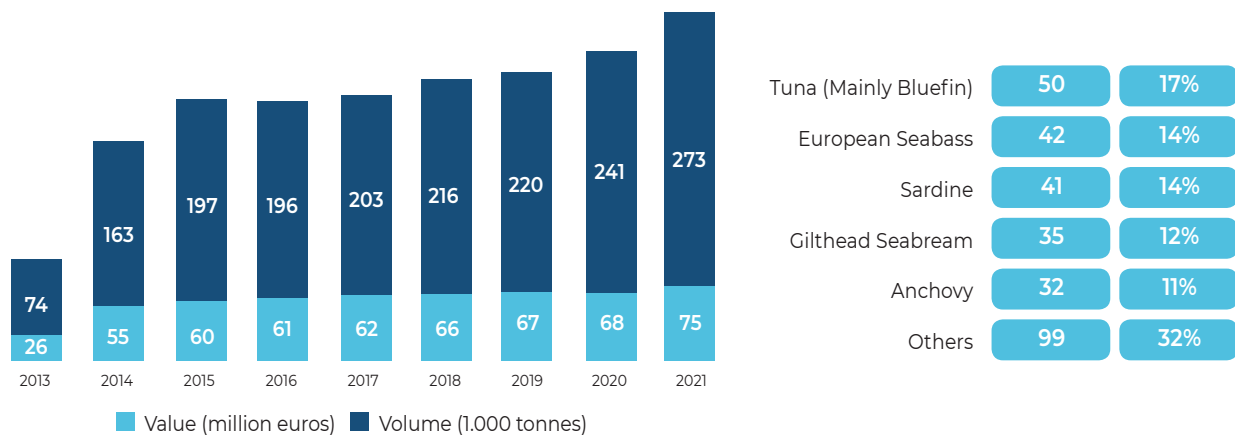
⁵⁹ EC Maritime Affairs and Fisheries. EMFF Croatia.

⁶⁰ While national increases were recorded in freshwater aquaculture especially, and the statement only partially refers to the coastal area.

Croatia is among the EU member states where the value of fish exports exceeds imports. According to Croatia's CBS the export of fish and processed fish products grew steadily from 2013, both in volume and value, reaching, respectively, 54,000 tons and €209 million in 2019. In terms of volume, imports of fish and fish products also grew during

2018–2019 by about 18 percent, thus exceeding exports. Over 40 percent of exported value is from mariculture products (tuna farming, seabass, and seabream). A large portion of imports is related to species for the processing industry as well as for farming (mariculture and cattle breeding) (Figure 17).

Figure 17. Main Commercial Species Exported and % of Total Exports in 2021, €, Millions (Nominal Value)



Source: European Market Observatory for Fisheries and Aquaculture (EUMOFA) 2023 (<https://www.eumofa.eu/en/croatia>).

According to data from the Fishery Directorate,⁶¹ the annual consumption of seafood per capita is lower than the EU27 average. The highest recorded consumption of 22.90 kg/capita was in 2021. This is still lower than EU average⁶² (24 kg live weight) of seafood per year in 2019, when Croatia recorded 20.02 kg live weight/capita. Marine species with high consumer preference are the pelagic, cephalopods (squid, cuttlefish, octopus), and demersal (hake, cod, seabass, seabream, and so on). The main consumption categories are fresh/chilled fish, followed by fish fillets. That highest consumption in 2021 was the result of higher tourist consumption preference for fillets and cephalopods. A typical consumer in Croatia prefers wild fish of local origin. However, due to relatively low purchasing power and high prices of fish and seafood, consumers 'left' the artisan fish markets and turned to specialized shops and supermarkets searching for fresh/frozen but affordable products.⁶³

Maritime Transport

The sector includes passenger and freight transport and related services. In 2019, maritime transport contributed to 9.06 percent of the blue economy jobs in the EU blue economic space.⁶⁴ Due to its direct link with the growth of tourism, particularly in the islands, passenger ferry services are among the fastest-growing maritime activities in Croatia, with a continuous increase in the number of passengers.

The economic potential of Croatian seaports is based on its favorable geographical position and the deep penetration of the Adriatic Sea into the continent. Integration into the network of European transport corridors represents a development potential for inclusion in trade flows within the European and world markets. Almost 90 percent of freight transport in Croatian ports takes place in the ports of Rijeka, Ploče, and Split (Table 4). Croa-

61 "Availability and apparent consumption of fishery and aquaculture product in the Republic of Croatia in 2020 and 2021." (https://ribarstvo.mps.hr/61_UserDocsImages/Dostupnost%20i%20potro%C5%A1nja%20proizvoda%20ribarstva%20i%20akvakulture_2020%20i%202021%2016.2.2023.pdf).

62 https://oceans-and-fisheries.ec.europa.eu/facts-and-figures/facts-and-figures-common-fisheries-policy/consumption_en.

63 EUMOFA 2023 (<https://www.eumofa.eu/en/croatia>).

64 EC. 2022. "The EU Blue Economy Report 2022," p.27, table 2.4.

tian statistics on cargo loads adhere to the mandatory provisions of the International Convention for the Safety of Life at Sea, 1974 (SOLAS), and the International Convention for the Prevention of Pollution from Ships, 1973 and 1978 (MARPOL), for prevention of pollution by harmful packaged substances

carried by sea. These provisions are aligned with the blue economy focus on sustainable sea-based economy and solutions for advancing the 'green' agenda in the shipping industry.

Table 4. Total Cargo Volume in Tons, Thousands, in 2021

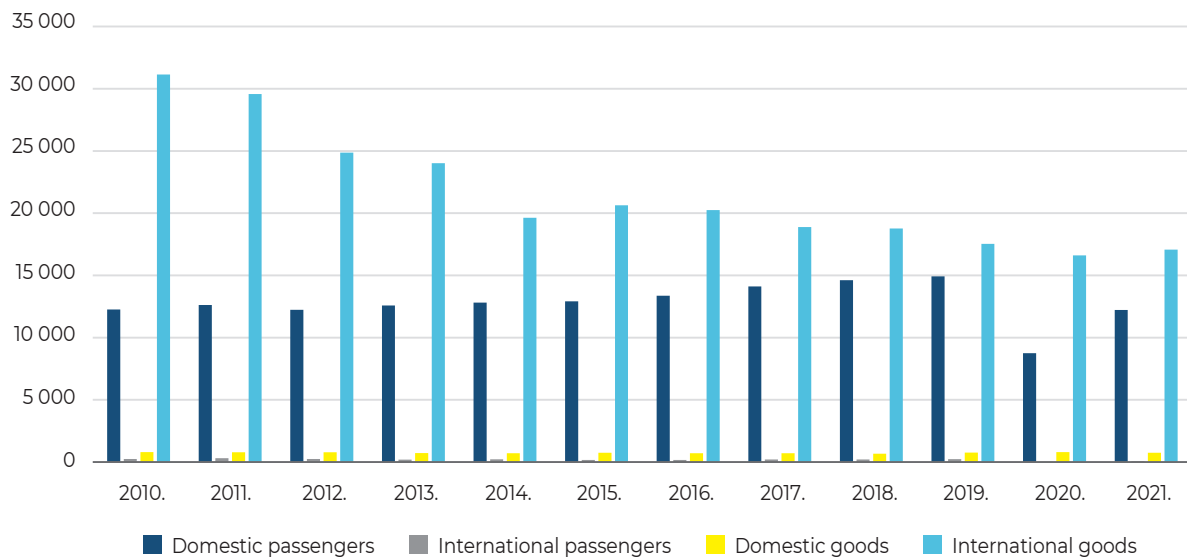
Port	Port Authority	Embarked		Disembarked	
		Total	of that dangerous load	Total	of that dangerous load
Gaženica – cargo and passenger port	Zadar	62,436	4,727	340,201	258,592
Gruž – passenger port (Dubrovnik)	Dubrovnik	7,446	0	5,328	0
Ploče	Ploče	1,041,096	596,486	3,185,438	2,733,663
Rijeka – Bakar	Rijeka	99,168	0	680,073	671,845
Rijeka – Omišalj	Rijeka	333,051	333,051	6,711,397	6,711,397
Rijeka – Raša (Bršica)	Rijeka	350,700	0	0	0
Rijeka – Rijeka	Rijeka	570,761	480	127,554	543
Rijeka – Sušak Brajdica	Rijeka	1,554,124	17,146	1,825,889	21,481
Split – City port	Split	47,192	108	34,063	0
Split – Kaštela B	Split	592,249	7,758	128,090	22,475
Split – Kaštela C	Split	3,486	3,486	455,622	434,342
Split – Kaštela D	Split	0	0	0	0
Split – Vranjičko-Solinski bay	Split	756,475	0	177,795	93,280
Šibenik	Šibenik	73,162	0	125,476	0
Zadar – passenger port	Zadar	16	0	5	0
Total		5,491,362	963,242	13,796,931	10,947,618
Number of employed ptal	1,831	2,018	2,018	2,018	2,018
Of that with seasonal jobs	374	446	446	446	446

Source: Ministry of Sea, Transport and Infrastructure, 2023.

Passenger traffic takes place mainly in the ports of Split and of Zadar, while most of the cruise traffic in the port of Dubrovnik.⁶⁵ According to the Ministry of Sea, Transport and Infrastructure in 2021, domestic sailings to and from domestic ports

took place in the port of Split recording the highest number of total sailings, followed by Dubrovnik (port Gruž), Zadar (Gaženica and Zadar port), Šibenik, and Ploče.

65 EC. 2022. "MSP Country Information Profile Croatia – February 2022."

Figure 18. Seawater and Coastal Transport: Passengers (in Thousands) and Goods (Tons, Thousands)

Source: CBS 2023.

In 2022, 14.3 million passengers were transported by the Croatian maritime and coastal fleet which is an increase of 13.7 percent compared to 2021. A total of 15.3 million tons of goods were transported, which is a decrease in maritime and coastal transport by 13.8 percent compared to 2021. In 2022, an increase in the volume of liquid cargo traffic was recorded which accounted for 48 percent of the total goods traffic and an increase of 21.8 percent. Additionally, there was a 2.6 percent increase in the volume of dry bulk cargo traffic, which accounted for 29 percent of the total goods traffic, compared to 2021. However, containerized cargo experienced a decline of 14.0 percent in tonnage, representing a 15 percent share of the total goods traffic, thus indicating a significant decrease of the transported goods.

Croatia has 435 seaports open to public traffic, of which 6 ports (namely Rijeka, Zadar, Šibenik, Split, Ploče and Dubrovnik) are of particular (international) economic importance. Of these, 67 ports are of national importance and 362 ports of local (communal) importance.⁶⁶ Construction, maintenance, and management of ports open to public transport are conducted through the port authorities, while ports of special purposes, except for ports

for military purposes that fall under special rules, are determined by a decision on concession.

The public maritime transport supports 56 lines of national importance (24 ferries, 16 fast shipping lines, and 10 classic shipping lines, with an additional 9 lines without public service obligation).⁶⁷ They are maintained by 13 shipping companies with a fleet of 87 ships in total in 2021, of which 15 are passenger ships, 17 fast passenger ships, and 45 are ferries. The average age of vessels operating in public liner maritime transport in 2020 was 41 years for conventional passenger ships, over 21 years for roll-on/roll-off passenger ships, and over 25 years for high-speed passenger ships. Public liner transport recorded 13.8 million passengers and 3.5 million vehicles in 2018, while in 2022 those figures have been 13.4 million and 3.8 million, respectively. Passenger and vehicle public liner traffic increased in 2022 compared to 2021, recording a growth of 14.1 percent in passengers and 8.9 percent in vehicles. The largest shipping company is Jadrolinija, based in Rijeka and fully owned by the state. The Jadrolinija fleet currently operates 54 vessels, including 10 high-speed passenger ships, 4 conventional passenger ships, and 40 roll-on/roll-off passenger ships, 3 of which are used for international navigation. In

⁶⁶ National Recovery and Resilience Plan, 2021–2026.

⁶⁷ Coastal Liner Shipping Agency <http://agencija-zolpp.hr/wp-content/uploads/2023/02/2022-MEDUNARODNE-LINIJE-Promet-putnika-i-vozila.pdf>.

2022, high-volume traffic was realized by Jadrolinija's ships, which transported 11,615,368 passengers (86.1 percent) and 3,394,132 vehicles (89.3 percent).

Currently, vessel size and age inhibit the capacity of the Croatian fleet, hamper growth, and therefore necessitate fleet renewal.⁶⁸ Adriatic Croatia is exposed to strong winds. Obsolete port infrastructure and aging coastal liner fleet cannot guarantee reliable access to islands during strong winds.

Croatia's maritime port infrastructure is well developed. Rijeka and Ploče, the two major ports on Croatia's Adriatic coast, have terminals for the transshipment of various types of freight. Although terminal capacities are satisfactory, the level of technological development varies. Some of the terminals at the Port of Rijeka are outdated (for example, the bulk cargo terminal) and not environmentally friendly. From a technological and operational efficiency perspective, the terminals for liquid cargo and containers meet international standards of quality and are competitive.⁶⁹ In 2021, the embarked dangerous cargo⁷⁰ was 17 percent of the total cargo, the disembarked dangerous cargo was higher—79 percent of the total cargo. In 2022 liquid cargo—coal and lignite, crude oil and natural gas, comprised the highest share (30 percent) of the embarked international cargo traffic, followed by crude and refined petroleum products (22 percent).⁷¹ Management of environmental risks poses special demand for carefully planned and managed port services and operation.

Intense boat traffic in the international seaports (arrivals and departures) increases the pressure on marine environment and existing infrastructure of the ports. Hence, the priorities in the development of ports open to public traffic, among others, particularly relate to the implementation of the new law, introducing EU and MARPOL requirements from July 2023, to ensure all ports provide adequate acceptance and management of all types

of waste and wastewater from vessels. According to the official national data, only a few ports have some of the necessary infrastructure/facilities/services, and none of them for all kinds of waste and wastewater.⁷²

Almost every Croatian port except Rijeka faces infrastructure problems which relate to accessibility of ports and effective use of space. Cargo and industry ports, especially in Split and Ploče, are not connected to a railway. Existing railway connections are obsolete and completely inadequate for cargo transportation which in future could impede freight growth. The Strategy of Transport Development 2017–2030 defines Split and Dubrovnik as passenger ports, dedicated both to island and tourist traffic, deemphasizing the importance of Split port in handling cargo traffic, domestic and international. Intermodal transport is recognized as a concept, but it seems there is a long way to go to attain this goal. Port space is not efficiently used, different activities are overlapping, revitalization of abandoned infrastructure/buildings is lagging, while there is shortage of public land, traffic issues, and so on. The issue of effective use of port space and city development is a matter of jurisdiction and coordination of different levels of government and their cooperation in physical planning and beyond. Most of the passenger lines are occupied by a single liner, Jadrolinija. A small number of small private liners struggle for the concessions and incur high operating costs. Outside the tourist season, there is no regular line along the coast to connect the islands and within the Adriatic-Ionian basin.

Shipbuilding and Repair

The shipbuilding sector has had fundamental transformations in the past 30 years. In 2017, the Croatian shipbuilding industry employed approximately 7,200 workers accounting for 5.0 percent of the industrial workforce.⁷³ By 2019, the workers in the shipbuilding industry decreased to about 2.7

68 National Recovery and Resilience Plan, 2021–2026.

69 World Bank. 2020. "Croatian Logistics, Opportunities for Sustainable Competitiveness."

70 International Convention for the Safety of Life at Sea, 1974 (SOLAS), as amended, deals with various aspects of maritime safety and contains in chapter VII the mandatory provisions governing the carriage of dangerous goods in packaged form. The carriage of dangerous goods in packaged form shall comply with the relevant provisions of the International Maritime Dangerous Goods (IMDG) Code which is considered an extension to the provisions of SOLAS chapter VII. Data source: Croatian Ministry of Sea, Transport and Infrastructure, 2023.

71 CBS 2023.

72 Ministry of the Sea, Transport and Infrastructure, <https://mmpi.gov.hr/more-86/zastita-jadrana-103/103>.

73 EC. 2022. "The EU Blue Economy Report 2022."

percent of the industrial workforce. From a growth poll of the coastal economy, the Croatian shipbuilding industry is almost negligible in the context of global shipbuilding. Nonetheless, the sector continues to be one of the important industrial sectors in Croatia.

The shipbuilding sector is economically and socially important for the national and local economy. It provides quality employment for large enterprises and small and medium enterprises (SMEs). In the past 15 years, the large shipbuilding enterprises had contributed consistently around 2 percent of GDP. The industry is geographically concentrated in Dubrovnik (Sustjepan), Vela Luka, Korčula, Split, Trogir, Zadar, Rijeka, Bakar, Kraljevica, and Pula. Regionally, two of the four large shipyards are situated on the north Adriatic zone (Istria and Primorje), and two in the South (Brodosplit, Split, and Brodotrogir, Trogir). Nonetheless, Croatian shipyards face financial problems and an uncertain future.⁷⁴ In 2020, the production of general cargo vessels dropped to zero compared to 2019 when it reached 3,147 Compensated Gross Tonnage (CGT). In 2020, manufacturing of other transport equipment reached only 60 percent of the average production values in 2015.⁷⁵

The shipbuilding industry in Croatia needs investments for production of green and autonomous vessels, smart solutions for ship repairs and future ports. Through strategic scientific partnerships for innovation, research, and development the sector could spur the development of new products in those niches. At the same time for the sector SMEs to modernize, they will benefit from integration in the regional value chains through technology transfer and digital transition for which more investments will be needed.

Oil and Gas

The main objective of the Energy Development Strategy of Croatia is to ensure a lasting, secure, and quality supply of all energy-generating prod-

ucts. The realization of the objective will be through diversification of supply routes of energy and energy-generating products; increasing gas and energy storage capacity in the energy system; increasing the flexibility (and thus resilience) of the energy systems; protection of critical infrastructure; and mitigating risks related to cyber security and climate change.

Croatia aims to cut greenhouse gas (GHG) emissions by 45 percent by 2030 and to abandon coal by 2033. The 2030 National Energy and Climate Plan (NECP) sets a target to make significant investments in the energy sector and achieve 36.4 percent of the energy resources from renewable energy by 2030. To address the need for transmission network upgrades by the middle of 2026, Croatia plans to revitalize about 550 km of transmission lines, to connect 1,500 MW of new renewable energy sources (RESs) into the system. Under the Republic of Croatia Recovery and Resilience Plan⁷⁶ €250 million has been allocated for those investments, although the total investment needs for network expansion cost to meet the RES scale-up are estimated between €600 and €800 million.

Figure 19. Floating LNG Terminal on Island Krk



The expansion of the liquefied natural gas (LNG) terminal is a major project for the security of natural gas supply. It is a project of strategic impor-

⁷⁴ EC. 2022. "The EU Blue Economy Report 2022."

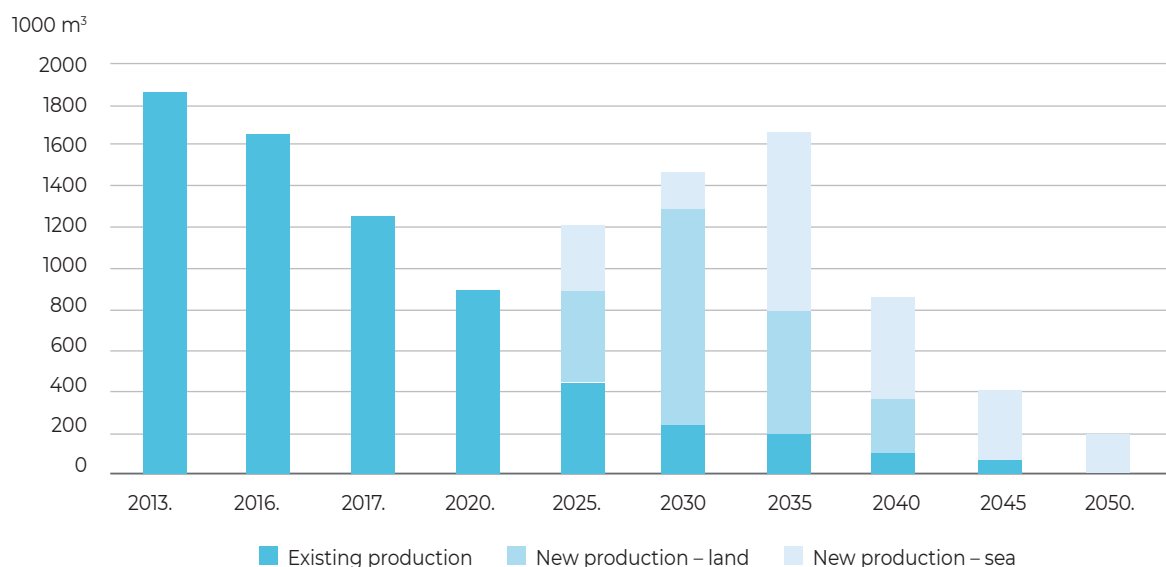
⁷⁵ CBS. 2022. "Industrial Production in 2020: Annual PRODCOM Results." Statistical Reports, Zagreb; CBS. 2016. "Production and Sales of Industrial Products." PRODCOM, Zagreb. Available at: <https://podaci.dzs.hr/hr/arhiva/industrija-energija-i-informacijsko-drustvo/godisnje-statistike-industrije/proizvodnja-i-prodaja-industrijskih-proizvoda-prodcom/>.

⁷⁶ Croatia Recovery and Resilience Plan approved by EU Council on July 28, 2021; <http://planoporavka.gov.hr/>.

tance for the region and the EU, led by Republic of Croatia.⁷⁷ Future plans include connecting the LNG terminal⁷⁸ in the northern Adriatic Sea basin to the Ionian Adriatic gas pipeline and construction of interconnectors to Bosnia and Herzegovina, Hungary, and Serbia (Integrated Energy and Climate Plan 2019, 65). The floating LNG terminal⁷⁹ in Omišalj on the island of Krk (County of Primorje-Gorski Kotar) was launched in 2021 and it consists of Floating Storage and Regasification Unit (FSRU) vessel and

an onshore part. As of April 2022, the capacity of the LNG terminal has been increased from 2.6 to 2.9 billion cubic meters (bcm), with further expansion plans in place. Its capacity will be doubled in the next few years. Additionally, to reduce the imports from other countries and cope with the declining gas production plans (Figure 20), the strategy foresees exploration of potential hydrocarbon deposits in the Adriatic (Integrated Energy and Climate Plan 2019, 66).

Figure 20. Natural Gas Production Projections Estimates by 2050



Source: Integrated energy and climate plan (2021, 71).

Gas exploitation activities are mainly in the northern Adriatic Sea, with 20 operative gas platforms and about 228 km of gas pipeline laid on the sea bottom. There are scenarios of oil and gas exploitation which predict a new offshore oil production projected to reach more than 800,000 m³ in 2035. Similar projections envisage new gas production to peak about 800 million m³ in 2023 (Integrated Energy and Climate Plan 2020, 69–70). According to the Framework Plan and Program for Hydrocarbon

Exploration and Exploitation in the Adriatic (2015), there are 28 hydrocarbon exploration areas envisaged in the Adriatic Sea, located both in the territorial sea and in the continental shelf of the Republic of Croatia: 8 exploration areas in the northern Adriatic, 15 in the central Adriatic, and 5 in the southern Adriatic. A strategic environmental assessment was carried out for the Program but there is no national consensus on how it should be achieved.⁸⁰

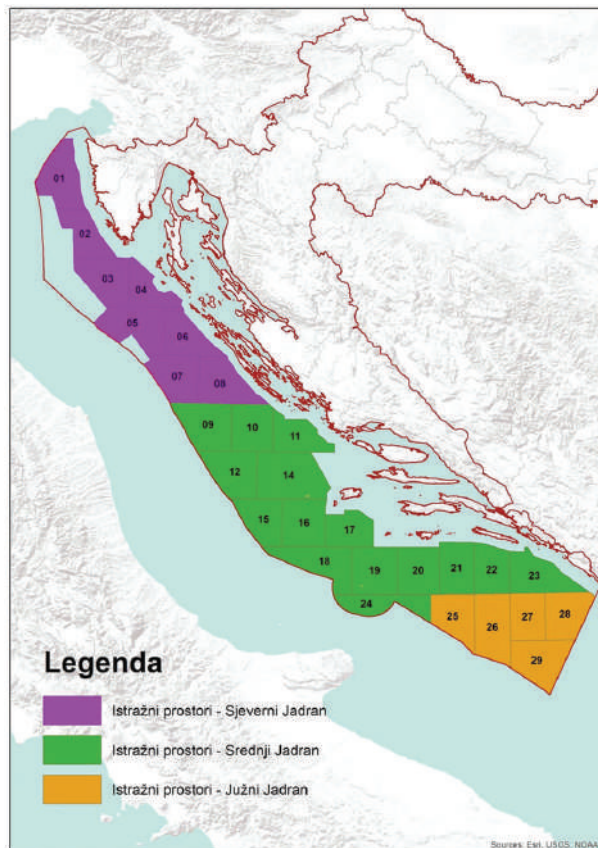
⁷⁷ <https://lng.hr/en/about-terminal/>.

⁷⁸ EC. 2022. "MSP Country Information Profile Croatia – February 2022."

⁷⁹ As of April 2022, the capacity of the LNG terminal has been increased from 2.6 to 2.9 bcm, with further expansion plans in place.

⁸⁰ EC. 2022. "MSP Country Information Profile Croatia – February 2022."

Figure 21. Hydrocarbons' Exploitation Map in Adriatic Croatia (MESD)



Sea Salt and Inert Materials

Production of sea salt has long traditions in Croatia. Historically, the Adriatic coastal areas played an important role in the salt production due their favorable geomorphological features.⁸¹ There are three registered areas for salt extraction, Ston in Dubrovnik-Neretva County, and Pag and Nin in Zadar County. All of them use traditional, environmentally friendly evaporation of seawater technology. Pag reported investments in new warehouse facilities and diversification of production. However, an increase of production quantities was not envisaged due to the specific nature of salt and production modes. Marine pollution (transportation, cruise and nautical activities, marine litter) as well as climate change (changes in precipitation distribution and draft periods, sea level rise) are recognized as

potential threats for salt production. This business activity was also affected by inconsistency in the concession granting framework.

Mineral extraction is growing in quantity and value. According to the Register of Active Exploitation Fields in the Republic of Croatia (May 2021), there are more than 200 legal entities holding concessionaires for exploitation. In Adriatic Croatia, there were 145 holders of concessions and 197 active exploitation fields: 174 fields related to stone quarries, 3 (Ston, Pag, Nin) to sea salt, 4 to sand and gravel for construction, and rest to carbonate, bauxite, mineral ores for cement production, flint, gypsum, carbonate mineral ore for industry. Stone extraction has a long tradition in Adriatic Croatia. There is also a traditional education of craftsmen in stone design and conservation (Brač, Istria). As far as conflicts of quarrying with other economic activities are concerned, the main conflict arises with tourism (Brač). Nonetheless, stone quarrying and related activities enjoy strong support from local communities.

Future scenarios for the sustainable use of Croatia's nonliving marine resources need to build on creative no-harm exploitation backed by effective commercial solutions. This includes harmonizing the procedures for granting concessions to make them more transparent and an effective mechanism for monitoring of granted concessions, effective control over illegal construction; prioritization of economically viable projects and new technologies; priority funding for renewable energy projects; and stronger institutional capacity to assess and prevent negative impacts.

Emerging Blue Economy Sectors

Exploring the full economic potential of the blue economy could go beyond existing maritime sectors. Although these are still underdeveloped, in future, Croatia can take advantage of the untapped economic potential in the emerging blue economy sectors.⁸²

⁸¹ Croatian Waters. 2017. Iz Hrvatske vodoprivrede: Jadranske tvornice "bijelog zlata": <https://voda.hr/hr/novost/iz-hrvatske-vodoprivrede-jadranske-tvornice-bijelog-zlata>.

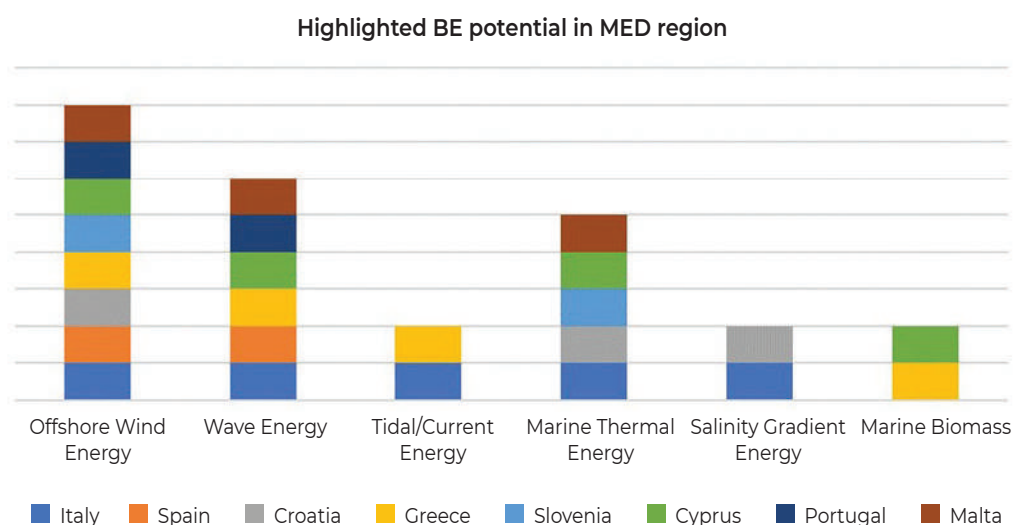
⁸² Emerging sectors of the blue economy encompass economic sectors and activities related to the marine environment but are not mature or for which data are not available (The EU Blue Economy Report 2022, 112). The emerging sectors are ocean energy, the blue biotechnology, desalination, maritime defense, security and surveillance, research and education and infrastructure.

Blue energy

Salinity gradient energy could be an important sustainable blue energy source. Nowadays, the global extractable energy from river mouths corresponds to about 3 percent of global electricity consumption (Plan Bleu 2022). In the region, only Croatia and Italy are among the eight Mediterranean countries with recognized salinity gradient energy potential that could be exploitable⁸³ (Plan

Bleu 2022). The existing methods for obtaining renewable energy from salinity gradients (for example, pressure retarded osmosis, reversed electrodialysis, and capacitive mixing)—their advantages and disadvantages, as well as Croatia's potential to generate blue energy need to be studied further. Plan Bleu recognized that Croatia has some potential in offshore wind and marine thermal energy (Nikolaidis et al. 2019) (Figure 22).

Figure 22. Blue Economy Emerging Sectors in the Mediterranean Basin



Source: Nikolaidis (2019, 3).

Renewable Energy Resources and Offshore wind energy

In 2021, the Government of Croatia adopted the National Energy Efficiency Program for decarbonizing the energy sector. A study by the European Bank for Reconstruction and Development (EBRD)⁸⁴ identified more than 29,000 km² of offshore area available for renewables, including offshore wind (both bottom-fixed and floating) and floating photovoltaic power plants. This includes several low-impact areas in the northern part of the Adriatic Sea, where up to 25 GW of offshore wind capacity could be installed. The identified potential of up to 25 GW of offshore wind capacity in low-impact areas alone

could help Croatia to achieve the national decarbonization goals faster and ramp up the renewable energy sector. Currently, the installed RES capacity in the coastal area is limited to several solar photovoltaic (PV) plants with capacities of 1–3 MW, mostly on the islands (for example, Vis, or Cres under construction with 7 MW). Wider utilization of rooftops solar PV would be relevant for coastal areas, especially as scaling up has been slowed by government interventions to keep the electricity price low. According to the study of the Energy Institute Hrvoje Požar conducted in 2018, to achieve its renewable energy goals Croatia needs to make investments in the range of US\$40–50 million annually.

⁸³ Plan Bleu is one of the Regional Activity Centers of the Mediterranean Action Plan (MAP) of the United Nations Environment Program (UNEP); https://planbleu.org/wp-content/uploads/2020/10/rapport_activites2019_VDef.pdf

⁸⁴ Akcijski-plan-za-obnovljive-izvore-web71.pdf (oie.hr) Project of the Association of Renewable Energy Sources of Croatia (OIEH).

There is growing interest in investments in wind and solar power in the region of Dalmatia.

The Agency for Hydrocarbons has launched investigations into potential offshore windmills locations, all of which are in the continental shelf. However, further analysis and measurements will be needed to determine the real potential of various locations. The Croatian oil and gas company INA-Industrija Nafta, D.D. (INA) has announced plans to diversify into renewable energy at its own facilities after 2025. The Croatian transmission system operator (HOPS) plans the construction of two major substations and an alternative transmission route to the coastal region of Croatia which harbors most of the country's RES potential. This will allow the integration of large-scale RES projects in the country's coastal region. This includes an upgrade the internal power 400 KW grid on the route Konjsko substation (Split) – Meline substation (Rijeka) to accommodate future inputs reaching 1,000 MW and higher.⁸⁵ The technical and legal issues related to submarine cables, infrastructure requirements, and funding of such projects must be resolved as well. This includes securing appropriate investments in the transmission network and the management system and a functioning and competitive electricity market to enable more market participants. Streamlining the procedures of physical planning, especially in the case of pipelines, submarine cables, and similar non-point infrastructure, especially in the cases of trans-border infrastructure could unlock the opportunities for integration in wider regional markets.

Companies from Croatia already collaborate with the scientific community to manufacture equipment, installations, and other components for onshore renewable energy production. The shipbuilding industry could develop capacity for building offshore wind turbines and other production facilities, based on the construction and installation capacity of Croatian shipyards. Further research and development in innovative technology will be necessary for offshore renewables to reach full

momentum and efficiency with lower costs and reduced impact on the environment.

Croatia can take advantage of the renewable energy potential in the Adriatic Sea.

To seize this opportunity Croatia needs a legislative framework for renewable energy and a national maritime spatial plan which comply with the EU environmental legislation and the integrated maritime policy. The national maritime spatial plan will be subject to a strategic environmental assessment under Directive 2001/42/EC ('SEA Directive') and to additional assessments to ensure continuous protection of Natura 2000 sites and protected species.⁸⁶ This includes the low- and medium-impact areas identified in Croatia's National Energy and Climate Plan (NECP) (under review). Croatia's current 10-year plan to upgrade its electricity transmission system should also allow for developing capacity for potentially new offshore renewables and collaboration with the plans of neighboring countries to develop their own offshore renewables.

Other Blue Economy Activities for Future Development

The European Green Deal (EGD),⁸⁷ the Farm to Fork Strategy,⁸⁸ and the Sustainable Blue Economy Communication⁸⁹ identify the potential of farmed seafood as a source of protein for food and feed with a low-carbon footprint.⁹⁰ The blue bioeconomy is developing fast in Europe, and it benefits from strong research and stakeholder engagement by the EU. Blue biotechnology refers to "economic activities associated with the use of renewable aquatic biological resources to make products" (EUMOFA 2023, vii), and it considers non-traditional commercial exploitation of marine organisms. Due to climate change issues, and the last policy responses, much of the focus in blue biotechnology is dedicated to its potential to contribute to the reduction of the global CO2 emission.

⁸⁵ The Integrated Energy and Climate Plan 2020, 72.

⁸⁶ European Commission, Brussels, 19.11.2020, COM (2020) 741 Final, Communication from the Commission to the European Parliament, The Council, The European Economic and Social Committee and the Committee of the Regions. An EU Strategy to Harness the Potential of Offshore Renewable Energy for a Climate Neutral Future.

⁸⁷ COM/2019/640 final.

⁸⁸ COM/2020/381 final.

⁸⁹ COM(2021) 240 final of 17.5.2021.

⁹⁰ EC Brussels, 15.11.2022 COM (2022) 592 final, Communication from the Commission to the European Parliament, the Council, the European Economic And Social Committee And The Committee Of The Regions Towards a Strong and Sustainable EU Algae Sector (SWD(2022) 361 final.

An emerging sector of the blue economy, world-wide, is algae cultivation (EUMOFA 2023).

However, cultivation of commercial use algae is at a nascent stage in the EU. Algae could contribute to environmental sustainability by capturing residual materials, mitigating climate change, and by carbon capture, substituting other food, petfood, and animal feed, providing alternatives for petrochemicals, preempting and reducing plastic waste, and by regenerative ocean farming (EUMOFA 2023). In the future, seaweed farms could have an important place in the European blue economy. However, more research and assessment of environmental impacts will be needed as national experts are rather cautious to the idea of developing algae cultivation in Adriatic Croatia.

Innovations, Research and Development

Science, research, and development (R&D) are enablers for achieving economic goals by developing solutions to overcome challenges and enhance the blue economy sector synergies.

Both the private and public sector would benefit from unlocking new ocean-enabled technologies and measures for strengthening the resilience of coastal and island communities. Until recently, the Croatian business sector's focus was on innovations that were not based on R&D, and the level of innovations in R&D lags the EU average. While commercial relevance may not be the main aspiration of many Croatian scientists, there is a need for greater collaboration between scientific institutions and businesses with the aim of making better use of

the human and technological resources available in research organizations.

The European Commission's Blue Economy Strategy emphasizes the role of research and innovation in achieving a sustainable blue economy.

It encourages governments to push up investments for strengthening science-based policy-making process by collaboration with academia and the research community. Research and innovation is deemed to be a central driver for fostering a sustainable blue economy as well as for fulfilling the goals laid out in the EGD. Increasing the scientific discourse in Croatia's policy making and sector interventions could be achieved by increasing the share of R&D expenditure which in 2021 stands at 1.27 percent of GDP⁹¹ (an increase of 0.02 percent from 2020) and was significantly lower than the EU average of 2.27 percent of GDP and the OECD average of 2.71 percent.⁹²

While Croatia is trying to move away from predominantly basic research, investments in applied research and intellectual property registration remain rather low. Croatia's total research and development personnel was 27,424 in 2021, which is 8.8 percent more than in the previous year. Notably, 13,247 (48.3 percent) of the researchers and scientists are women. A detailed analysis by sector shows that enterprises financed R&D with internal funds (77.4 percent), while the government and private non-profit sector (58.0 percent) and higher education (62.0 percent) were mostly financed by the central and local governments (Croatian Bureau of Statistics).

Table 5. Gross Domestic Expenditure on R&D, by Sectors and Types of Expenditures, 2021

	Gross domestic expenditure	Capital	Total	Current expenditures	
		Expenditures		Labor costs	Other current costs
Sectors – total	724,638	106,373	618,266	452,918	165,347
Business enterprise sector	337,096	34,995	302,100	199,472	102,628
Government and private non-profit sector	153,211	33,760	119,451	89,115	30,336
Higher education	234,332	37,617	196,715	16,4331	32,383

Source: CBS.

91 <https://databank.worldbank.org/source/world-development-indicators#>.

92 <https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm>.



CHAPTER 3.

Croatia's Maritime Space – Threats and Opportunities

KEY TAKEAWAYS

- Adriatic Sea has always been a key factor in the economic activities of Croatia. Traditional maritime sectors which generate significant economic profit face sustainability challenges potentially hampering the prospects of future economic opportunities.
- Pressures stem from climate change, pollution, urbanization, and overutilization of marine living resources, all of which threaten the economic resilience of Adriatic Croatia by reducing the value of maritime assets. In the medium term these threats could be detrimental to maritime economic sectors which depend on them and diminish the quality of life of coastal communities.
- Impacts from solid waste, effluents, and marine litter from tourism are estimated to cost around €21 million annually in economic damages. If current anthropogenic pressures persist, then the costs of environmental degradation will likely rise exponentially exacerbating the environmental degradation at the national level, estimated at 2–3 percent of GDP (2020).
- Overutilization of natural spaces for capacity development and seasonal pressures on infrastructure from large number of tourists act as stressors. The Croatian coastal zone is under pressure from expansion of residential housing and tourist infrastructure on available land. The consequences could be significant in terms of deteriorating landscapes, overuse of water resources, and wastewater discharged in the karstic underground and into the sea.
- With current trends, the value of marine assets will potentially decline, causing the number of high-value tourists to decline, exacerbating public costs, reducing revenues, and hence increasing the vulnerability of the coastal economy.
- Multiple opportunities across key blue economy sectors will emerge to coop with challenges and steer a change of course. In fish processing, innovation and integration with tourism can open new markets, particularly in the EU. Fisheries and aquaculture can grow through technological enhancements and sustainable practices, supported by public and EU funding. The shipbuilding sector, though challenged by global competition, can rejuvenate through investment in innovation and targeting new market segments, such as technology. Coastal tourism can grow sustainably through infrastructure development and diversification beyond traditional hotspots, including through synergies with local agriculture. Furthermore, new segments of the blue economy can boost the local and national economy by utilizing the marine assets in sustainable and innovative ways.

Natural and Human-induced Threats to the Adriatic Marine and Coastal Environment

Climate Change Vulnerability

Croatia is part of the southeast European subregion which is exposed to complex climate variabilities. Most of the country has a Mediterranean climate with hot and dry sunny summers and relatively mild yet rainy winters, especially in the coastal area. Dalmatia is already experiencing fall seasons with declining winter and spring precipitation. Particularly, the mountainous region and the coastal zone are mostly affected by decreasing precipitation during the summer season (May to October), while

the mainland is subjected to higher precipitation conditions. In the northern Adriatic, the reduction in precipitation amount is evident in all seasons. The northeastern Mediterranean, which comprises Adriatic-Ionian Croatia, heat waves have become more frequent, longer lasting, and more severe.⁹³ All over the coast, due to climate change, the usual climate patterns are changing toward more unpredictable seasons. Changes in rainfall and evaporation for Croatia could potentially decrease the reliability of groundwater and surface water sources during droughts or prolonged dry seasons.

Croatia is vulnerable to climate change impacts and ranks 51 out of 181 countries in the 2020 ND-GAIN Index. The ND-GAIN Index⁹⁴ ranks 181 coun-

⁹³ Climate Adapt. 2021. "Adriatic-Ionian Area." URL: <https://climate-adapt.eea.europa.eu/countries-regions/transnational-regions/adriatic-ionician>

⁹⁴ University of Notre Dame. 2020. "Notre Dame Global Adaptation Initiative." URL: <https://gain.nd.edu/our-work/country-index/>. This index aims to help businesses and the public sector better identify vulnerability and readiness to better prioritize investment for more efficient responses to global challenges.

tries using a score which calculates a country's vulnerability to climate change and other global challenges as well as their readiness to improve resilience. The more vulnerable a country is the lower its score, while the more ready a country is to improve its resilience the higher it will be. Norway has the highest score and is ranked 1. Croatia submitted⁹⁵ the Updated Nationally Determined Contributions (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC) as an EU member state in 2020. The country's adaptation priorities include availability and accessibility of water for drinking and irrigation uses, coast and coastal zones, forestry and land use change, agriculture, biodiversity, and human health.

The Croatian Adriatic coast is prone to the global sea-level rise due to climate change. Particularly at risk from sea-level rise are Croatia's low islands such as Krpanj (only 1.5 m above sea level) and river deltas (that is, the Neretva River delta) which includes large areas of agricultural land which are vulnerable to coastal flooding as well as salinization. The Dynamic Interactive Vulnerability Assessment (DIVA)⁹⁶ carried out for the coastal zone of Croatia shows that the impacts of sea-level rise in Croatia will be substantial during the 21st century if no adaptation measures are taken. The area of Croatian coastal zone exposed to the 1-in-100-year coastal extreme water level will increase from the current 240 km² to 320–360 km² in the late 21st century. The expected number of people affected by flooding annually will increase from 17,000 in 2010 to 43,000–128,000 in 2100 and the expected annual damages from US\$40 million in 2010 to 0.9–8.9 billion per year in 2100.

Notably, nearly a quarter of the Croatian economy is based on sectors potentially vulnerable to climate change and extreme weather, including agriculture and tourism. The tourism sector which generates a significant share of GDP could experience serious economic consequences due to higher temperatures, increased flooding, and sea storm frequency. Tourism infrastructure may also be at

risk due to coastal flooding.⁹⁷ Long-term climate vulnerability could cause tourists to avoid hot destinations in favor of cooler locations to the north and thus affect local communities, depending solely on beach tourism. Conversely, climate change may benefit the coastal areas by prolonging the tourist season or creating two seasons for visitors—spring and autumn.

Among the effects potentially increasing climate variability are health and equity implications. Hot and dry summers with increased night and day temperatures and frequent occurrence of heat waves will pose a serious threat to human health, particularly for highly vulnerable groups: children, elderly, and chronically ill people more susceptible to heat stress, air pollution, and more vulnerable to weather events given mobility issues.

As a result of climate change, summer rainfall along the coastal areas of Croatia is expected to decrease by 7 percent in 2040, and 16 percent in 2070, and up to 25 percent in some locations in 2070. At the same time, summer air temperature is expected to increase by 1.3°C in 2040 or 2.4°C in 2070 (World Bank 2022a, 209). It is expected that Croatia will become hotter and drier, especially in the summer. Western and specifically southern areas in the Adriatic will experience a significant reduction in water supply (Willaarts et al. 2022, 8–9) and a risk of interannual and seasonal water variability. A decrease in precipitation levels in the Adriatic part during the summer months is predicted (Willaarts et al. 2022, 45) with associated negative impacts on the availability of freshwater. Also, saltwater intrusion into groundwater is expected (World Bank, 2022a, 209; World Bank 2019, 27). The most vulnerable areas in terms of water availability are Zadar, Dubrovnik, Labin, Krk, Šibenik, Split, and Brač (World Bank 2022a, 210). There is an increased risk of water shortages for water supply, consequently constraining the growth prospects of key blue economy sectors, such as tourism. Adapting to climate change challenge calls for increased efficiency of the use of water resources.

95 Croatia submitted its Seventh National Communication (NC7) and Third Biennial Report of The Republic of Croatia Under the UNFCCC in 2018. https://unfccc.int/sites/default/files/resource/2671905483_Croatia-NC7-BR3-2-96481035_Croatia-NC7-BR3-2-7.%20NC%20i%203.%20BR_resubmission_IX_2018_0.pdf.

96 MEDPARTNESHIP PAP/RAC Presentation for the REGIONAL WORKSHOP ON CLIMATE CHANGE ADAPTATION IN MEDITERRANEAN COASTAL AREAS, Athens 2015.

97 Climate Risk Profile: Croatia (2021): The World Bank Group.



© Benan Berhan

Croatia receives an average of 18–20 million tourists annually, which is five times the country's population. Most tourists visit the coastal areas during the summer season (Willaarts et al. 2022, 21) when water demands reach their peak. The Zadar and Split region and islands are exposed to significant pressures from water abstraction due to a sharp seasonal increase in water consumption (World Bank 2022b, 16). The water sector in Croatia needs further investments in flood defense and a more integrated approach to water resources management. Shortages of water are expected in the long run during the cultivation period and the tourist season when water requirements reach the peak demand.

In the Mediterranean region, temperatures are going up 20 percent faster than the global average.⁹⁸ Under almost all climate scenarios for Europe, the climate change impacts could cause a dramatic drop of tourism arrivals in southern European countries (more than 7 percent in Greece and more than 8 percent in Cyprus). On the contrary, Croatian coastal tourism could exhibit a modest rise until

2100 (between 0.05 percent and 1.08 percent). The climate change impacts could prolong the tourist season and shift tourism from sea-sun-and-sand to other attractions because of high temperatures and potential health hazards. While future estimations of climate change impacts on tourism from water availability, invasive species, pollution affecting critical habitats like *Posidonia* meadows, would benefit from an in-depth vulnerability assessment, there is an obvious need for strengthening the resilience of the coastal and marine ecosystems. The water resources in the Adriatic water management district on which 2,091 settlements⁹⁹ depend could be affected by climate change impacts. While the structure of future blue economy of Croatia is hard to predict in the absence of an official stance on the issue, developing a strategic vision and a roadmap could chart new avenues for Adriatic Croatia. In the meantime, while markets continue to rule, and investment directions continue to be shaped by EU policies, the imperative of embracing sustainability goals for the coastal and marine economy of Croatia will prevail.

98 "The Climate Change effect in the Mediterranean. Six stories from an Overheating Sea" WWF Mediterranean Marine Initiative, Rome, Italy, 2021.

99 Water District Management Plan 2016–2021. OG 'Narodne Novine' 66/2016.

Municipal Solid Waste

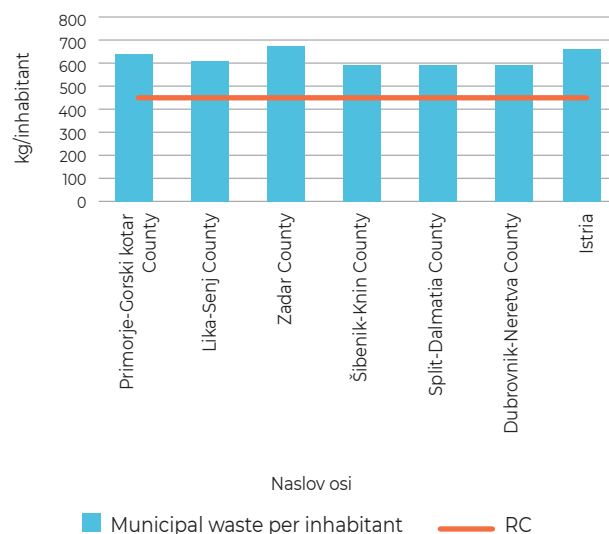
In 2018 the European Commission published an early warning report for member states at risk of missing the 2020 target of 50 percent preparation for re-use/recycling for municipal waste.

Croatia was flagged as one of the countries missing the 2020 targets. Key findings presented in the early warning report for Croatia¹⁰⁰ (SWD 2018, 414 Final) are as follows: the recycling rate in 2016 (including composting) reported to Eurostat was 21 percent. The rate of municipal waste landfilling was 77 percent, making it among the highest in the EU. Croatia failed to effectively implement separate collection of recyclables, including biowaste; economic incentives for citizens and municipalities are not yet in place; the extended producer responsibility schemes in Croatia do not fully cover the costs of separate collection; and more investment is needed in projects higher up the waste hierarchy that go beyond the treatment of residual waste.

The waste produced in the coastal counties exceeds the national average of 454 kg/year/inhabitant in 2021. The main source of municipal solid waste exceeding the national average is tourism in the coastal areas (Figure 23).

The estimated annual cost and economic damage due to marine litter and associated harmful impacts on the marine ecosystems in Croatia is €21 million.¹⁰¹ The most common waste leaked into the Adriatic Sea is single-use plastics from packaging, followed by fishing nets, ropes, hygiene items, cigarette butts, most being washed ashore (Republic of Croatia, MESD, 2023). The monitoring results of marine litter¹⁰² in 2021, indicate that the share of plastic materials washed ashore is 97 percent. The usual plastic objects were pieces of plastics – 35 percent, bags – 13 percent, caps from plastic bottles – 12 percent, and hygiene ear sticks – 6.7 percent. The Clean Coast Index (CCI) which measures the amount of plastic waste is an indicator of beach cleanliness (less plastic waste = cleaner beach), for the location of Nin is 1.20, for Prapratna 6.73, while for Stončica it is 77.605. These results

Figure 23. Municipal Waste per Inhabitant in Adriatic Croatia



Source: Adjusted by Authors from the MESD of the Republic of Croatia. (2022). Report on Municipal Waste for the Year 2021, p. 27.

indicate that the most stressed areas are those affected by waste brought in from the open sea.

Monitoring of solid waste accumulated on the seabed confirms that plastics are the prevalent category of waste. The highest total amount of solid waste on the seabed was recorded by a monitoring station in the northern Adriatic. The areas that are more heavily affected by waste from the open sea are more heavily loaded. The 2021 findings on the concentrations of microplastics on the sea surface mirror the trend of multiyear research. It indicates that the values in the central and southern Adriatic do not exceed 20,000 N/km², while in the northern Adriatic the concentrations are higher and have a greater variability, per station.

The Draft Waste Management Plan 2023–2028 of Croatia has provisions for reducing single-use plastic products, light plastic bags, packaging waste, increasing the recycling rate, and improving wastewater treatment to prevent the creation of marine litter. Croatia has defined the areas for EU financial support for the next planning period 2023–2028 as follows:

¹⁰⁰ https://environment.ec.europa.eu/topics/waste-and-recycling/waste-framework-directive_en.

¹⁰¹ World Bank. 2012. Croatia CoED Report.

¹⁰² Official portal of the MoESD IOR: <http://baltazar.izor.hr/azopub/bindex>.

- Establishing a sludge management system;
- Identifying the locations and sources of marine waste and identifying locations of accumulated marine waste on the seabed;
- Establishing a system of prevention, collection, and disposal of marine waste, as an integral part of the waste management system; and
- Interventions for collection and disposal of marine waste.

Municipal Wastewater

Implementation of the UWWTD¹⁰³ is facing challenges in the coastal areas of Croatia. Overall, 66 percent of the urban wastewaters in Croatia are treated before releasing into the water bodies. This is below the EU average of 76 percent.¹⁰⁴ Discharges without tertiary treatment are frequent in the counties of Šibenik-Knin and Split-Dalmatia. In 2022, there were 186 wastewater treatment (WWT) plants across the country. In the coastal areas, primary treatment of wastewater is the prevalent treatment technology.

Table 6. Croatia's Wastewater Treatment Plants 2022

Tertiary treatment (nitrogen [N] and phosphorus [P] removal)	Secondary treatment	Primary treatment
30	90	66

Source: Croatian Bureau of Statistics, *Public Sewage System, 2022, first release*.

Coastal areas are under seasonal pressure from untreated sewage. Croatia lags the necessary investments in sewage and wastewater treatment infrastructure along the Adriatic coast.¹⁰⁵ Commissioning of the secondary WWT plants in the main

coastal agglomerations is expected by the end of 2024. Since wastewater flows in the coastal areas increase seasonally, large WWT plants could be underutilized outside the high season. An alternative to avoid investments in oversized treatment capacity which entails high operational and management cost, would be the natural treatment (green and grey wastewater infrastructure) for treating effluents during peak season and to ensure the discharge flows meet the environmental requirements (Willaarts et al. 2022, 112–113). Based on results from the monitoring,¹⁰⁶ it is assumed that the coastal bathing waters have not been affected by direct discharges of urban wastewater. About 95.6 percent of the monitored bathing waters in Croatia are coastal waters (894 out of 935 bathing waters). Based on the available information for 2021, more than 95 percent of the bathing waters are of 'excellent' quality.

Pressures from Tourism Industry

The 2023 Sustainable Tourism Development (STD) Strategy¹⁰⁷ of Croatia points to several impacts on the tourism sector. Tourist activities increase the pressures on marine ecosystems and biodiversity (from sudden pollution of the marine environment, waste leakage, and noise). Coastal habitats are particularly threatened from construction, backfilling, municipal waste, and recreational activities. In the long run, accumulated pressures could alter the marine ecosystems especially during the high tourist season in the absence of effective conservation measures. Different tourism markets/products/activities have different environmental and carbon footprints. For instance, sea cruises are among the most polluting and low-value tourism segments, while sailing may have low carbon but some pollution, wind-powered water sports have low environmental impacts and carbon footprint.

Most municipal solid waste (MSW) generated by tourists is during the months of July and August, when waste management reaches its limited ca-

¹⁰³ The Urban Wastewater Treatment Directive (UWWTD) (Council Directive 91/271/EEC), revised in 2022, is one of the key policy instruments under the EU water acquis.

¹⁰⁴ <https://water.europa.eu/freshwater/countries/uwwt/croatia>.

¹⁰⁵ Draft Water Management Plan of Republic of Croatia, 2023 (443–444).

¹⁰⁶ Ministry of Economy and Sustainable Development, <https://mingor.gov.hr/o-ministarstvu-1065/djelokrug/uprava-vodnoga-gospodarstva-i-zastite-mora-2033/kakvoća-mora-za-kupanje-na-plazama-hrvatskog-jadrana/1450>.

¹⁰⁷ Republic of Croatia Sustainable Tourism Development Strategy, OG 2/2023.

capacity. Total annual MSW on islands without bridge connections and without landfills is approximately 24,000 tons, equivalent to 1.3 percent of the total produced waste in Croatia.¹⁰⁸ Overall, at least 5 percent of national waste is produced on all islands in Croatia, while less than 0.7 percent of Croatia's population lives permanently on these islands (World Bank 2021).

About 92.5 percent of all tourist accommodation facilities are on the Adriatic coast. Due to excess tourist demand and the rise in real estate prices, local population in the old city centers vacate and leave their dwellings exclusively for tourists. About 55 percent of survey¹⁰⁹ respondents believe that the cost of living of the local population has increased due to expansion of tourism. The STD strategy recommends stricter regulation and enforcement of spatial planning and construction laws to reduce the negative impact of advanced coastal urbanization.

Traditionally, tourist visitors are concentrated in the four summer months and mostly in the coastal zone. According to the STD strategy, the most common reason for tourists to visit Croatia is the sea (81.5 percent) and nature (56.2 percent). Croatia has 6.7 m² of beach space per bather with an estimated pressure of 1 million bathers per day. Crowding of beaches is the key reason for tourists' dissatisfaction during their stay. Croatia has one of the highest numbers of charter fleet in the world and comprises approximately 40 percent of the global charter market.¹¹⁰

Croatia's coastline with its lengthy accessible coast, clear sea, and attractive archipelago offers favorable conditions for nautical tourism. However, the nautical infrastructure needs improvements for adequate reception and treatment of wastewaters from boats and for protection of *Posidonia oceanica* seagrass meadows which are extremely endangered in the Mediterranean region due to anchoring. The impacts of nautical tourism are well recognized in the commitment to the strategic sector development goal 'Tourism with preserved environment, space and climate'.



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The 2030 STD strategy promotes actions for (a) reducing the burden from tourism on environment and nature, (b) reducing the negative impact of tourism on the space, and (c) addressing negative impact on tourism from climate change. Furthermore, the implementation of integrated management of the coastal area, integration of less-developed tourism areas, and fostering the integration of coastal tourism with the tourism activities in the hinterland will reduce the burden on coastal tourism. Coastal activities which could have a positive multiplier effect on other sectors, such as fishing and agriculture through the development of special tourist products need further support. The strategy further promotes greater use of renewable energy sources and energy efficiency in accommodation facilities and tourist infrastructure, as well as in traffic. This contributes to Croatia's effort to combat the impacts of climate change. There are also plans to expand the use of rail transport and other forms which are more environmentally friendly. Croatia can choose to focus on low-impact and high-value tourism products and segments as part of its blue economy strategy.

¹⁰⁸ World Bank. 2021. Croatia Cost of Environmental Degradation.

¹⁰⁹ TOMAS. 2019. "Survey on Attitudes and Expenditures of Tourists in Croatia." Institute for Tourism, Croatia.

¹¹⁰ Ministry of Sea, Transport and Infrastructure 2023;

<https://mmpi.gov.hr/vijesti-8/svecano-otvoren-25-medjunarodni-nauticki-sajam-biograd-boat-show/24216>.

Despite the economic benefits, coastal and marine tourism is associated with negative consequences. Overutilization of natural spaces for capacity development and pressures on infrastructure from large number of tourists within a short seasonal period act as stressors. On one hand, selling quality nautical tourism experience depends largely on the baseline environmental factors. On the other hand, sustainable nautical tourism is important for the protection of the marine and coastal environment, as well as for the stimulation of environmental awareness in tourists and the local population. Therefore, the tourism strategies and measures for extending the tourist season and reducing the negative impacts may need to factor in multiple considerations such as density and intensity of tourism activities, opportunity cost of the valuable land and natural capital, social impacts to local communities from rising real estate prices, leading to the emigration of young people from tourist (urban) areas, and emerging of 'ghosts' areas in city cores outside the season.

Urbanization and Land Use

Adriatic Croatia is home to 33.54 percent of the population of Croatia.¹¹¹ The aesthetic values of and economic opportunities on the coast attract many businesses. Excessive construction and uncontrolled development along the coast is only one of the consequences of excessive urban development, affecting the physical, biological, economic, and social processes in the coastal space. Land is a nonrenewable resource under immense pressure in many coastal counties. An analysis of the Croatian coastal zone and pressures from residential housing and tourist infrastructure on available land applied the so called 'land-take' indicator, pointing that "environmental consequences could be significant in terms of deteriorating landscapes, overuse of local and regional water resources and wastewater discharged in the karstic underground and into the sea" (Kružić and Povh Škugor 2015). The same analysis questions the trade-offs between potential gains from resi-

dential housing and the loss of agricultural land, high-value natural farming, and natural habitats and ecoservices.

According to the CBS, the utilized agricultural land¹¹² in Adriatic Croatia decreased from 456,741 ha in 2017 to 441,105 ha in 2021. According to the Agriculture Census (2020), the surface of unutilized agricultural land amounts to 19,909 ha, which represents 53 percent of the unutilized agriculture land of the Republic of Croatia. In 2021, the agriculture sector of Adriatic Croatia generated GVA equal to €65.43 million, that is, 4.5 percent of GVA of the agriculture production at the national level. In terms of agriculture production value, the GVA growth rate (2021/2020) in Adriatic Croatia was the lowest in Croatia—equal to 2.3 percent.

Agriculture has been regaining importance during the last few decades, especially in terms of organic production. In Croatia, 31 percent of the total land that is under organic farming is in Adriatic Croatia, along with additional 46 percent in conversion to organic farming. Coastal agriculture and cultivation of local crops (for example, grapes, olive production, almonds, citrus fruits, and figs)¹¹³ is highly important for the sustainable development of the coastal zone, for tourism and agricultural exports. The soil in the hinterland of Adriatic Croatia is relatively cleaner than elsewhere in the country and suitable for organic farming. Indeed, the potential for organic farming (provided strict monitoring of agricultural techniques and land use planning), is high due to the short supply chains and value added that could boost both sectors. This is also acknowledged in the EGD strategy, as well as the strategy for industrial transformation of Adriatic Croatia. Further urbanization pressure could compromise the prospects to use agriculture as an avenue for diversifying tourist products and the coastal economy. Therefore, a more balanced land use and spatial planning which integrates ecosystem impacts and mitigates the risks of loss of nonrenewable natural capital could help avoid potential loss of natural value.

¹¹¹ Populations Census 2021.

¹¹² Utilized agriculture area consists of arable land, kitchen gardens, permanent grassland, and meadow and permanent crops.

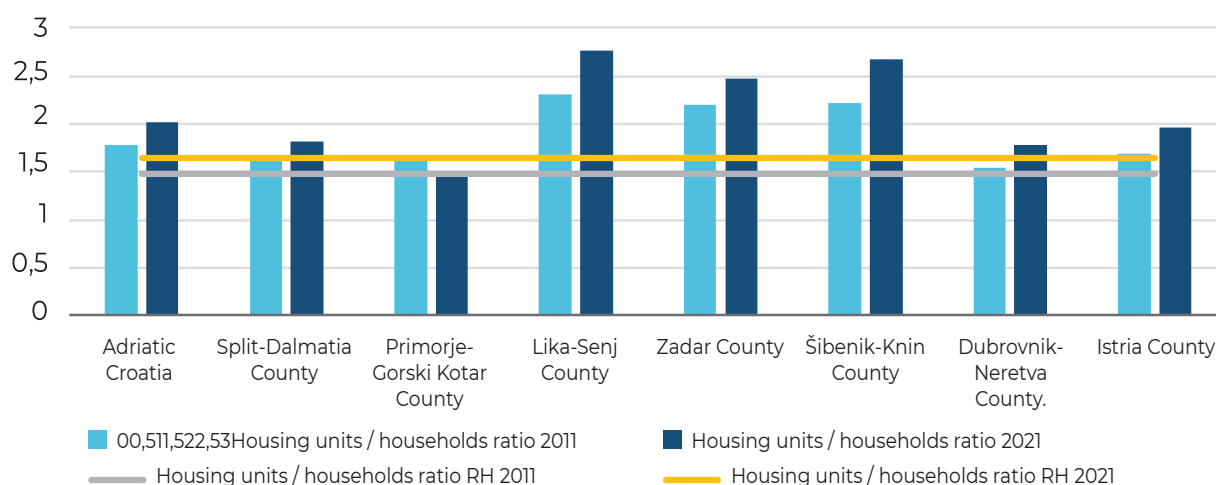
¹¹³ Spatial Development Strategy of Republic of Croatia October 2017. <https://narodne-novine.nn.hr/eli/sluzbeni/2017/106/2423>.

Recent upward urbanization is a consequence of fragmented approach to development, weak enforcement of local regulations and coordination of stakeholders' interests.

A particular problem is the increasing number of seasonal housing units built in violation of spatial standards, with questionable quality and design. Many apartment buildings are for seasonal use thus affecting the traditional societal linkages within local communities and their development aspirations. The "land-take" indicator¹¹⁴ relevant to growth of households and housing units per unit of regulated land, points out that the number of housing units surpasses the number of households in Croatia (Figure 24). In 2021, the housing units/household ratio for Croatia was 1.47 and for Adriatic Croatia it was

greater than 2. Notably, the number of households has decreased by 4.6 percent; the number of inhabitants has decreased by almost 8 percent, while the number of housing units has increased by more than 8 percent (in relation to the 2011 Population Census). Such findings call for a revisiting of the spatial planning in the coastal area, particularly taking into account the increasing pressures on the coastal and marine ecosystems. The highest ratio between housing units and households is in Lika-Senj, Zadar and Šibenik-Knin counties. A considerable increase of the ratio is observed in Istria, while the ratio in Primorje-Gorski kotar has decreased below the national values. These trends need further analysis to inform spatial development policies.

Figure 24. Housing Units Versus Households by Counties in 2011 and 2021



Source: CBS.

Environmental Health of Coastal and Marine Ecosystems

The need for better governance of human activities in the coastal and maritime space is widely recognized by the Government of Croatia in the Marine Environment and Coastal Zone Management Strategy (not validated by the Parliament yet). Protection of the Croatian marine resources is guided by two EU directives: the Water Framework Directive (WFD) and the Marine Strategy Frame-

work Directive (MSFD). The MSFD contains 11 descriptors of good environmental status (D) which are evaluated by different criteria. The updated analysis of GES by descriptors is reported in Updated documents of Marine Environment and Coastal Zone Management Strategy of Republic of Croatia¹¹⁵ (Table 7). The European Commission (2022 a,b, 15) assessed the level of adequacy of GES assessment with regard to the criteria and methodology on GES of marine waters (Figure 25).

¹¹⁴ EU Environmental Agency uses the land-take indicator for measuring the change in agricultural, forest, and other semi-natural land taken for urban and other artificial land development. 'Land-take' includes areas sealed by construction and urban infrastructure, as well as urban green areas, and sport and leisure facilities. This indicator measures how EU Directive 2014/52/EU has been implemented at the national level and stipulates that Environmental Impact Assessment (EIA) should consider 'land' in addition to 'soil', thereby opening the possibility that EIAs will play a more significant role in curbing land-take.

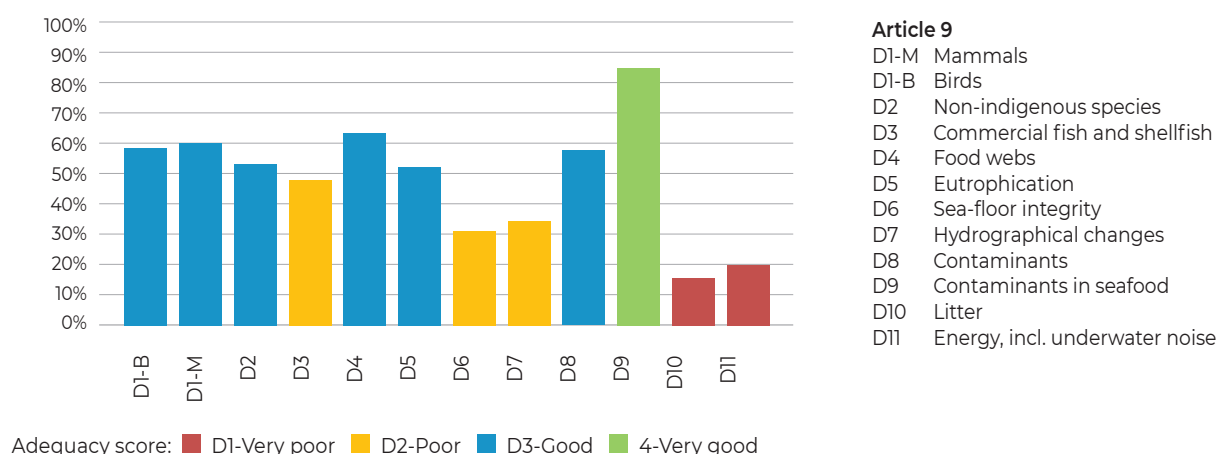
¹¹⁵ Republic of Croatia, 2014. Maritime development and Integrated Maritime Policy Strategy of the Republic of Croatia for the period 2014-2020.

Table 7. Updated Documents of Marine Environment and Coastal Zone Management Strategy

Descriptor	Summary
Biodiversity (D1)	GES partly achieved
Non-indigenous species (D2)	GES is not determined
The population of commercial fish species is healthy (D3)	Overfishing
Elements of food webs (D4)	GES is maintained
Eutrophication is minimized (D5)	GES is maintained
The sea floor integrity (D6)	Additional monitoring needed
Permanent alternations of hydrographic conditions (D7)	Additional monitoring needed
Concentrations of contaminants (D8)	GES partially achieved
Contaminants in seafood (D9)	GES is maintained
Marine litter (D10)	Additional monitoring needed
Introduction of energy (including underwater noise) (D11)	Additional monitoring needed

Source: European Commission (2022, 15).

Figure 25. Adequacy of Assessment of GES by Croatia (Mediterranean Adriatic Region) with Criteria Set Out in Article 9 of the Commission GES Decision (based on 2018 reporting)



Source: European Commission (2022, 15).

The EC recommended priority actions for achieving GES which include the following: (a) improving the status of descriptors that were assessed as very poor; (b) implementing the EC's recommendations regarding the preparation of marine strategies, including an assessment, GES determination and establishment of environmental targets; and (c) ensuring regional cooperation with mem-

ber states sharing the same marine (sub)region to address predominant pressures. Specific aspects of 'state and pressures' to the marine environment are further presented in Annex 6 based on the findings of the updated background documents to the Marine Environment and Coastal Zone Management Strategy (Republic of Croatia 2021).

User Conflicts and Synergies

Blue economy sectors often face challenges from competition over the use of marine resources which could be addressed through planning based on sectorial synergies.

Blue economy sectors share a strategic backbone: they all depend on the exploration and exploitation of marine natural capital inputs for their processes. Understanding the links between economic activities and the status and value of natural coastal and marine systems can enable smarter economic decisions, investments and conservation support that benefit both tourism businesses and help sustain the coastal economy. Transition to blue economy could lead to conflicts over the use of coastal and marine space. For instance, conflicts related to recreational boating are linked to overcrowding, space restriction, and safety hazards. Boating may compete with other recreational activities (for example, swimming) or with other types of boating (for example, sailboats, motorized vessels, personal watercrafts). However, codes of conduct, proper planning, and good communication between users can minimize these conflicts. Other potential conflicts are related to areas where boating may not occur due to the presence of other blue sector infrastructures (for example, aquaculture farms, oil and gas platforms).

Spatial development plans of coastal counties provide for expansion of existing capacity and the construction of new reception capacities.¹¹⁶

New capacity is foreseen in about 300 potential locations for more than 33,000 new berths. The adopted scenario for nautical tourism foresees an increase of additional 15,000 vessels and 15,000 nautical berths in the next decade.¹¹⁷ It is necessary to re-examine these planned locations and capacities in marine spatial plans in conjunction with terrestrial spatial plans with an objective to reduce the already rising pressures on the coast, sea, and islands, and creating spatial preconditions for avoiding user development conflicts. This includes creating conditions for new types of tourist experiences by reducing the potential disturbances

of the quality of life of people living on the coast and visitors, avoiding environmental and ecosystem changes and destruction of natural capital, and preserving the coasts and islands from excessive construction. It is necessary to evaluate the development potential of planned tourist zones and reconsider the compliance of spatial plans of local and regional self-government units with investment needs in tourism. Given the existing trends and planned activities outlined in various sectoral planning documents, it is expected that pressures on coastal and maritime space will intensify.

Commercial fishing is a classic example of resource competition with other maritime activities.

This is particularly true with respect to coastal tourism, shipping, offshore oil and gas. Aquaculture also may compete for access to space with coastal tourism, ports, shipping, offshore oil and gas, and fishing. The synergies between tourism and aquaculture could reinforce the sectors' economic benefits. For instance, efforts from other sectors to protect the marine environment could increase the business prospects of the aquaculture sector. Hosting tourists on aquaculture vessels to visit farming plants and learn about aquaculture techniques and fishing traditions could offer tourist products with educational and recreational value. Another example of mutually beneficial impacts between aquaculture plants and coastal tourism is the setting of seafood-processing factories close to tourist resorts and with food supply chains.

Exploration and exploitation of hydrocarbons in the Adriatic Sea may affect other human activities and the marine environment (MESD 2015).

Such activities are limited and prohibited in some locations to protect the ecosystems and marine protected areas, attractive sites for nautical tourism, fishing, spawning and fish breeding grounds, the Jabuka pit with a surface area of 305,38 km² from disturbances to whales and sea turtles. It is suggested not to undertake exploration at more than three sites at a time due to cumulative underwater noise effects. Wind farms also can have significant

¹¹⁶ Ministry of Physical Planning, Construction and State Assets. 2021. The Report on the Spatial Situation in the Republic of Croatia for the Period 2013–2019.

¹¹⁷ Nautical Tourism Development Strategy for the Period 2009–2019.

synergies as well as conflicts with the other activities in the sea. On one hand, offshore wind farms may contribute to energy security, on the other hand they may cause habitat changes and disturbances as a result of the electromagnetic fields of submarine cables.

Structural transformation of the mariculture sector could benefit from tighter economic links between mariculture and other bio-industries and their value chains. Creation of new income opportunities and jobs and along the value chains of mariculture and related rural/coastal industries largely depends on the physical and marine planning as well as the incentives and support schemes at national and local levels. There is a need to address the current administrative flaws and fragmented jurisdiction in the coastal areas. Prolonged procedures and overlapping sector interests could result in lost opportunities to open mariculture (support) facilities and increased conflicts with other resource users/sectors (tourism, construction, and so on).

Food production and tourism are both synergistic sectors that could support future economic growth in coastal Croatia. The hotels and restaurants experience difficulties related to supply chains. A closer connection between these economic sectors could open possibilities for replacing food imports with domestic production. To improve the supply chain, stakeholders from these sectors need support for removing bottlenecks and reducing market risks. For instance, turning to shorter supply chains, reducing the number of intermediaries and local sourcing directly from food producers could improve the quality of food services, thus making agriculture production cheaper and reducing the carbon footprint.

Public sector could promote blue sector synergies by adopting 'soft' measures, such as facilitating multisector dialogue between the relevant stakeholder communities.¹¹⁸ A case in point are the targeted sea-basin and pan-European cruise dialogues promoted by the European Commission. They involve international cruise line operators

(business), ports and local tourism stakeholders, and municipalities (destinations) to resolve conflicts (for example, traffic congestion, noise, air and marine pollution), enhance synergies, exchange best practice, encourage innovation and competitiveness, and craft joint strategies for sustainable development.

Marine spatial planning (MSP) can provide valuable insights for designing proper governance framework capable to deal with inter-sectorial interdependences. The economic sectors linked to the sea are increasingly carrying out their activities in adjacent or overlapping sea areas, thus sharing inputs involved in their respective business processes. In this vein, interactions between sectors, businesses and economic actors become more and more common and competition for land availability in port and coastal areas, as well as prospective sea areas becomes increasingly intense.

Marine and coastal areas are home to a wide range of urban infrastructure. Urban areas and tourist accommodation facilities need more efforts and support to improve the water supply and wastewaters management, as well as waste management. This is particularly important when it comes to the old city centers, that are usually under a special conservation regime (historical cores in particular). Use of environmentally friendly products as well as promoting entrepreneurial stakeholders with sustainable practices (such as restaurants offering locally grown food, shops with ecofriendly products) should be fostered and beneficial to tourist value chains. The 'soft measures' promoting procedures for attaining eco-labels, especially those recognized at the EU level, such as more regional or destination-specific labels, could be on one hand, clearly communicating the sustainable operations of the owners, and on the other hand, could significantly contribute to the destination branding of Croatian tourist products. However, the monitoring and control mechanisms should be precisely defined and deployed.

¹¹⁸ https://ec.europa.eu/maritimeaffairs/policy/coastal_tourism_en.

To address the seasonal user conflicts arising from increased water consumption along with water-savings measures in the National Loss Reduction Action Plan (NLRAP), the possibility to use desalination technologies and wider use of recycled wastewater during periods of high demands could be explored.¹¹⁹ However, desalination is an energy-intensive technology which could affect endemic marine ecosystems (for example, *Possidonia* meadows) and is usually linked to considerable investment costs.¹²⁰ The Croatian islands have many sunny days which is an opportunity for more environmentally friendly solutions such as increased use of solar en-

ergy. Increasing the resilience of the water systems is a priority for water supply development in Croatia (World Bank 2022a, 209). Wider application of innovation will contribute to more efficient use of water resources and renewable energy solutions as well as introduction of circular economy business models in line with the EU Circular Economy Action Plan (World Bank 2022a). Increasing energy generation from cleaner sources demands an increase in the capacity of transmission and distribution networks to address transmission network energy losses which was about 15 percent in 2021.¹²¹



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¹¹⁹ Willaarts et al. 2022, 18.

¹²⁰ Luttenberger 2017.

¹²¹ Energy Statistics, 2021; https://podaci.dzs.hr/media/rhdnfduh/si-1698_energetska-statistika-u-2021.pdf.

Opportunities for Established Blue Economy Sectors

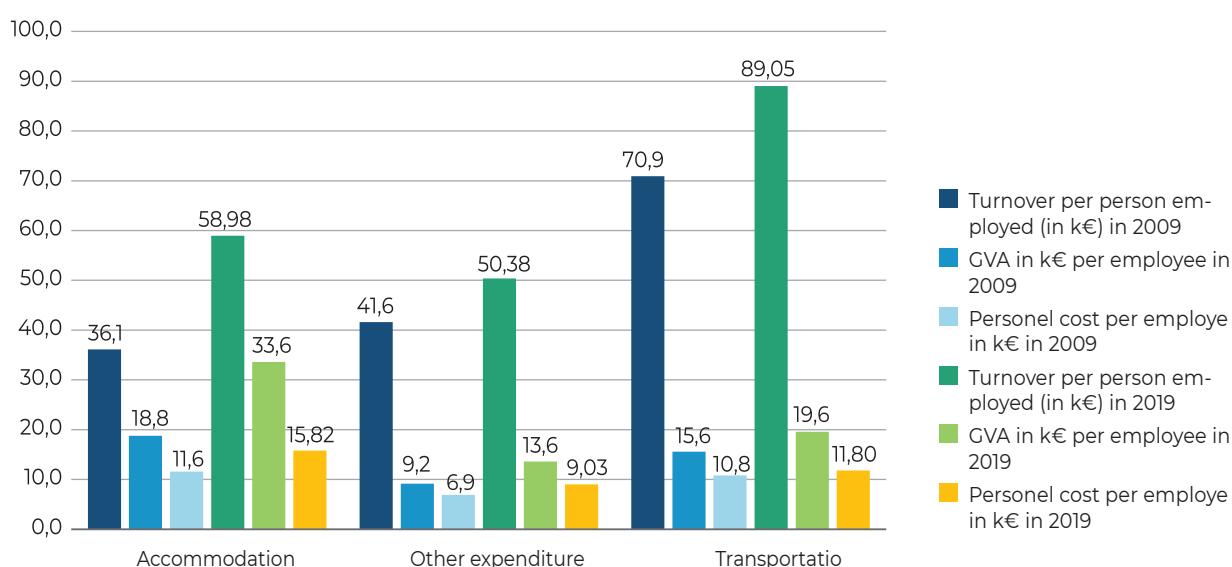
Addressing user conflicts and tapping in sector synergies creates opportunities to accelerate growth in the existing and emerging 'blue' sectors. Annex 7 provides details on the SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis in the established maritime sectors underpinning the discussion on opportunities that can unleash sustainable growth of Croatia's blue economy across the key sectors.

Coastal and Marine Tourism

Coastal and marine tourism, as one of the most mature economic sectors, makes consistent contributions to the national economy. According to tourism satellite accounts for 2019, the tourism industry accounts for close to 25 percent of the overall value added to Croatia's economy, and the World Travel and Tourism Council (WTTC) expects that this share will increase to above 30 percent by the end of this decade. Yet, by improving the sustainability of natural resources and addressing multiple challenges, Croatia could take advantage of the growth potential of tourism in the region. New environ-

mentally friendly and community-based products tailored to special-interest tourism niches represent a window of opportunity. Tighter links with the rural economy in the coastal area will contribute to the sustainability of the sector and will boost the rural economies. There are already small-scale offerings of traditional homemade cuisine, tourism fishing, and spa tourism. These could grow provided there is public sector support with the right incentives and engagement of all stakeholders (for example, fishermen organizations, small business organizations, nongovernmental organizations [NGOs] working with vulnerable groups). Tourist agencies and operators need new forms of involvement. Instead of offering standard products like 'a week at the sea', they could procreate new products and target new niches and market demands. They can foster local sustainability initiatives, marrying environmental and social benefits (for example, vine tours through vineyards and vineries promoting eco- and organic production, eco- and rural tourism products, the use of electric vehicles). Nautical tourism has direct economic contributions to the national market and the so-called 'invisible exports'. Nautical tourism could help decrease the seasonality and valorization of environmental and natural resources and, as such, contribute to regional development.¹²²

Figure 26. Trends of Coastal Tourism: Turnover, GVA, and Personnel Cost Per Person Employed (2009 and 2019)



Source: EU BE Report 2022, Annex2, Summary tables.

¹²² Taveira, F.F., A. I. Correia, G. Silva, and J. Pereira. 2021. "The Potential of Nautical Tourism as a Strategic Product for Regional Tourism Development: The Case of Alto Minho and Esposende, Northwest Portugal." In: , edited by J. V. de Carvalho, A. Rocha, P. Liberato, A. Peña). ICOTTS 2020. Smart Innovation, Systems and Technologies, vol 208. Springer, Singapore. https://doi.org/10.1007/978-981-33-4256-9_21

The driving forces behind the development of established blue sectors have been identified using the four dimensions of SWOT analysis.

Several issues that may hamper the development potential of tourism if not properly addressed were determined. The weaknesses of the internal environment mainly concern institutional incapacity for tourism product development and innovations in service provision. Threats are posed by external environmental issues, climate vulnerability, and lack of infrastructure. The results of the SWOT analysis could assist in the sector planning, coordination, monitoring, and promotion of new activities (Annex 7). In the foreseeable future, tourism will remain a driving force of Croatia's coastal economy. Taking the blue economy path and charting a sustainable course would include the following:

(a) Increasing the spatial and temporal dispersal of tourism to reduce environmental and social pressures.

Demand-side management could include measures for lowering negative impacts and carbon footprint of tourism by marketing to lower-impact visitors who come off-season—that is, long-stay visitors over the low season such as digital nomads and retirees, incentivizing low-carbon, off-season product development (that is, hosting off-season events), building up niche sports offerings (wind-based watersports, mountain biking, cultural tourism, health tourism) all of which are less seasonally dependent and have lower carbon footprints than cruises for example.

(b) Increasing the net-positive environmental and social benefits of tourism by regulating and planning for supply.

This can be done by exploring nationally mandated sustainability certification for all tourism firms (see Türkiye Sustainable Tourism industry Criteria (TR-I) example¹²³); adding a high-season sustainable tourism levy to be reinvested toward tourism sustainability initiatives; planning wastewater treatment plants/systems through nature-based solutions to include tourists as part of capacity calculations instead of only residents and reducing capital costs of treatment; regulating vacation rentals to help mitigate negative impacts on land use, cost, and social externalities (for example, some municipalities cap

the ratio of vacation rentals to population or total housing units), requiring shore power use for all cruise ships and motor boats.

(c) Developing tourism in an integrated manner within Croatia's blue economy vision.

Croatia could invest in innovative data and statistics systems and in understanding the carbon footprint of tourism markets and target the growth of low-carbon, low-impact, high-value markets. Improving the ongoing carrying capacity assessment of coastal industry and development plans will define the limits of acceptable change for sensitive blue tourism destinations and will link land use and spatial/marine planning and regulatory incentives to adhere to these limits. Croatia has already stepped the efforts to control marine litter. Setting tourism on the path to blue economy could be supported by integrating the single-use plastics directive into tourism policy making including targets and monitoring provisions, and regulation of tourism firms (that is, banning single-use plastic bottles from the catering industry and restaurants).

Fisheries and Aquaculture

Fisheries are highly sensitive to environmental and anthropogenic pressures affecting marine living stocks.

There are concerns that the Common Fisheries Policy (CFP) that aims to preserve stocks and impose stricter measures can, eventually, threaten the economic and social sustainability of marine fisheries. The financial sources available in support of CFP implementation that can be used to solve these problems as well as develop information and technology (IT) solutions where needed. The long tradition in fishing and fisheries defining the life of small local communities along the coast and islands is an asset for tourism development in such rural areas.

The marine fisheries sector could tap into more opportunities by cooperation with other blue economy sectors along the value chains.

This will enable more efficient use of the available funds (technical and administrative support, stronger role of Fisheries Local Action Groups [FLAGs] and producers' organizations, and so on). Cooperation

123 12.04.2022-V1 (tga.gov.tr).



among all stakeholders in marine fishing and with the R&D and IT sector could be beneficial for adopting new methods in stock monitoring to support stocks management plans and enable more flexible and adaptive management measures. Outstanding problems with landing places and fish market infrastructure could be resolved with the help of public resources and leveraging private capital. While there are no conflicting uses between tourism and small-scale marine fisheries, tourist recreational fishing activities in permitted areas outside the MPA could benefit both fisheries and biodiversity conservation by reducing the time fishers allocate to fishing and by attracting visitors for wildlife and seascape viewing. Annex 7 provides details on the SWOT analysis of the fisheries and aquaculture sector.

Given Croatia's long tradition in mariculture, it will remain an important driver of the local economy. The 'equitable governance' approach embedded in the blue economy principles could help Croatia realize the growth opportunities of marine aquaculture and diversify the income sources of coastal and island communities while supporting broader economic development. While mariculture highly depends on new technologies and fishmeal availability to achieve efficient production, small producers could be encouraged and incentivized to introduce innovations and make investments in agriculture and food production. These investments in

Croatia are generally rather low in comparison with the EU. These actions will need effective coordination between relevant institutions and stakeholders, primarily through strategic planning using the avenues of the MSP processes to determine and demarcate the aquaculture zones for new development. The cooperation with the R&D sector and extension services will overcome methodological and implementation bottlenecks. This includes low interest among small producers in R&D and innovations which are deemed too expensive.

Fish Processing Industry

Fostering the value chains between fisheries and aquaculture and the fish processing industry is a development priority and an emerging trend in Croatia's fish processing industry.

Further coherence of marketing plans and integration among the sector segments will result in increased availability of domestic raw material for the processing industry and lower production cost. At the same time, the fish processing industry needs modernization, smarter energy solutions, and diversification of production in terms of new products and increased value added. To this end, more intensive and effective cooperation with the R&D sector is needed, as well as cooperation within the sector to draw benefits from already existing good practices. Better cooperation with the tourism and the hospitality industry

should increase sales in the domestic market of all fish and seafood products.

The sector needs to engage in resource and physical planning and MSP to secure space for necessary infrastructure and facilities. Access to capacity building, extension services, and to low-cost funds (especially EU programs and other external sources) could fill in the skills gap and bring more capital investment. Fish processing cooperatives and producer organizations need support for improvements in the business conditions of the fish processing sector and resources. While fish processing still depends heavily on raw materials from domestic sources, these materials, especially pelagic fish, could become scarce in the future, due to overfishing and cessation of fishing activities. The dual challenge could be resolved in a manner that integrates sector efficiency strategy that assesses inputs (energy, water, and technology) and outputs (product type, consumer preference, and volumes of product) and implementing a variety of value chain measures including more efficient resource utilization, implementing fish product cold storage, using fishing industry by-products in an innovative manner, reducing food waste and loss, reassessing fleet capacity for catching power and economic benefit, and using ecolabeling of local fish food products for marketing to high-value segment tourists.

Shipbuilding and Repair

The shipbuilding industry made progress in expanding in the small-scale segments for production of vessels in targeted market niches. Further growth in a cluster with accompanying small-scale industries (for example, refit services), production of engines and equipment, as well as large (cargo) vessels may not present a long-term growth option without public support and incentives due to the competition at the global market, primarily from East Asia shipyards. The existing 'cluster policy' (establishing clusters of smart specialization) has not produced substantial results and needs incentives for take-up by sector industries.

Building stronger ties between the shipbuilding industry and the emerging blue economy sectors presents future opportunities especially through R&D and knowledge products. Support to new production lines and necessary in-

frastructure (for example, warehousing/charging stations along the coast and on islands), technical (vessel tanks) and transport safety equipment on the sea (hydrogen), and smart on-shore boat services could boost the sector growth. While currently the production of 'green' vessels does not seem profitable in passenger transportation, future options remain to be explored. The role of the R&D sector could fuel innovation and expand market opportunities. This includes recognizing and responding to emerging market segments, such as the military sector and maritime surveillance, fishing industry, to promote the growth of the shipbuilding industry.

Addressing the lagging workforce competences by turning to educational traditions could offer more attractive and innovative jobs. It could reverse the declining interest in working in small-scale shipbuilding (in industry in general) by offering specializations targeting digitalization and innovations and prospects to work in the global market. Strengthening the collaboration with the R&D sector could spur innovative skills development across the industry.

More targeted public support for innovation clusters can help the sector to adapt to global transformations in shipbuilding and repair and to remain competitive and responsive to changing demands. This includes fostering the growth and advancement of start-up companies and SMEs, particularly in priority niches within the shipbuilding sector, by providing support and resources for innovation and development.

The blue economy innovations gain momentum in the established sectors and in the new emerging sectors such as sustainable marine energy and biotechnology. The potential for development of emerging sectors of blue economy in Croatia have yet to be studied further, together with the methodology for assessment of their impacts on marine ecosystem services and competing sectors. In the short run, studying the prospects of offshore blue energy and expanding the R&D for coastal engineering through soft protection and nature-based measures could provide multiple benefits to the local economy and habitat and ecoservices.

Opportunities for Advancing Blue Economy Transition

Croatia holds several promising economic sectors that can create more opportunities and unleash Croatia's blue economy potential. To transition to sustainable 'blue' sectors aligned with the national development objectives, Croatia needs to foster their strengths, enable opportunities, address weaknesses, and mitigate risks. The SWOT analysis of the blue economy of Croatia (Figure 27)

emphasizes the momentum, highlights strengths such as Croatia's favorable geographical position and abundant marine resources. It also underscores the traditional coastal sectors that contribute to the economy. However, it brings attention to weaknesses like over-urbanization and seasonality of tourism. Opportunities are seen in EU membership and regional cooperation and the rising demand for ecofriendly products, while threats include climate change impacts and global market volatility.

Figure 27. SWOT Analysis of the Blue Economy of Croatia

Strengths	Weaknesses
<ul style="list-style-type: none"> ■ Favorable geographic location with abundant high-quality marine resources ■ Rich cultural heritage alongside stable traditional coastal economic sectors ■ Good governance practices in fishing and new technologies in mariculture and fish processing ■ Established legislative and institutional framework for blue economy with some strategies and incentive programs in place ■ Monitoring and reporting mechanisms on the marine environment. 	<ul style="list-style-type: none"> ■ Alarming demographic trends and over-urbanization of coastal areas hampering economic resilience ■ Overuse of certain marine resources alongside seasonal and intensive tourism pressures ■ Insufficient port infrastructure and unsustainable coastal tourism growth ■ Lack of stakeholder cooperation in specific mariculture sectors and energy distribution limitations ■ Low blue economy awareness, lack of strategic framework, and unfavorable investment climate.
Opportunities	Threats
<ul style="list-style-type: none"> ■ EU membership facilitating free movement and funding opportunities ■ Rising demand for ecofriendly products and services, boosting blue economy sectors ■ Untapped coastal and marine resources potential for mariculture and ocean energy ■ New market niches within blue economy sectors for both existing and new products/services ■ Enhanced stakeholder cooperation and strengthened value chains linking tourism with fishery, mariculture, and agriculture ■ Expand stakeholders' inclusion. 	<ul style="list-style-type: none"> ■ Vulnerability to the impacts of climate change ■ Pollution-induced changes in marine resources affecting the economy and urbanization ■ Imbalance between resource capacities and development needs ■ Global and regional market volatility along with potential market distortions ■ Compliance with upcoming EU environmental regulations possibly causing market disturbances and social affordability challenges.

Croatia's geographical features, nature settings, regional economic structure and markets provide an insightful consideration for future planning of resources. For example, Croatia has 30

inhabited islands. All economic activities on the islands contribute to the maritime economy while at the same time their ecosystems could be subject to same threats and pressures at different scale.

Taking a closer look at Croatia's island economy could add more strengths to the blue economy and more opportunities which stand out. In addition, there are economic activities taking place on the coast, close to the sea, whose impact the marine environment may not be so obvious. These are agriculture, quarrying of stone and lime, cement production, and unregulated construction. While these activities may contribute insignificantly to the GDP, compared to tourism, they are locally important. Some are part of the local tradition and are at the core of community livelihoods (especially on the islands). Industrial transformation in line with the EU Green deal and the availability of maritime resources will transform parts of the Adriatic coast of Croatia. Therefore, looking at all aspects of strategic development documents underpinning

Croatia's blue economy transition needs a closer look at the synergies, user conflicts to render them operational.

The public discourse on the opportunities and risks associated with the blue economy sectors is still fragmented and new to the Croatian public. A meaningful engagement of communities in shaping the blue economy path would mean better understanding of the diverse development aspirations of coastal communities. The good practice lessons point out that sustaining and revitalizing the local economies and infrastructure through inclusive local development strategies that build on synergies, resource endowment, all have the potential to create more equitable opportunities and to mitigate potential resource user conflicts.

Box 2. Croatia: Blue Economy Stakeholder Consultations – Focus Group Discussions

Blue Economy Focus Group Discussions in Croatia: Existing BE Sector Recommendations

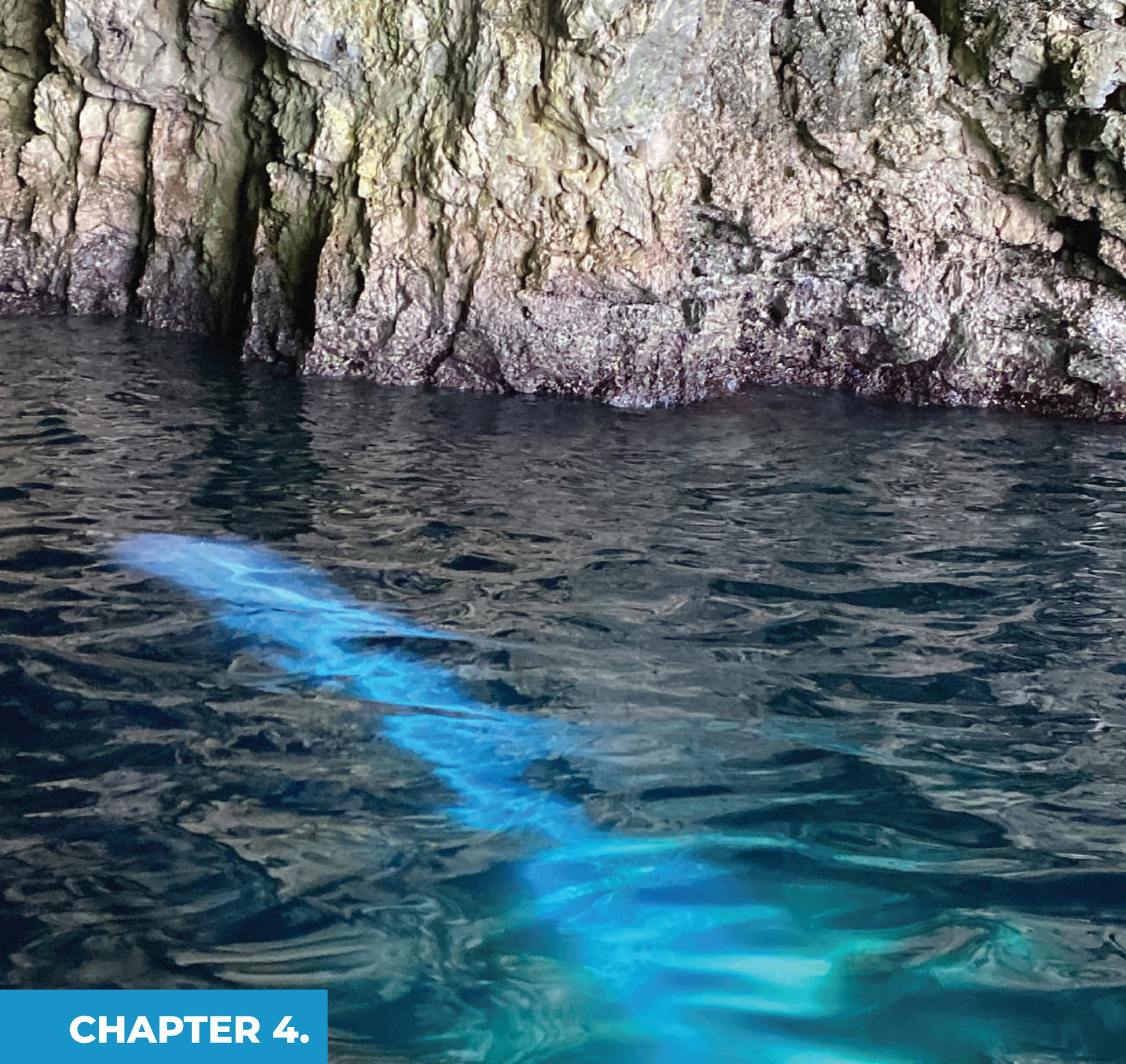
In June 2023, in partnership with the Government of Croatia, the blue economy report team held focus group discussions (FGDs) with stakeholders from five different sectors. The key question, "Is Croatia on a path towards sustainable blue economy?" provoked interesting responses from stakeholders from the Shipbuilding, ports and infrastructure, and maritime transport; Nonliving resources; Emerging sectors; Living resources; and Tourism. Stakeholders participating in the FGDs covered most of the respective subsectors relevant for the Sustainable Blue Economy (SBE) in Croatia. During the discussions, the following major points that impede the potential for the SBE were emphasized by the participants:

- There is a lack of vertical and horizontal coordination and integration between major sector stakeholders, notably between the government and private sector, and between the administrative levels of government.
- The question of ownership of the public maritime domain is the main factor that reduces the level of potential investments in necessary coastal and marine infrastructure, resulting in conflicts between the administrative levels of government, notably the state and major coastal cities.
- Strategic thinking on major BE sectors is mainly confined within sectors, rarely stepping outside the silo. Furthermore, strategies and action plans are not always implemented, which results in resource use conflicts, such as between industrial activities and urban development, coastal tourism and fisheries, overconsumption of coastal space for urban (tourism) development, and so on.
- Some traditional and once strong sectors have been significantly reduced in size. Shipbuilding, for example, is specializing in niche production but faces considerable lack of qualified workforce.
- Fisheries is still relatively strong but is threatened by the lack of coastal infrastructure and adequate workforce.
- The use of marine areas for renewable energy production is still in an early phase of development. However, the coastal land has been increasingly used for renewable energy production, but its capacities are limited due to inadequate transmission and distribution systems.
- Tourism is experiencing strong post-COVID growth but is being threatened by overuse in some coastal locations, such as Split and Dubrovnik.

Source: Authors.

Croatia needs make considerable and sustained efforts to comply with the EU environmental and climate change/energy acquis, requiring it to rethink the recently defined “*the most relevant and promising activities*” and areas and recommendations to enable the fulfillment of Croatia’s Blue Growth potential¹²⁴ to factor in natural capital and ecosystem considerations and cross sectoral impacts on the blue resources.

124 Maritime Spatial Planning Country Information- Croatia, issued by the Ministry of Physical Planning, Construction and Spatial Development of Croatia (February 2022). (https://maritime-spatial-planning.ec.europa.eu/sites/default/files/download/croatia_february_2022.pdf).



CHAPTER 4.

Strategies, Policies, and Institutions for Blue Economy Transition

KEY TAKEAWAYS

- Croatia harmonized the national policy and legal framework with EU legislation and embraced environmental sustainability and the blue growth paradigm. Nonetheless, there are challenges demanding better integration of sector policies to address sustainability risks in the blue economic space.
- Key factors to be addressed are related to the enabling conditions toward blue economy.
- Croatia needs a Blue Economy Strategy and a Roadmap to frame the governance approach in the blue space aligned with national development aspirations, commitments, and goals.
- Mainstreaming the BEDF components will help overcome policy fragmentation and will ensure policy coherence, coordination, and consistency across the blue economy sectors.
- Addressing specific normative and practical questions linked to the feasibility of sector integration in the maritime economic space (that is, MSP) will enable a shift from sectoral to boundary-spanning development approach. This includes improved horizontal and vertical coherence of development priorities in Adriatic Croatia focusing on resource availability, protection of natural capital, economic equity, and increased benefits to society.
- An important cross-cutting issue to resolve is the institutional capacity and organizational ability to assess and deal with complex challenges such as impacts of climate change, pollution threats and environmental degradation, demographic challenges, and sustainable tourism development in Adriatic Croatia.
- Assigning an organizational responsibility for oversight of the blue economy transition and an effective political mechanism emphasizing the cooperation between all actors will be an important element of the 'blue governance capacity' of Croatia.
- Croatia can further the public sector effort to tap into more opportunities for effective partnerships with private sector.

Strategic Context for Sustainable EU Maritime Space

The Convention for the Protection of the Mediterranean Sea between Mediterranean countries and the EU (the Barcelona Convention) was signed in 1976 and is central to the regional cooperation on protection of the sea. The last amendments to the Barcelona Convention entered into force in 2004. These include seven protocols which tackle different issues of marine protection: pollution from ships, land-based pollution, protected areas, pollution from exploration and exploitation of continental shelf and seabed, transboundary movement of hazardous waste, and integrated coastal zone management.



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Table 8. Croatia's Alignment with International and Regional Commitments

	International Agreements	Status
1	United Nations Convention on the Law of the Sea (UNCLOS)	UNCLOS for Croatia came into force on November 16, 1994, OG – International Treaties no. 9/2000
2	Convention on Biological Diversity (CBD)	Entered into force in relation to the Republic of Croatia on October 7, 1996, OG – International Treaties no. 6/96
3	International Convention for the Prevention of Pollution from Ships (MARPOL)	MARPOL 73/78 for Croatia came into force on October 8, 1991. OG – International Treaties no. 1/91
	Regional Agreements	Status
1	The Barcelona Convention and its protocols	Based on the succession notification, the Republic of Croatia is a party to the Barcelona Convention since October 8, 1991 (OG – International Treaties no. 12/93)
1.1	Protocol for the prevention of pollution of the Mediterranean Sea by dumping from ships and aircrafts – Dumping Protocol	Based on the succession notification, the Republic of Croatia is a party to the Dumping Protocol since October 8, 1991 (OG – International Treaties no. 12/93 and 17/98)
1.2	Protocol concerning cooperation in preventing pollution from ships and, in cases of emergency, combating pollution of the Mediterranean Sea – Prevention and Emergency Protocol	The Prevention and Emergency Protocol was published in the OG – International Treaties no. 12/03, entered into force in relation to the Republic of Croatia on March 17, 2004 (OG – International Treaties no. no. 4/04)
1.3	Protocol for the protection of the Mediterranean Sea against pollution resulting from exploration and exploitation of the continental shelf and the seabed and its subsoil – Offshore Protocol (1994)	The Offshore Protocol was published in the OG – International Treaties no. 13/17
1.4	Protocol on the prevention of pollution of the Mediterranean Sea by transboundary movements of hazardous wastes and their disposal – Hazardous Waste Protocol (1996)	The Republic of Croatia did not sign the protocol.
1.5	Protocol concerning specially protected areas and biological diversity in the Mediterranean – Specially Protected Areas and Biological Diversity Protocol	Specially Protected Areas and Biological Diversity Protocol was published in the OG – International Treaties no. 11/01, entered into force in relation to the Republic of Croatia on May 12, 2002 (OG -International Treaties no. 4/04)
1.6	Protocol for the protection of the Mediterranean Sea against pollution from land-based sources – Land-based Sources of Pollution Protocol	Based on the succession notification, the Republic of Croatia is a party to the Land-based Sources of Pollution Protocol since October 8, 1991 (OG -International Treaties no. 12/93 and 3/06)
1.7	Protocol on Integrated Coastal Zone Management in the Mediterranean – Integrated Coastal Zone Management Protocol	Published in the OG – International Treaties no. 8/12, entered into force in relation to the Republic of Croatia on February 28, 2003 (OG -International Treaties no. 2/13)
2	Agreement on the Subregional Plan of Interventions for the Prevention of, Preparedness for, and Response to Large-Scale Sudden Pollution of the Adriatic Sea	Act of ratification is published in the OG – International Treaties no. 7/08

Transition to a sustainable maritime economy could be challenged by multiple economic, social, and environmental factors. The EU body of strategies and policies is shaping the policies of member states to address these challenges and to continue to protect their coastal and marine ecosystems threatened by anthropogenic pressures and climate change. The national policies of Croatia for protection of marine and coastal assets are guided and shaped by the EU acquis.

Maritime areas face competing demands for resources to support tourism, fishing and aquaculture, mineral extraction, sea transport, offshore energy, and MPAs. The EU has a wide range of policies that address the different aspects of risks to ocean health and marine conservation. One of the most important tools reconciling users' conflicts in maritime space is maritime spatial planning. The *Maritime Spatial Planning Directive 2014/89/EU of the European Parliament and of the Council of July 23, 2014* ensures that potential negative impacts on the natural environment are identified and avoided at a very early stage in the planning process and that national maritime spatial plans are coherent

with NECPs as well as with good environmental status as defined in the *Marine Strategy Framework Directive (MSFD) 2008/56/EC of the European Parliament and of the Council of June 17, 2008*. In relation to the MSFD, fulfilling the objective of GES depends on the full compliance with the *UWWTD Council Directive 91/271/EEC of May 21, 1991*.

Biodiversity conservation and protection of natural capital are among the foundational principles of the blue economy. The Habitats Directive (Council Directive 92/43/EEC of May 21, 1992) on the conservation of natural habitats and of wild fauna and flora aims to contribute to biological diversity through conservation of certain natural habitats and protection of wildlife and plant species. Marine conservation gives full recognition of the role of the circular economy in preventing waste from leaking into the water bodies. Therefore, full application of waste management legislation will be essential, including the *Waste Framework Directive 2008/98/ECC* and the *Single Use Plastic Directive 2019/904/ECC of June 5, 2019*, as well as the *Port Reception Facilities Directive 2019/883/ECC of June 7, 2019*, for the delivery of waste from ships.

Box 3. Core Body of EU Strategies and Policies Relevant to Blue Growth

The **EU Integrated Marine Policy**¹²⁵ is a holistic approach to all sea-related EU policies. It is based on the idea that the Union can draw higher returns from its maritime space with less impact on the environment by coordinating its wide range of interlinked activities related to oceans, seas, and coasts. It sets an ambitious goal to scale up marine protection from the current 11 percent to a 30 percent area coverage by 2030, meet ambitious depollution targets, and make the most of Europe's natural and maritime assets to attain Europe's 2030 targets and climate neutrality ambition.

The **Blue Growth Strategy (2012)**¹²⁶ aims to stimulate growth in the blue economy (COM/2012/0494 final). It builds upon the Commission's Integrated Maritime Policy launched in 2007 and identifies five areas which have potential in growth and jobs in the blue economy: blue energy; aquaculture; maritime, coastal, and cruise tourism; marine mineral resources; and blue biotechnology.

The **Blue Economy Sustainability Framework (BESF)**¹²⁷ defines the sustainability criteria and indicators across various blue economy sectors with the purpose to inform public policies and investment decisions of member states. The BESF criteria and indicators link the four dimensions of sustainability (economic, environmental, social, and governance).

125 <https://www.europarl.europa.eu/factsheets/en/sheet/121/the-integrated-maritime-policy>.

126 Communication From the Commission to the European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions Blue Growth opportunities for marine and maritime sustainable growth. Brussels, 13.9.2012 COM (2012) 494 final.

127 Informed by the study, "Sustainability Criteria for the Blue Economy," launched by the European Commission, European Climate, Infrastructure and Environment Executive Agency. Sustainability criteria for the blue economy: main report, Publications Office, 2021. <https://data.europa.eu/doi/10.2826/399476>.

The **Bathing Water Directive** (Directive 2006/7/EC of the European Parliament and of the Council of February 15, 2006) concerning the management of bathing water quality and repealing Directive 76/160/EEC aims to protect the environment and the health of its citizens by attaining good bathing water quality throughout the EU.

The **EU's Biodiversity Strategy** for 2030 (COM (2020) 380 final) is a comprehensive, ambitious, and long-term plan to protect nature and reverse the degradation of ecosystems. It sets Europe's biodiversity on a path to recovery by 2030 and contains specific actions and commitments including to enhance the protection of marine ecosystems with the objective of achieving good environmental status. One of the key commitments for 2030 is to legally protect a minimum of 30 percent of the EU's seas.

The **Zero Pollution Action Plan for Air, Water and Soil** (COM (2021) 400 final) outlines the zero-pollution vision for 2050, which is for air, water, and soil pollution to be reduced to levels no longer considered harmful to health and natural ecosystems, thereby creating a non-toxic environment. A set of key actions aim to improve water quality by reducing waste, plastic litter at sea (by 50 percent) and microplastics released into the environment (by 30 percent).

The **Common Fisheries Policy** (CFP) aims to ensure long-term environmental, economic, and social sustainability for fisheries and aquaculture; the availability of food supplies; and a fair standard of living for fisheries and aquaculture communities. In February 2023 the EC presented a package of measures aiming to reduce the negative impact on marine ecosystems, particularly through seabed disturbance, by-catch of sensitive species, and effects on marine food webs.

The **EU Strategy on Adaptation to Climate Change** (COM (2021) 82 final) aims to stop ocean acidification and encourage nature-based solutions for sustaining Europe's seas. In coastal and marine areas, nature-based solutions will enhance the coastal defense and reduce the risk of algal blooms.

The **Offshore Renewable Energy Strategy** (COM (2020) 741) supports the long-term sustainable development of this sector aiming to reach the EU's ambitious energy and climate targets for 2030 and 2050. The strategy sets targets for an installed capacity of at least 60 GW of offshore wind and 1 GW of ocean energy by 2030, and 300 GW and 40 GW, respectively, by 2050.

The **European Green Deal** (COM (2019) 614 final) and the **Recovery Plan for Europe** (COM (2020) 442 final) highlight a new approach for a sustainable blue economy in the EU (COM (2021) 240 final) affirming that the EU's blue economy is fundamental to both efforts. The blue economy agenda aims to help achieve the European Green Deal's objectives, and complement other recent Commission initiatives on biodiversity, food, mobility, security, data, and more.

The **Farm to Fork Strategy** (COM (2020) 381) final) aims to reduce the environmental and climate impact of primary production, ensure fair economic returns for farmers, fishers, and aquaculture producers. It also seeks to improve animal welfare, protect plant health, and promote adoption of new green business models, circular bio-based economy and sustainable fish and seafood production.

National Policy Framework for Transition to Blue Economy

Croatia has made its strategic choices for alignment of national policy and legal framework with the ambitious sustainability agenda of EU, although there is still room for improvement.

Harmonization of national policies and legislation with EU policies has taken place on many levels including the governance aspects of environmental protection and conservation of marine ecosystems. Annex 5 provides an overview of alignment of relevant national legislation with EU policies. To move toward deeper transformation and integration of BE principles, politicians and policy makers

need to promote local engagement and support relevant BE policies, including scientists and the entrepreneur community. Implementation challenges ahead necessitate that institutions and organizations respond to them in a timely manner by expanding their knowledge, skills, and capacity to measure impacts and results.

The main documents which address the sustainability of coastal and marine environment are the Environmental Protection Act (OG no. 80/2013, 152/2015, 78/2015, 12/2018, 118/2018), the Nature Protection Act (OG no. 80/2013, 15/2018, 14/2019, 127/2019), and the Water Act (OG no. 66/2019). Table 9 provides a comprehensive list of national strategies and legislation related to blue economy development.

The Maritime Development and Integrated Maritime Policy Strategy sets out two basic goals: (a) sustainable growth and competitiveness of the maritime economy and (b) safe and environmentally sustainable development of maritime transport, infrastructure, and a maritime area of the Republic of Croatia. The EU Networking Group for Integrated Maritime Policy (EUNETMAR 2014) identifies the priority marine/maritime sectors, including tourism/nautical tourism, passenger shipping and ferries, fishing and marine aquaculture, oil and gas, protected areas.

Fisheries and aquaculture sector development follows the National Strategic Plan for the Development of Fisheries (prepared under the provisions of Council regulations of the European Fisheries Fund) and the National Strategic Plan for Aquaculture Development 2014–2020. Both documents promote sustainable development of the sectors, increased productivity, and strengthened competitiveness. More recently, the strategic goals and priorities of the fishery and aquaculture sector were elaborated in the Fisheries and Aquaculture Program of the Republic of Croatia for the program period 2021–2027,¹²⁸ approved by the EC in November 2022. The program is supported by a total of €0.35 billion available to the Croatian fisheries and aquaculture sector, of which €0.24 billion from the EC and rest from the budget of the Republic of Croatia. The new program envisages the implementation of support measures within the framework of all four priorities of the European Maritime, Fisheries and Aquaculture Fund, aimed above all at supporting the implementation of the Common Fisheries Policy (CFP), through support for management measures and compliance with the requirements set by the same, while respecting the specific goals of the Republic of Croatia.

The Strategy on Transport Development for 2017–2030 (OG, no. 84/17) prioritizes pollution prevention of the Adriatic Sea from maritime facilities and vessels. Specific measures include modernizing the fleet of cleaning boats and availability of services, equipment, and devices for interventions in the event of large-scale sea pollution, accessible service

for the acceptance and disposal of ship waste and cargo residues in accordance with international and EU regulations, supervision and management of ballast water treatment in accordance with international guidelines. The strategy has provisions for adequate emergency measures to combat pollution accidents at sea to prevent far-reaching consequences on the environment and maritime sectors. It foresees the establishment of an oceanographic model system for actions in traffic-related technological incidents and interventions in the case of pollution. Furthermore, the strategy prioritizes the need to reduce transport CO₂ emissions, thereby mitigating the impact of transport on climate change.

The Strategy for the Development of Sustainable Tourism by 2030 adopted by the Parliament in 2023 is **aligned** with the National Development Strategy of the Republic of Croatia until 2030 and consistent with EU policies. The strategy recognizes the pressures and negative impacts of tourism to the environment and recommends a qualitative shift from unsustainable tourism toward a development path of high value added and no harm to the environment. Thus, the sector commitment is preservation of natural capital on which Croatian coastal tourism depends by (a) reducing the pressure from tourism on space, environmental components, and nature while encouraging a circular economy and (b) reducing the interrelated negative impact of tourism and climate change. The **Law on the Provision of Tourism Services** (OG No. 70/21)¹²⁹ regulates tourism services, the manner, and conditions for providing such services, the package travel contract and linked travel arrangements contract, as well as the rights and obligations of the trader and the traveler in relation to these contracts. The **Law on Hospitality Activities** (OG No. 126/21)¹³⁰ regulates the manner and conditions under which legal and natural persons may engage in hospitality activities.

The Hydrogen Strategy until 2050 introduces hydrogen as a potential new energy fuel in the transport sector. Supporting legislation that will be developed will include new standards relating to hydrogen as an alternative fuel, use of emerging

¹²⁸ <https://euribarstvo.hr/files/Program-za-ribarstvo-i-akvakulturu-RH-za-2021.-2027..pdf>

¹²⁹ OG: 130/17, 25/19, 98/19, 42/20, 70/21.

¹³⁰ OG: 85/15, 121/16, 99/18, 25/19, 98/19, 32/20, 42/20, 126/21.

technologies for production, consumption, and storage of hydrogen. According to the Hydrogen Strategy, maritime transport has great potential for hydrogen use, especially when it comes to the traffic connecting the mainland and the islands.

Although the Croatian islands are connected to the mainland by submarine cables, hydrogen fuel can enhance their energy independence and can be used as fuel for the public insular transport like ferries.

Table 9. Core Strategies and Legislation of the Republic of Croatia Relevant to Blue Economy

National Legislation	Environmental Protection Act
	Nature Protection Act
	Water Act
	Marine Fisheries Act
	Law on Marine Aquaculture
	Law on Maritime Domain and Seaports
	Law on Public Liner and Occasional Coastal Maritime Transport
	The Maritime Code
	Law on the Provision of Tourism Services
	Law on Hospitality Activities
	Republic of Croatia's Physical Planning Act (PPA)
National Strategies	Maritime Development and Integrated Maritime Policy Strategy of the Republic of Croatia
	Agriculture and Fisheries Strategy of the Republic of Croatia
	National Strategic Plan for the Development of Fisheries
	National Strategic Plan for Aquaculture Development 2014-2020
	Fisheries and Aquaculture Program of the Republic of Croatia 2021-2027
	Strategy for Transport Development of the Republic of Croatia
	Framework Plan and Program for Hydrocarbon Exploration and Exploitation in the Adriatic
	Hydrogen Strategy until 2050 of Republic of Croatia
	Marine Environment and Coastal Zone Management Strategy
	National Island Development Plan 2021-2027
	Spatial Development Strategy
	Strategy for the Development of Sustainable Tourism by 2030
	Strategy for the Management of the Marine Environment and Coastal Zone

The Energy Strategy, like the Low-Carbon Strategy, foresees Croatia's reduction of 74 percent of its GHG in 2050 compared to the base year—1990—for emissions. The Integrated Energy and Climate Plan sets national objectives and targets along five dimensions: (a) decarbonization; (b) energy efficiency; (c) energy security; (d) internal energy market; and

(e) research, innovation, and competitiveness. The decarbonization objective sets a target for reduction of GHG emissions by 2030 compared to 2005: at least 43 percent in the ETS (emission trading system) sector and at least 7 percent in non-ETS sector. The indicative national targets for RES shares by 2030 are presented in Table 10.

Table 10. Targets for Increasing the Supply of RES

RES share, %	Estimated 2020	Targets 2030
In the gross direct consumption of energy	28.6	36.4
In the gross direct consumption of electricity	47.0	63.8
In the gross direct consumption of energy for heating and cooling	33.3	36.6
In the direct consumption of energy in transport	5.2	13.2

Source: Republic of Croatia Integrated Energy and Climate Plan (2019).

The Framework Plan and Program for Hydrocarbon Exploration and Exploitation in the Adriatic (2015), defines 28 hydrocarbon exploration areas in the Adriatic Sea, comprising both territorial sea and the continental shelf of the Republic of Croatia: 8 exploration areas in the northern Adriatic, 15 in the central Adriatic, and 5 in the southern Adriatic. A strategic environmental assessment was carried out for the program but there is no national consensus on how it should be achieved.

Marine fisheries are regulated by the Marine Fisheries Act (OG no. 62/17, 14/19, 30/23). This Act regulates the implementation of EU's CFP and determines the competent authorities, their tasks, supervision, and enforcement. It also sets objectives of the fisheries policy, methods of managing and protecting the renewable biological resources of the sea, fishing regimes, the collection of data, the management of the fishing fleet, regulation of market, and other issues important for marine fisheries. According to articles 4 and 5, fisheries are a strategic economic activity for Croatia. The goals of the fishery policy are improvement of the competitiveness of fisheries and its economic and social sustainability and ensuring sustainable management of the natural resources.

The Law on Marine Aquaculture (OG no. 13/17, 111/18, 144/20, 30/23) regulates the implementation of EU's CFP in the area related to aquaculture, determines the national goals of aquaculture development, the manner, and conditions of performing aquaculture activities, the competent authorities for the implementation of support in aquaculture and market regulation, supervision, and control, as well as other important issues for aquaculture.

The Regulation on development and implementation of the Marine Environment and Coastal

Zone Management Strategy (OG no. 112/14) was issued pursuant to the provisions of the Environmental Protection Act. The Marine Environment and Coastal Zone Management Strategy links the obligations arising from the MSFD and the ICZM Protocol in one strategic document that would reflect and harmonize the management solutions in support of sustainability of the coastal and marine environment, economy, and society. The Marine Strategy places strong emphasis on regional cooperation of countries in the Mediterranean Sea and the Adriatic Sea subregion to achieve harmonization of the marine strategies of all the countries. The strategy is informed, among others, by (a) an Initial Assessment of the Status of Marine Environment and the pressures thereon in the Croatian part of the Adriatic Sea (adopted in 2012); (b) a Characterization of Good Environmental Status (GES) for the Marine Waters (adopted in January 2015); (c) an economic and social analysis of the use and the cost of degradation of marine and coastal environment (adopted in June 2015); (d) a Program of Measures for the Protection and Management of the Marine Environment and Coastal Zone of the Republic of Croatia (OG no. 97/2017), as the most comprehensive document addressing land-sea interactions; (e) an Action Program for the Marine Environment and Coastal Zone Management Strategy; and (f) a Monitoring system for the ongoing assessment of the status of the Adriatic Sea 2021–2026 (OG no. 28/2021). The ecosystem-based approach is referenced in the Strategy for the Management of the Marine Environment and Coastal Zone and the principles of spatial planning are determined by the Republic of Croatia's Physical Planning Act (PPA).

The government has acknowledged the value of the Adriatic Sea and the high risk of pollution due to coastal urbanization and growing devel-



opment of tourism (especially nautical). It has devised a strategy to address these pressures in the National Island Development Plan 2021–2027 (Republic of Croatia, Ministry of Regional Development, 2021). Protection of the marine environment and the policy of sustainable development of the coastal economy are integrated in the spatial/physical planning system.

Croatia has established a monitoring system in line with the provisions of the MSFD which requires regular monitoring of the marine environment through 11 quantitative descriptors for assessing GES. The updated analysis of GES by descriptors is reported in the Updated Documents of Marine Environment and Coastal Zone Management Strategy of Republic of Croatia, 2021. Although substantial efforts were made to integrate marine data with the information system MORE (<https://vrtlac.izor.hr/ords/portal/>) which leads to several databases, it is evident that additional monitoring and data collection will be needed to fully meet the directive's provisions.

The Law on Maritime Domain and Seaports (OG No. 158/03, 100/04, 141/06, 38/09, 123/11, 56/16, 98/19) regulates the legal status of maritime property, boundaries, management and protection of mar-

itime property, its use and utilization, classification of seaports, port areas, establishment of port authorities, port activities and their performance, construction and use of port superstructure and substructure, as well as important issues regarding order in seaports.

The Law on Public Liner and Occasional Coastal Maritime Transport (OG No. 19/2022). According to Article 1, the Law regulates the system of public coastal liner transport, which ensures regular maritime connectivity between inhabited islands and the mainland, as well as among inhabited islands. This Law also regulates the activities, working procedures, and public authority of the Coastal Liner Service Agency.

Croatia regulates the reception and handling of ship-generated waste in the ports. *The Ordinance on the conditions and method of maintaining order in ports and other parts of Croatia's internal marine waters and territorial sea* (2021), transposes Directive (EU) 2019/883 in the national legislation. The ordinance exempts certain types of vessels from the requirement to provide prior information on ship-generated waste aiming to reduce the administrative burden. The Maritime Code, the Ordinance on the conditions to be met by ports, and the

Ordinance on terms and methods of maintaining order in ports and other parts of the internal seawaters and the territorial sea of the Republic of Croatia mandates delivery of ship-generated waste, based on the adopted Ship Waste Reception and Handling Plan. Specifically, these are the legal provisions for delivery of ship-generated waste, the disposal, reception, and collection of waste and cargo residues from maritime facilities, the content of waste and cargo residue management plans for maritime facilities in ports, information on ship-generated waste, method and deadlines for delivering and retaining waste delivery certificates, deadlines and procedure for handling complaints, criteria for fees for waste reception and collection, methods of payment for waste reception and collection from fishing vessels, yachts, and small boats. Further, the *Regulation on the conditions and means of attaining the right to privileged carriage on public shipping lines* (OG No. 33/2006, 38/2009, 87/2009, 18/2011, 80/2013, 56/2016, 122/2020) establishes the conditions and procedure for granting preference to public liner maritime transport.

Implementation of EU Urban Wastewater Treatment Directive¹³¹ (UWWTD) lags specifically in the coastal area. According to the CBS, 66 percent of the total wastewater is treated to at least the secondary level in 2022.¹³²

At the national level, Croatia has aligned many of the policies and legislation with the EU environmental protection objective including on protection of marine waters, waste management, biodiversity and nature protection, transport, energy and fisheries, and so on. As a member state of the EU, Croatia has adopted a number of policy documents and legislations in line with the EU's overall political goals, that is, achieving climate neutrality by 2050. However, the concept of sustainable blue economy is not fully interpreted in the Croatian policy documents. The existing documents for the development of blue economy activities (tourism, transport, fisheries, and so on) need to be informed by an assessment of sector development goals and activities involved, to achieve coherence among

sectoral policies. An evidence-based analysis of possible cross-sectoral impacts of the blue economy resources for delivering smart, sustainable, and inclusive growth of the Adriatic coast and islands of Croatia would make a significant contribution and fill in the analytical gap. Further, an analysis of the national and regional strategies, development and physical plans and normative acts relevant to the management of coastal and marine areas (environmental protection, nature protection, fisheries, water management, tourism, transport, agriculture, exploitation of mineral raw materials, and so on) should be carried out. This analysis should reveal possible overlap or incoherence between policy documents and legislation regulating different sectors of the blue economy. This entails a considerable scope of work, which should become a key task of the coordination mechanism for the effective implementation of the Sustainable Blue Economy in Croatia.

One prerequisite for achieving sustainable blue economy goals is better integration of legal, regulatory, and institutional frameworks. The lack of a coherent vision toward achieving sustainable blue economy is evident at all levels of governance. In the short run, more synergies and consistent approach to the blue economy sectors would be necessary to fulfil the sectors' potential and render more sustainable outcomes. In this context, it would be advisable to adopt a National Blue Economy Strategy accompanied with an action plan or a roadmap and investment plans.

In parallel, speeding up the enforcement of the EU laws, especially on waste management and protection of marine waters from pollution will increase the protection of near shore resources. Croatia should step up efforts to fully implement the EU waste policy and facilitate transition to a circular economy through improving waste management, stimulating innovation in recycling, and limiting landfilling. Another important challenge for Croatia is implementation of the UWWTD. There is still a long way to go to ensure full compliance with this directive. (An urban area is compliant with the

131 The EU UWWTD requires secondary treatment of all discharges from agglomerations of >2,000 population equivalents, and more advanced treatment for agglomerations >10,000 population equivalents in designated sensitive areas. European Commission (EC). 2020a. "Urban Wastewater Directive Overview." https://ec.europa.eu/environment/water/water-urbanwaste/index_en.html (accessed June 19, 2020).

132 Croatian Bureau of Statistics, Public Sewage System, 2022.

UWWTD requirements, when all generated wastewater is collected and treated in line with the UWWTD provisions.) Obviously, planning and finance remain the main challenges in achieving such a level of compliance.

Marine Spatial Planning

Marine Spatial Planning is an essential tool for helping the national authorities to accommodate the blue economy transition by creating evidence-based and inclusive maritime spatial plans. It can also help assess the future spatial needs of established and emerging blue economy sectors. Other tools for strengthening the blue economy institutional and stakeholder capacity include knowledge transfer for accelerating technology innovations; promoting maritime skills necessary to apply new technologies; efforts to gain better and relevant data and information; and initiatives which facilitate and streamline investments including risk funding for innovative maritime technologies.

The MSP Directive is transposed in the national legislation through an amendment of the PPA (OG 65/2017), which came into force in July 2017. The national Spatial Development Strategy sets strategic goals and priorities based on established core values and analysis of territorial status. Spatial plans are the main instruments supporting the national spatial planning policy at state, regional/county, and local levels. The spatial plans have the force of bylaws (Article 58, paragraph 1 of the PPA). Depending on the level, they are adopted by the Croatian Parliament, the Government of the Republic of Croatia, and the representative bodies of counties and cities/municipalities.

Croatia's physical planning system (PPS) covers both terrestrial and marine areas. Maritime spatial planning is traditionally an integral part of physical planning. It incorporates most of the

themes and requirements for MSP pursuant to Directive 2014/89/EU – MSP Directive, Directive 2008/56/EC – MSFD and the Protocol to the Barcelona Convention on Integrated Coastal Zone Management in the Mediterranean (ICZM Protocol 3). The ICZM Protocol was incorporated in the physical planning system, starting with the declaration on protected coastal and marine zones in 2004. Although there is no single MSP plan for the Croatian maritime area, the existing spatial plans cover the inner waters and territorial sea.¹³³ For instance, the continental shelf area is covered by the Physical Planning Programme of the Republic of Croatia (adopted by the Parliament in 1999 and revised in 2013), which includes strategies and implementation components at the state level. According to the provisions of the UNCLOS convention (Part V, Exclusive Economic Zone), a single spatial plan of the EEZ area may be developed.

There is no single integrated¹³⁴ MSP plan for the Croatian maritime area, although the existing spatial plans cover all coastal waters and territorial sea.¹³⁵ The continental shelf area is covered by the Physical Planning Program of the Republic of Croatia (adopted by the Parliament in 1999 and revised in 2013), a document with strategic and implementation components at the state level. An analysis carried out in the EU-funded Project SUPREME¹³⁶ affirms that most provisions of the MSP Directive regarding activities in the sea are covered in the Adriatic counties' spatial plans¹³⁷. Existing spatial plans on the state (NUTS1), regional (county; NUTS3) and local (city or municipality; LAU2) level cover the entire sea area up to the outer border of the territorial waters. However, all existing spatial plans will have to be revised and restructured in the process of transition to the 'new generation' of plans according to the Republic of Croatia's PPA.

The development of new generation of spatial plans has begun with the preparation of the

¹³³ MSP Country Information Profile Croatia – February 2022.

¹³⁴ 'Integration' refers to five dimensions of integration, namely among sectors, among levels of government (international, European, regional and subregional), across land and water interface (coastal and maritime aspects), among disciplines (socioeconomic and environmental), and across countries (cross-border).

¹³⁵ European MSP Platform. MSP Country Information Profile Croatia – February 2022.

¹³⁶ <https://maritime-spatial-planning.ec.europa.eu/projects/supreme-supporting-maritime-spatial-planning-eastern-mediterranean>.

¹³⁷ <https://www.msp-platform.eu/practices/addressing-msp-implementation-case-study-areas-dubrovnik-neretva-county>, Addressing MSP Implementation in Case Study Areas: Dubrovnik – Neretva County; all Spatial plans are also available via the central platform (Informacijski sustav prostornog uređenja – ISPU/Physical Planning Information System): <https://ispu.mgipu.hr/>.

National Spatial Development Plan (NSDP/PPR)¹³⁸ for the entire land and sea area (up to the outer border of the Croatian territorial waters).

As part of the preparatory work for the DPPR, the data for valid spatial plans were processed and are part of the preparation for the development of lower-level spatial plans. This includes development and adoption of a spatial plan of special features covering the marine area of special competence. This is according to UNCLOS and based on the Decision on Declaring the Exclusive Economic Zone (EEZ) of the Republic of Croatia in the Adriatic of February 5, 2021 (OG 10/2021). Since the Decision has entered into force, the adoption of the Spatial Plan of the Protected Ecological and Fisheries Area and the Spatial Plan of the Continental Belt of the Republic of Croatia, prescribed in Article 49a of the PPA, cease to be an option. Given these facts, an amend-

ment of the PPA has been planned for 2023. Provisions for public consultation in spatial planning are prescribed by the PPA (Art. 94). Those refer to both land and marine spatial planning because spatial plans cover both terrestrial and maritime areas.

Another good example is the integrated coastal zone plan for Šibenik-Knin county with emphasis on climate change adaptation (UNEP/MAP/PAP, 2016) which earned the MedAward in 2019.

“As part of the planning process, Šibenik-Knin County recently initiated the ‘coastal infrastructure cadaster’ with the support of the EU Interreg AdriaAdapt project. Kaštela, another Croatian coastal town, emulated the Šibenik-Knin County example by producing an even more detailed cadastre. The towns of Kaštela, Vodice, and the county of Split -Dalmatia, recently adopted full-fledged coastal adaptation plans.”¹³⁹

Box 4. Zadar County Spatial Plan

The Zadar County Spatial Plan was developed in 2001. The objectives of the plan include economic development, coastal development, rational use of natural resources, protection, landscape protection, and protection of historical heritage. It addresses the demand for different uses of its marine area, including protected areas, maritime transport, ports, and others. The plan obliges municipalities and towns to define sea use within their coastal belts, through their spatial plans. It identifies four different marine zones for mariculture, which is one of the most important maritime activities for Zadar County, amounting to approximately 60 percent of total mariculture production in Croatia. Mariculture zonation is based on the ‘Study on the Use and Protection of the Sea and Seabed in Zadar County’, of which the main objective was to initiate the ICZM process in the county and simultaneously propose zones for different types of mariculture, based on suitability assessments.

Designated uses: Referring to MSP and land-sea interaction (LSI) themes, the plan has designated marine ports for different purposes, marine traffic routes, island heliports, sea salt harvesting area(s), underwater cables, freshwater supply, areas for mariculture with detailed zoning and capacities, and the following areas with special restrictions for users:

- Particularly sensitive and especially endangered habitat areas, sources of marine pollution, areas defined according to building density along the coastline (natural coast, planned building areas, illegal construction of different types)
- Protected areas (coastal and underwater archaeological zones, protected landscape, natural park)
- Restricted area (1,000 m of land and 300 m of sea surface measured from the coastline)
- Areas for aquaculture with detailed zoning and capacities (based on detailed study).

Source: Zadar County Plan: <https://www.zpu-zadup.hr/prostorno-uredjenje/>;

City/municipality plans: <https://www.zpu-zadup.hr/prostorno-uredjenje/prostorni-planovi>.

¹³⁸ The Decision on the Preparation of the National Spatial Development Plan (OG 39/18) was passed by the Government of the Republic of Croatia in 2018.

¹³⁹ <https://www.unep.org/unepmap/news/story/how-coastal-plans-bolster-adaptation-climate-change>.

Blue Governance, Institutions, and Stakeholders

'Blue governance' is defined as the formal and informal processes of collective decision-making, planning, deliberating, and capacity building by government and civil society and market actors connected to marine and coastal environment.

Blue governance marries blue economy and blue growth with the governance principle and encompasses the structures and processes that are designed to ensure accountability, transparency, responsiveness, rule of law, stability, equity and inclusiveness, empowerment, and broad-based participation.¹⁴⁰

The blue economy holds the potential to act as an integrator framework for sustainable development of the maritime space. It can succeed if the 'architecture' of national blue economy creates the enabling environment for cross-sectoral policy coherence and the process of decision-making to achieve desired outcomes involving all stakeholders. The United Nations (UN) principles of effective governance¹⁴¹ for sustainable development, among others, includes stability of the political leadership and commitment, policy coherence, effective institutional capacity, coordination and partnerships, transparency and accountability, and equity and inclusiveness.

Box 5. Blue Governance (University of Portsmouth, UK)

The definition of blue governance encompasses four central themes and several sub-themes:

- Blue policies, planning, and security (sub-topics include Coordination of aquatic economic sectors and inclusion of non-market/ecological services; Spatial planning; Maritime security and maritime domain awareness; SDG14 implementation; Integrated coastal zone management);
- Blue energy, technologies, and transport solutions (Sub-topics include Marine renewables energies; Logistics and safety; Shipping; Port management; Oil Spill prevention; Biofouling and anti-fouling; Off-shore technologies);
- Biodiversity, blue carbon, and climate change (Sub-topics include marine and coastal ecosystem functioning; Ecosystem carbon sequestration and storage; Ecosystem resilience; Marine debris litter and plastics; Biodegradation and bioprospection; Marine and coastal ecosystem service valuation);
- Aquatic resources management (Sub-topics include Fishery management; Fishing by-catch of birds, turtles, and mammals; Aquaculture development; Marine protected areas; Habitat restoration).

Source: <https://www.port.ac.uk/research/research-centres-and-groups/centre-for-blue-governance>.

Box 6. Blue Governance in Seychelles

Seychelles is in the Western Indian Ocean just south of the Equator. It has an EEZ of 1.35 million km², a land area of just 454 km², and a population of around 96,000, mainly concentrated on three main islands. Seychelles had a gross national income (GNI) per capita of US\$16,870 (2019), which ranks it as a high-income country. The two main pillars of Seychelles' prosperity are tourism and fisheries, both being ocean-based activities. In addition, Seychelles has one of the highest fish consumption per capita (around 65 kg per year) (Republic of Seychelles 2013). Seychelles' unique island and marine environment is of global significance with one marine UNESCO World Heritage Site, the Aldabra Atoll, which is famous for its endemic population of giant tortoises and is rich marine life. Due to its geography and socioeconomic characteristics, Seychelles' prosperity directly and indirectly depends on its coastal and marine environments; hence, there is critical importance of a well-articulated blue economy strategy to inform national development in a way that respects its marine ecological integrity.

¹⁴⁰ As defined by the Centre for Blue Governance, University of Portsmouth, UK: <https://www.port.ac.uk/research/research-centres-and-groups/centre-for-blue-governance>.

¹⁴¹ United Nations Economic Social Council. 2018; SDG 16 and SDG 17 (2015); WB Good Governance Indicators (WGI); and OECD indicators for policy coherence (2019).

Seychelles initiated a national blue economy strategy in 2012, establishing a blue economy department and a Blue Economy Research Institute as early as 2015, which led to the adoption of a Blue Economy Strategic Policy framework and Roadmap (2018–2030) in 2018, hereafter referred to as the blue economy roadmap. Seychelles has achieved international visibility, thanks to a successful debt swap for conservation and climate change adaptation in 2015 and the issuing of the first blue bond for transitioning to sustainable fisheries in 2018, both of which contributed to the implementation of Seychelles blue economy roadmap.

Source: Benzaken, D., M. Voyer, A. Pouponneau, and Q. Hanich. 2022. "Good Governance for Sustainable Blue Economy in Small Islands: Lessons Learned from the Seychelles Experience." *Front.Polit.Sci.* December 1, 2022. Sec. Comparative Governance Volume 4 – 2022 | <https://doi.org/10.3389/fpos.2022.1040318>.

While there are multiple important facets of 'blue governance', the central one that matters for swift transition is how effective the governance arrangements are for enabling integration among blue economy sectors. This also includes how policy decisions are being made and how responsible institutions and organizations coordinate and partner to respond to sustainability challenges in the maritime space. A holistic governance approach which builds on a solid knowledge base, inclusive decision-making, and cross-sectoral collaboration could bring an array of benefits including the following:

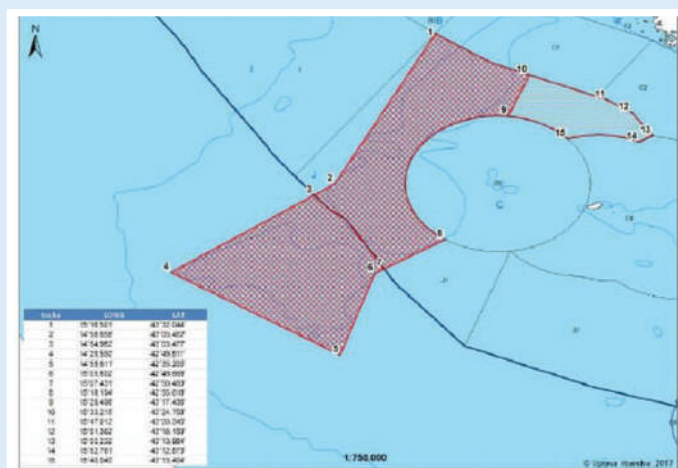
- **Effective implementation of the Marine Strategy Framework Directive, the Water Framework Directive, the Single-use Plastics Directive, and the Directive on Maritime Spatial Planning.** This in turn, will help protect the coastal areas and the health of many beachgoers, safeguard the natural environment, while promoting more sustainable business models and consumption.
- **Better use of science, big data analytics, artificial intelligence, machine learning, and remote technologies to inform decision-making and increase efficiency.** At least in the foreseeable future, regulation of marine activities is expected to focus on the integration and synergies of existing and emerging marine industries.
- **Effective programming and use of existing and future funding avenues** for integrated territorial development, sectoral and cross-border cooperation (for example, EU Regional Development and Cohesion Policy programs 2021–2027, including the European Maritime and Fisheries Fund).
- **Stronger enabling environment for responsible private sector investments throughout the value chain by reducing risks and providing incentives for innovation.** Moreover, an effective governance framework will enhance the contribution of fisheries, aquaculture, and mariculture to the macro-economy, which will help improve the visibility of the blue sectors and consequently resource allocation.
- **A robust pipeline of investable opportunities to grow the blue economy in a way that benefits the maritime industry and blue sectors, while protecting natural resources.** An effective governance framework will promote investments in sustainable management of aquatic resources and environment and ensuring biodiversity and ecosystem resilience. This, in turn, would contribute to enhance coastal local communities' resilience, both economically and against climate change and sea level rise.
- **Empower local communities and encourage broad-based citizen participation.** Analysis and results of fisheries rebuilding efforts around the world have demonstrated that when local communities and fishers have a voice in setting policy and management guidelines, these rules are much more likely to be followed and create a lasting change.

The Government of Croatia has successfully implemented a fishing ban in the Jabuka-Pomo pit,¹⁴² which became an international good practice of regional collaboration on fleet management and restrictions of fishing efforts within the GFCM and EU policies frameworks (Box 5).

¹⁴² Government of the Republic of Croatia – Italy, Croatia agree to three-year fishing ban near Jabuka Pit.

Box 7. Croatia Case: Jabuka Pomo Pit Fisheries Management

Croatia and Italy have reached an agreement on a three-year ban fishing in the vicinity of Jabuka island from September 1, 2017 to August 31, 2020. The agreement was reached based on negotiations between Croatian and Italian administrations, backed by scientists, the fishing sector and NGOs in both countries, the ministry said in a press release. The Ministry of Agriculture's establishment of an area of protection in the Jabuka pit is of exceptional significance for the Union's fisheries in compliance with the General Fisheries Commission for the Mediterranean Scientific Advisory Committee last week in Ljubljana.



Only a small number of vessels were allowed to operate in that area which need special authorization. The pit is a breeding ground for most of the demersal species including the two important species for Croatian fishers, hake and Norway lobster. It is one of the main spawning and nursery areas in the Adriatic. Declaring the area an FRA was a protracted affair that took years of negotiation and only succeeded in 2017. In fact, twice before, in 2015 and 2016, Croatia had tried to close the area bilaterally with Italy, but these efforts only lasted a year. In the end, it was the work of NGOs, scientists from universities and institutions around the world,

the GFCM, and the EU that enabled the creation of the FRA. Pursuant to the restrictions the channel areas between the islands were completely closed to bottom trawling for six months in the year and are only accessible to vessels with small engines of up to 184 kW and for only two days in the week. The Velebit channel, a strip of water separating the mainland from the islands of Pag, Rab, and Goli Otok, was also completely closed to bottom trawling. Several restrictions were thus already in place. Furthermore, the Croatian coast is more than 5,000 km long and according to EU regulations bottom trawling is forbidden in areas within 1.5 nautical miles of the coast (and within 3 nautical miles where the depth is less than 50 m). This significantly enlarges the restricted area in the Croatian part of the Adriatic. Fishermen in the Dalmatia-Spilt region have witnessed substantial restoration of fish stocks in a single year.

Source: Government of Croatia; Eurofish International Organization; Restricting Fisheries in the Jabuka Pit has had Multiple Positive Impacts – Eurofish

The MESD of the Republic of Croatia, in particular, the Directorate of Water Management and Sea Protection, and the Regional Service for the Protection of the Sea and Coast in Rijeka are the institutions with a mandate to protect the coastal and marine environment. Monitoring of the marine environment is conducted by the Institute for Oceanography and Fisheries together with the Center for Marine Research (CMR), Rovinj. The Croatian Hydrological and Meteorological Service regularly monitors the sea temperature and other climatological trends in the Adriatic Sea. The MESD participates in the implementation of the Barcelona Convention and accompanying protocols through participation in the work of the Mediterra-

nean Action Plan (MAP), participation in the work and implementation of MEDPOL (Program for the Prevention of Pollution and Environmental Monitoring in the Mediterranean Sea), implementation of the ecosystem approach to the management of human activities (ECAP) in the Mediterranean, in the activities and work of REMPEC (Regional Action Centre for the Prevention of Sudden Pollution in the Mediterranean, Malta), and PAP/RAC (The Regional Action Centre of the Program of Priority Activities, Split) and in the work Mediterranean Commission for Sustainable Development (MCSA). The MESD regularly prepares and submits annual reports on the implementation of the Barcelona Convention and accompanying protocols.

The Marine Environment and Coastal Zone Management Strategy is coordinated by the MESD.

The National Committee, representing inter-ministerial coordinative body was established in 2012 for the development and implementation of the Marine Strategy, and its members were appointed by the Croatian Government, which is also the coordinator of cooperation with other competent authorities. Coordination is carried out through the Commission for Coordination, whose work includes ministers and the Expert National Committee composed of scientists and experts from competent bodies responsible for the implementation of the obligations from the Marine Strategy (Decision on the appointment of the National Expert Committee for the execution of the tasks regulated by the Regulation on the preparation and implementation of documents of the Strategy for the Management of the Marine Environment and Coastal Area and the preparation and implementation of the Strategy, OG no. 31/17, 42/18). The UNEP office PAP/RAC in Split supports the coastal zone management and integrates different stakeholders concerned with the marine environment.

The responsibility for management of marine non-living resources is vested with the MESD, specifically, the Energy Directorate. On one hand, the MESD oversees nature and environmental protection and on the other the exploration and exploitation of hydrocarbons and other mineral resources in the marine area. Furthermore, the Agency for Hydrocarbons, under jurisdiction of this Ministry, provides operational support for activities related to exploration and exploitation of hydrocarbons, and gas and CO₂ permanent storage in geological structures, and for activities related to the development and application of sustainable technologies of renewable energy sources. Hrvatski operator prijenosnog sustava d.d. (HOPS) is an independent transmission operator, and the only operator of the electric power transmission system in the Republic of Croatia and the owner of the entire Croatian transmission network (voltage levels 400 kV, 220 kV, and 110 kV), and holds a license to carry out the energy activity of electricity transmission as a regulated public ser-

vice. The Croatian Energy Regulatory Agency (HERA) regulates the energy market in Croatia. The Energy Institute Hrvoje Požar (EIHP) is the government research institution in the field of energy, scientific and market research, and advisory support to public authorities. The EIHP institute provides services related to renewable energy sources. The Agency of hydrocarbons acts as a contact point for renewable energy sources at sea. Other institutions acting on production and distribution of oil and gas are INA and JANAF. The core business of INA, d.d. is exploration and exploitation of oil and gas.

The Ministry of Physical Planning, Construction and State Assets (MPPCSA) is the competent state body for spatial and physical planning and is responsible for reporting the state of implementation of the MSP Directive. MPPCSA is the competent authority for MSP implementation in Croatia and is also responsible for spatial plans at the state level. Following the amendments made to PPA in 2018 (OG 114/2018), the former Croatian Institute for Spatial Development continues its work within the MPPCSA.

According to the Marine Fisheries Act, the Ministry for Agriculture, and its Fisheries Directorate is the key implementing body in charge of the operations in fisheries and aquaculture. Other institutional stakeholders and administrative units in charge of inspection, LAUs and counties, Croatian Chamber of Economy, Croatian Chamber of Crafts and Arts, scientific and professional organizations, and especially the fisheries cooperatives¹⁴³ and producer organizations. The fishery cooperatives were established with the aim to contribute to environmentally sustainable use and protection of marine biological resources and ecosystems, to improve the competitiveness of producers in fisheries and market transparency by providing consumers with accurate and precise information and product traceability; to assure market stability by production planning and supplying consumers with healthy and quality food; improve skills, working conditions and safety at work, foster innovations toward blue economy growth and support national and international cooperation.

¹⁴³ The Rulebook on Fishery Cooperatives (OG 48/2010) and Rulebook on Recognition of Fishery Cooperatives (OG 115/2022).



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Specific measures have been taken to support the sustainable and long-term development of fishing communities in Croatia.

This includes support to their social cohesion, engaging them in strategic planning, improving their decision-making role, and ensuring a balance between conflicting interests in many coastal areas and islands. According to the court register,¹⁴⁴ there are 18 active fishery cooperatives—4 operate in the Istria County, 2 in the Primorje-Gorski Kotar County, 4 in Zadar County, 4 in Šibenik-Knin, and 4 in the Split-Dalmatia County. Fisheries local action groups (FLAGS) are active within Croatian Leader network.¹⁴⁵ FLAGS is a partnership between stakeholders in fisheries and other stakeholders in local public and private sectors, to promote sustainable development of fishery and aquaculture. Their primary task is to elaborate and implement local development strategy in fishery and aquaculture. There are 14 FLAGS in Adriatic Cro-

atia: 4 in Istria County, 2 in Primorje-Gorski kotar; 1 in Lika-Senj, 3 in Zadar, 1 in Šibenik-Knin, 2 in Split-Dalmatia, and 1 in Dubrovnik-Neretva County.¹⁴⁶

The Ministry of the Sea, Transport, and Infrastructure is responsible for transport policies (including maritime), for monitoring of their implementation, including for protecting the marine environment (including islands, coastal regions, ports, and inland waterways), and telecommunication infrastructure. Port Authority is a non-profit legal entity established by the state to manage, construct, and operate a port open to public traffic that is of special, international, and economic interest to the Republic of Croatia. National port authorities are responsible for the economic development of port and terminal facilities within the areas assigned to them. The Croatian Registry of Shipping (CRS) is a non-profit organization under the Croatian law, which, according to

¹⁴⁴ <https://sudreg.pravosudje.hr/registar/f?p=150:2:0::NO:RP>.

¹⁴⁵ <https://www.lmh.hr/>; Leader network is the European Network for Rural Development, currently integrated into the European CAP Network (https://eu-cap-network.ec.europa.eu/about-european-cap-network_en).

¹⁴⁶ https://lmh.hr/karta_flag.html.

the Law on the Croatian Register of Shipping (OG No. 1996/81, 2013/76 and 2020/62) and the Charter of the Register, is an independent, public welfare foundation, among others, performing classification and statutory certification of inland and sea-going ships on behalf of the Flag State Administrations, statutory certification and conformity assessment of recreational crafts, certification of materials and products, conformity assessment of marine equipment, conformity assessment of pressure vessels, certification/registration of quality management systems. Private sector organizations such as shipping companies (Atlantska plovdba, Tankerska plovdba, Rapska plovdba, and Jadrolinija) and shipowners, shipyards, and shipbuilding companies play an important role in the maritime transport sector while encountering economic difficulties in recent years. Their role in the future development of the blue economy needs to be factored in. The Coastal Liner Service Agency established pursuant to the Liner Shipping and Seasonal Coastal Maritime Transport Act (OG no. 33/06, 38/09, 87/09, 18/11, 80/13, 56/16) provides general framework for regulation of public passenger service in Republic of Croatia.

In accordance with the Law on the Organization and Scope of State Administration Bodies (OG No. 85/20), the **Ministry of Tourism and Sports** is responsible for tasks related to strategy and tourism policy development for the sector, including tourism developments and investments. Croatia has a system of Tourist Boards which are organizations that operate on the principle of destination management and are established to promote and develop tourism in the Republic of Croatia and the economic interests of legal and natural persons providing hospitality and tourism services or engaging in other activities directly related to tourism and destination management. Croatia has 1,379 travel agencies which act as intermediaries to provide organization of multi-day trips and offer package tours and day trips for domestic and foreign tourists and visitors in Croatia.

A shift from a single-sector approach to address overfishing, pollution, and unplanned coastal development needs the engagement of all stake-

holders to reconcile the competing interest for maritime resources. The extended list of stakeholders includes other institutions such as LAUs and counties, LAGs and FLAGs, NGOs, research community and academic institutions, tourism associations, and coastal and island communities.

In the transition to blue economy, Croatia can further the public sector effort to tap in more opportunities for effective partnerships with the private sector. Leveraging private sector investments will augment the potential for substantial economic growth and enhanced social well-being in the Adriatic counties. Blue growth is recognized by the Adriatic Croatia Industrial Transition Plan (MRDEUF 2022) as one of the priority sectors for targeted investments. It is related to the strategic priority areas: Smart and green transport, Digital products and platforms, and Sustainable and circular food. The plan links industrial transition to regional, innovation and industrial policies, focusing on value added niches by introducing the following elements: unified approach at the NUTS2 level, prioritization based on entrepreneurial discovery process, and new strategic regional partnerships based on regional added value chains.

Innovation, Research, and Development

Croatian universities are involved in scientific research on the marine environment. One of them that stands out is the Department of Marine Studies of the University of Split with a strong focus on blue economy research. While the universities and research institutions already collaborate with the NGOs on the topic of marine environment, such as World Wildlife Fund (WWF) Adria, Association Biom, Association for Nature, Environment and Sustainable Development Sunce, Blue World Institute from Rovinj, and many others, creating a wider network for knowledge exchange with the global ocean research community and could open the gates for innovation in the Croatian blue economy space.

The global innovation trends provide new opportunities for the regions in transition such as Adriatic Croatia. Croatia has already formulated the areas for actions promoting innovation¹⁴⁷ aligned with the EU framework for blue growth in Adriatic Croatia.

¹⁴⁷ Republic of Croatia, Ministry of Regional Development and EU Funds (MRDEUF) 2022a, 71 and 2022b.



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There are also good examples of research projects implemented by Croatian universities, for example, by the University of Split, which aim to highlight the opportunities for emerging blue economy sectors. These include research on marine aquaculture (for example, *An innovative, ecological approach to growing mussels on ropes made of recycled materials with eDNA barcoding and pasteurization of edible shells*), on environmental monitoring (for example, *Water management solutions for reducing microbial environment impact in coastal areas*), and on the Mediterranean coastal agriculture (for example, *Innovative sustainable organic sea fennel (*Crithmum maritimum* L.)-based cropping systems to boost agrobiodiversity, profitability, circularity, and resilience to*

climate changes in Mediterranean small farms – SEA FENNEL4MED).

The Regional Innovation Scoreboard (2023)¹⁴⁸ appraised Croatia as the Emerging Innovator in the Adriatic region. Croatia's innovation index stands at 69.9 percent of the EU average in 2023. The relative strengths include the following: overall digital literacy of total population is above the EU average; performance business process innovations increased 10.7 percentage points in 2023 compared to 2022. Nonetheless, overcoming the low level of business sector investment in R&D (only 10 percent of the EU average) could advance Croatia's science development. Emerging sectors are significantly affected by global trends such as

¹⁴⁸ The European Innovation Scoreboard provides a comparative assessment of the Research and Innovation performance of EU member states, other European countries, and regional neighbors. It helps countries assess the relative strengths and weaknesses of their national innovation systems and identify challenges that they need to address. The European Innovation Scoreboard 2023 was released on July 6, 2023. Croatia, Slovakia, Poland, Latvia, Bulgaria, and Romania are emerging innovators; [European innovation scoreboard \(europea.eu\)](https://europea.eu).



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the consequences of the COVID-19 pandemics, changes in global economic power, technological changes (artificial intelligence, nanotechnologies, biotechnologies, and other key enabling technologies [KETs]), population aging and negative demographic trends, climate change and sustainable use of resources, security issues, urbanization, and future jobs.

Croatia's research capacity is mainly in the universities and institutes. Many research departments in commercial firms have disappeared over the last few decades. The R&D community often lacks strategic foresight in key areas of development. R&D suffers from a 'brain drain' due

to low career prospects and limited resources for research. Many young researchers, after obtaining doctoral degrees (PhD), leave the country. The R&D legal provisions need to be revisited to foster science and innovation and stimulate collaboration with economic sectors including the blue economy sectors.

Greater effort will be needed to connect science with the public sector and businesses to spur innovation including in the emerging blue economy sectors. The policy and decision-making capacity of relevant ministries and institutions could be strengthened by scientific input from the R&D community. Croatia still invests relatively small amounts of R&D funds per capita in basic research, applied research, and experimental development. Croatia's spendings on R&D¹⁴⁹ for 2021 is 1.27 percent—much lower than EU average 2.27 percent and the OECD average of 2.71 percent. Croatia also spends a lot less on higher education R&D and on businesses compared to EU and OECD peers.¹⁵⁰ Only 1 percent of R&D in higher education institutions is financed by companies, and the cooperation between SMEs and universities is low (4 percent of SMEs in Croatia cooperate with universities, in contrast to 10 percent in the EU28). Although Croatia is trying to move away from predominantly basic research, investments in applied research and intellectual property registration are still low. A potential source for increasing the national resources for R&D is from the EU Horizon Europe Framework Program.¹⁵¹ The program's policy supporting instruments extend beyond traditional R&D topics to actively foster green and digital transitions. The program has a budget of €94.4 billion over seven years (2021–2027),¹⁵² of which at least 35 percent will be devoted to climate-related actions, support for the transition of maritime industries to climate neutrality.

149 (<https://databank.worldbank.org/source/world-development-indicators#>).

150 https://ec.europa.eu/eurostat/statistics-explained/images/9/94/Gross_domestic_expenditure_on_R_and_D_by_sector%2C_2021_%28%25%2C_relative_to_GDP%2C_ordered_by_the_expenditure_in_the_business_enterprise_sector%29_04-10-2022.png.

151 https://ec.europa.eu/info/horizon-europe_en.

152 Cluster 6 of the Strategic Plan specifically targets the sustainable Blue Economy: "Research and innovation will support the transition to a climate neutral, sustainable and productive Blue Economy, including thriving aquaculture, fisheries and emerging sectors such as marine biotechnology. Innovative nature-based solutions will unlock the potential of the sustainable bioeconomy and replace fossil-based, carbon-intensive and harmful materials with innovative, climate-neutral, bio-based, non-toxic materials and chemicals. Innovative solutions, a non-toxic and more circular use of resources and the mainstreaming of circular systems will contribute to achieving zero polluted land, soil, water and air, seas and oceans, including by taking a multi-stressor approach."

Table 11. R&D Stakeholders in Existing BE Sectors¹⁵³

Blue growth industries	Coastal tourism	Shipbuilding and repair	Fisheries and aquaculture
Locations	Islands and mainland coast	Dubrovnik (Sustjepan), Vela Luka, Korčula, Split, Trogir, Zadar, Rijeka, Bakar, Kraljevica, Pula	Brač, Kali, Rijeka, Rovinj, Ston, Šibenik, Zadar
Specialized business and research infrastructure	<ul style="list-style-type: none"> Center for supporting smart and sustainable cities of the University of Rijeka Center for Urban Transition, Architecture and Urbanism of the University of Rijeka – Delta Lab Institute for Agriculture and Tourism Poreč Department of Biotechnology, University of Rijeka Tourist incubator in Opatija (tourism) 	<ul style="list-style-type: none"> AluTech – Business Innovation Center, Šibenik (advanced materials) Metris – Materials Research Center, Pula (shipbuilding, smart industry) CEKOM Brodogradnja d.o.o., Split (shipbuilding) CEKOM for advanced mobility, Split (shipbuilding) Maritime Electronics Center, Split (shipbuilding) 	<ul style="list-style-type: none"> Aquaculture Research Center (CIRA) of the University of Dubrovnik Center for marine research Institute “Ruđer Bošković” Rovinj Mariculture Development Center ŠKŽ – under construction (aquaculture) Blue-green center of Zadar County – under preparation (agriculture, fishing) Croatian center for autochthonous fish and crustacean species of karst waters, Otočac (fishery) Institute of Oceanography and Fisheries, Split (fisheries)
Seafood processing; building and equipping seafood processing facility	<ul style="list-style-type: none"> Center for innovation and entrepreneurship Rijeka Technology Park Split (information and communication technology [ICT], smart industries) Dubrovnik Sea and Coastal Institute Step Ri – Technology Park Rijeka (ICT, smart industries) Torpedo production park – PORIN (additive technologies) Business and Innovation Center iNAVIS, Šibenik (blue economy) CPZI – Center for Popularization of Science and Innovation of the Istrian County, Pula 		

¹⁵³ Plan for industrial transition of Adriatic Croatia, page 29; https://strukturnifondovi.hr/wp-content/plugins/pdfjs-viewer-shortcode/pdfjs/web/viewer.php?file=https://strukturnifondovi.hr/wp-content/uploads/2022/02/Plan-za-industrijsku-tranziciju-Jadranske-Hrvatske_ilektorirano_clean.pdf&attachment_id=&dButton=true&pButton=true&oButton=false&sButton=true.

Blue growth industries	Coastal tourism	Shipbuilding and repair	Fisheries and aquaculture
Relevant high education institutions	<ul style="list-style-type: none"> ■ Faculty of Electrical Engineering, Mechanical Engineering and Shipbuilding, Split (shipbuilding, smart industry) ■ Faculty of Civil Engineering, Architecture and Geodesy, Split (green construction) ■ Faculty of Management in Tourism and Hospitality, Opatija (tourism) ■ Faculty of Natural Sciences in Pula ■ Faculty of Civil Engineering, Rijeka (green construction) ■ Maritime Faculty, Rijeka (shipbuilding) ■ RIT Croatia, Dubrovnik (tourism) ■ Study of energy efficiency and renewable sources of the University of Zagreb, Šibenik (green technologies) ■ Jurja Dobrila University in Pula ■ LIBERTAS University in Dubrovnik ■ University of Dubrovnik (UNIDU) ■ University of Rijeka (Department of Biotechnology) ■ University of Split (Ecology and Sea Protection and Marine Fisheries studies) ■ University of Zadar (Department of Ecology, Agronomy and Aquaculture, Center for Karst and Coastal Research, Center for Interdisciplinary Sea and Maritime Research – CIMMAR, Zadar) ■ Center for Food Technology and Biotechnology within the Faculty of Food and Biotechnology of the University of Zagreb, Zadar ■ Istrian Polytechnic Pula ■ Technical Faculty, Rijeka (smart industry) 		
Professional education and lifelong learning	<ul style="list-style-type: none"> ■ Educational and research center Torpedo of the Maritime Faculty in Rijeka ■ Regional centers of competence in tourism: Split, Pula, Opatija and Dubrovnik ■ Regional centers of competence in mechanical engineering: Vocational School of Vice Vlatković Zadar and Industrial Crafts School Šibenik ■ Regional center of competence in electronics and computing: Vocational Technical School Split 		

Domestic economic activities that depend on maritime resources can benefit from greater collaboration between scientific institutions and businesses. Digital technologies play an important role in connecting fisheries and tourism and monitoring and optimization of production. Digital technologies could facilitate the supply of fresh fish

food and make a positive impact on tourism sector revenues multiplied through food value added chains, if the food is delivered locally.¹⁵⁴ The Adriatic Croatia Industrial Transition Plan¹⁵⁵ has identified three priority blue economy sectors and actions for advancing innovation (Table 12).

¹⁵⁴ Republic of Croatia, MRDEUF 2022a, 63.

¹⁵⁵ Republic of Croatia, MRDEUF 2022a, 29–34.

Table 12. Blue Economy Priority Areas for Innovation

Vessels of the future	Luxury coastal tourism	Smart fishery and aquaculture
<ul style="list-style-type: none"> ■ Additional investment in green and autonomous ships, smart solutions for ship repair, and smart solutions for repair of vessels ■ Port of the future ■ Strengthen partnerships for new product development ■ Use of <i>de minimis subsidies</i>,¹⁵⁶ technology transfer, and digital transition to integrate SMEs and promote entrepreneurship within regional value added chains 	<ul style="list-style-type: none"> ■ Support to small and medium entrepreneurs for integration in the regional value chains ■ Innovative solutions for supply, management, improved visibility, sustainable development in synergy with other activities, improved competitiveness ■ Innovative solutions for more efficient communication and meeting the needs of tourists, application and development of local suppliers branding skills. ■ Innovative solutions for tourist destination management ■ SmartTech solution for accommodation, gastronomy, nautical tourism, digital nomads; green solutions in coastal tourism 	<ul style="list-style-type: none"> ■ Support investments in R&D and commercialization of innovations ■ Support growth and development of innovative startups and SME entrepreneurs in priority niches (for example, by de minimis subsidies for innovative solutions) ■ Enable smart skills development for industrial transition. ■ Subsidy schemes for large and SME entrepreneurs and innovation clusters, centers of excellence, startups to support smart skills development for new product niche development and skills needed for markets, safety standards, design and use of new materials; flexible production tailored to specific customer needs

Regional Partnerships: EUSAIR – A Common Maritime Agenda for Blue Economy

Enhanced regional cooperation in the Adriatic Sea can ensure that the sea is safe, secure, clean, and sustainably managed. The transboundary cooperation between Croatia and other Adriatic countries (Italy, Slovenia, Bosnia and Herzegovina, and Montenegro) has been formalized through a series of treaties and legal acts. A recent effort on transboundary cooperation, supported by significant contributions from Croatian and Italian scientists, brought the 41st session of the General Fisheries Commission for the Mediterranean (GFCM) in October 2017 to the adoption of the EU proposal for the establishment of a Fisheries Restricted Area in the Jabuka/Pomo pit, effectively banning demersal fishing (that is, bottom-set nets, bottom trawls, and

some long lines and traps). The marine area of at least 2,700 km², recognized as an essential nursery and spawning ground for several marine species, is located outside the territorial waters of Italy and Croatia.¹⁵⁷

Croatia is part of the Union for the Mediterranean (UfM), a regional partnership supporting numerous initiatives for the development of the blue economy. Croatia is also a partner of the Blue Med Initiative from 2014, aiming to foster regional integration and knowledge base on Blue Growth in the Mediterranean. BlueMed aims to promote joint actions at the Mediterranean level on relevant research and innovation priorities. The initiative has identified key challenges including MSP and ICZM. The Strategic Research and Innovation Agenda (SRIA), updated in 2017, considers MSP and ICZM among the key sectoral enablers in the Mediterranean region.

¹⁵⁶ State aid mechanism designed for small amounts of funding.

¹⁵⁷ European MSP Platform. MSP Country Information Profile Croatia – February 2022, www.msp-platform.eu.

Blue economy is a pillar of the European Strategy for the Adriatic-Ionian Region (EUSAIR). The EUSAIR aims to foster social, economic, and territorial cohesion and to reduce the disparities in the Adriatic-Ionian macro-region through cooperation. It promotes research, innovation and business opportunities in blue economy sectors, the adaptation to sustainable seafood production and consumption, and the improvement of the sea basins' governance. EUSAIR comprises both EU and non-EU countries of the Adriatic and Ionian regions. In both cases, MSP is considered a relevant tool/process for the sustainable management of marine space.

Croatia took over the presidency of the EUSAIR in June 2023 to steer the nine coastal neighbor-

ing nations¹⁵⁸ toward a common framework for blue growth. EUSAIR is committed to action toward a common, integrative approach in the Adriatic-Ionian basin, organized around four pillars—blue growth, regional connectivity, environmental sustainability, and sustainable tourism—and seven thematic focus areas¹⁵⁹. In 2020, the European Commission proposed a new 'sustainable blue economy' approach, with the hope that industries and sectors related to the oceans, seas, and coasts across the EU would better align to achieve the objectives set forth in the European Green Deal (EGD) as a pathway toward greener and inclusive recovery from the pandemic and beyond. The legal recognition of Croatia's EEZ was an important step in this regard.



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¹⁵⁸ EUSAIR members include Greece, Italy, Slovenia, Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, Serbia, and Croatia.

¹⁵⁹ Thematic focus areas include blue technologies, fisheries and aquaculture, maritime and marine governance and services, maritime transport and intermodal connections to the hinterland, energy networks, the marine environment (including transnational terrestrial habitats and biodiversity), and diversified tourism offers with sustainable and responsible tourism management.

Table 13. EUSAR Strategic Pillars, Challenges, and Opportunities

	Pillar 1 Blue growth	Pillar 2 Connecting the region	Pillar 3 Environmental quality	Pillar 4 Sustainable tourism
Objective	<ul style="list-style-type: none"> To promote research, innovation, and business opportunities in blue economy sectors, by facilitating the brain circulation between research and business communities and increasing their networking and clustering capacity. To adapt to sustainable seafood production and consumption, by developing common standards and approaches for strengthening these two sectors and providing a level playing field in the macro-region. To improve sea basin governance, by enhancing administrative and institutional capacities in the area of maritime governance and services 	<ul style="list-style-type: none"> To strengthen maritime safety and security and develop a competitive regional intermodal port system. To develop reliable transport networks and intermodal connections with the hinterland, both for freight and passengers. To achieve a well-interconnected and well-functioning internal energy market supporting the three energy policy objectives of the EU—competitiveness, security of supply and sustainability. 	<ul style="list-style-type: none"> To ensure a good environmental and ecological status of the marine and coastal environment by 2020 in line with the relevant EU acquis and the ecosystem approach of the Barcelona Convention. To contribute to the goal of the EU Biodiversity Strategy to halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restore them in so far as feasible, by addressing threats to marine and terrestrial biodiversity. To improve waste management by reducing waste flows to the sea and, to reduce nutrient flows and other pollutants to the rivers and the sea. 	<ul style="list-style-type: none"> Diversification of the macro-region's tourism products and services along with tackling seasonality of inland, coastal, and maritime tourism demand. Improving the quality and innovation of tourism offer and enhancing the sustainable and responsible tourism capacities of the tourism actors across the macro-region.
Topics	<p>Topic 1 – Blue technologies</p> <p>Topic 2 – Fisheries and aquaculture</p> <p>Topic 3 – Maritime and marine governance and services</p>	<p>Topic 1 – Maritime transport</p> <p>Topic 2 – Intermodal connections to the hinterland</p> <p>Topic 3 – Energy networks</p>	<p>Topic 1 – The marine environment</p> <p>Topic 2 – Transnational terrestrial habitats and biodiversity</p>	<p>Topic 1 – Diversified tourism offer (products and services)</p> <p>Topic 2 – Sustainable and responsible tourism management (innovation and quality)</p>
Coordinators	Greece and Montenegro	Italy, Serbia, and North Macedonia	Slovenia and Bosnia and Herzegovina	Croatia and Albania

Source: EUSAIR Adriatic-Ionian Pillars, <https://www.adriatic-ionic.eu/pillars/>

Croatia is also a partner of the BlueMed Initiative, set up in 2014 to foster the integration of knowledge and efforts to develop Blue Growth in the Mediterranean. BlueMed aims to promote joint actions at the Mediterranean level on relevant

research and innovation priorities. The initiative has identified key challenges including MSP and ICZM. SRIA, updated in 2017, considers MSP and ICZM among the key enablers in the Mediterranean region.



CHAPTER 5.

Financing Croatia's Blue Economy Transition

KEY TAKEAWAYS

- Financing will be a crucial enabler for the transition to a blue economy from both public and private sectors.
- Croatia posted the highest ratio of GDP to total general government expenditure on environment (1.5 percent of GDP) among the EU27 countries. Considering the value of economic cost of environmental degradation at 2.3 percent of GDP—resulting in ecosystem loss, water and air pollution and untreated waste. Croatia needs to adopt a more targeted spending approach to increase the resources for waste management and wastewater treatment to tackle this challenge in Adriatic Croatia.
- Croatia's environmental investment, including in the Adriatic area, are lower than the EU average. While Croatia performs better than some of its peers in the EU, the government spending on environment is contingent on the current state of the economy, including GDP per capita.
- The 'green' fiscal reform will go a long way in enabling Croatia's green-blue transition and removing of the obstacles for implementing costly environmental protection policies. The fiscal decentralization reforms need to address the factors inhibiting introduction of new taxes in the coastal counties. National action for introduction of carbon taxes to mitigate climate change could spur sustainable initiatives and blue economy innovation.
- The role of the public sector in protecting the environment has to go far beyond the limited budget resources. Using public funds to leverage private investments could lead to effective implementation of environmental policies and emphasizing spending preferences.
- Medium-term blue economy financing needs stand at an estimated €7.5 billion investment to meet financing needs in water supply, sanitation, and the seafood value chain. To meet EU Directive obligations, about €7.0 billion investment is required in water and sanitation infrastructure, with €2.6 billion yet to be publicly funded. The EU, along with local Croatian entities, plans to fund €3.4 billion, necessitating €2.6 billion from the private sector. The seafood value chain seeks €0.5 billion in investments, with €0.27 billion expected from the private sector to enhance various facets including small-scale fisheries and aquaculture.

Preserving the coastal and marine natural assets is critical for the sustainable growth of the blue economy in Croatia. Current growth prospects of the key marine-based sectors might be limited by the rate of environmental degradation, which is a growing concern that needs action and financial resources. The vulnerabilities related to climate change also call for additional financial resources to address climate threats with economic consequences for tourism and agriculture. Starting with 'no regret' institutional measures¹⁶⁰ to address the shortcomings affecting the water resources from untreated wastewater and flaws of the solid waste management systems¹⁶¹ could tackle the current institutional constraints and management failures and ensure long-term resilience and better protection of Croatia's natural capital and marine areas.

All three tiers of the government—the central government, counties, and the local government level (towns, cities, and municipalities), have specific responsibilities for environmental protection and need resources. The Law on Local and Regional Self-Government (OG NN 33/01, 60/01, 129/05, 109/07, 125/08, 36/09, 36/09, 150/11, 144/12, 19/13, 137/15, 123/17, 98/19, 144/20) sets the legal framework for the division of competences between the government levels, while the Law on Local and Regional Self-Government Financing (OG 127/17, 138/20, 151/22, 114/23) provides the legal framework of the local government finance system. The basic source for the financing of local and regional government is shared taxes between the central government and the lower levels of government. Grants from the central government have increased and are also available to the local governments. Yet, the fiscal

¹⁶⁰ The World Bank Group Country Partnership Framework for the Republic of Croatia for the period FY19–FY 24.

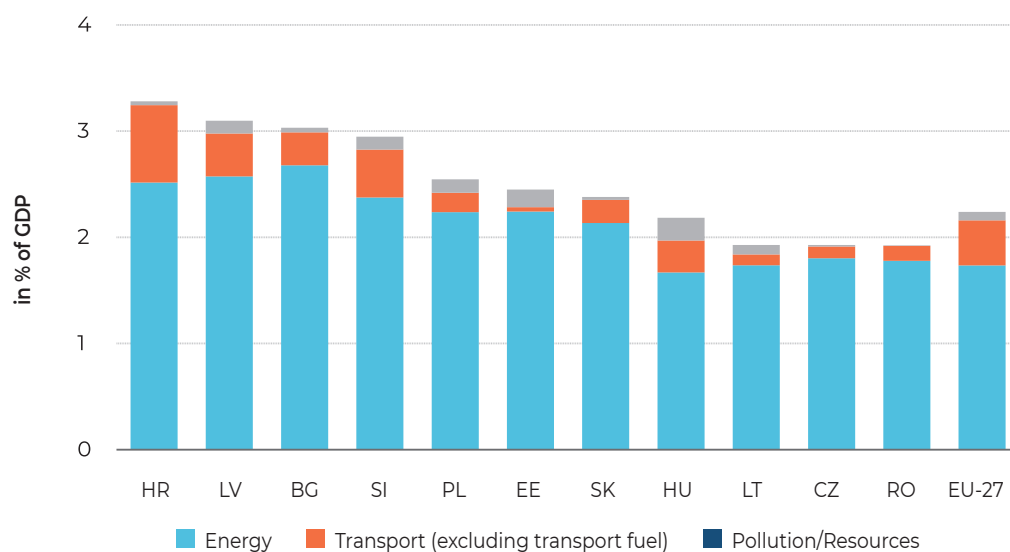
¹⁶¹ The eutrophication of Croatia's surface water resources is already leading to economic damages, with the damage to ecosystems' health estimated at €80 million per year.

autonomy of local self-government units in Croatia is relatively limited in determining the tax base and rates of tax revenue, but not non-tax revenue. There is also limited autonomy in defining the purpose of local-level expenditure. It is not uncommon to witness disparities between the statutorily delegated functions and the quality, quantity, and/or financial viability of the delivered public services.

Environmental taxes in Croatia account for a significant share of the total tax revenues and are among the highest in the EU.¹⁶² These are taxes on energy products (including CO2 taxes), transport (excluding fuel, which is covered by energy taxes), pollution, and natural resource fees. Although the overall environmental taxes, including taxes on energy use, are considered high, Croatia does not impose significant levies on pollution and CO2 emissions.

The revenues from environmental taxes represent 3.1 percent of GDP (2021)¹⁶³ (Figure 28). The energy tax revenue accounts for almost 80 percent of Croatia's environmental tax revenue. Motor fuel taxes were originally introduced for fiscal rather than environmental reasons, and account for the bulk of this revenue. In the first half of 2022, the government significantly reduced the excise duties on motor vehicles, by more than 15 percent on average, although these changes were meant to be temporary and will be reversed. The revenue-oriented environmental tax structure needs to be complemented by necessary regulatory incentive for pollution reduction for Croatia to achieve the environmental protection goals. Green fiscal reforms will play a critical role in enabling the green-blue transition, with carbon pricing through taxes, as the key policy to mitigate climate change.

Figure 28. Environmental Taxes by Sources



Source: European Commission, DG Taxation and Customs Union, based on Eurostat data.

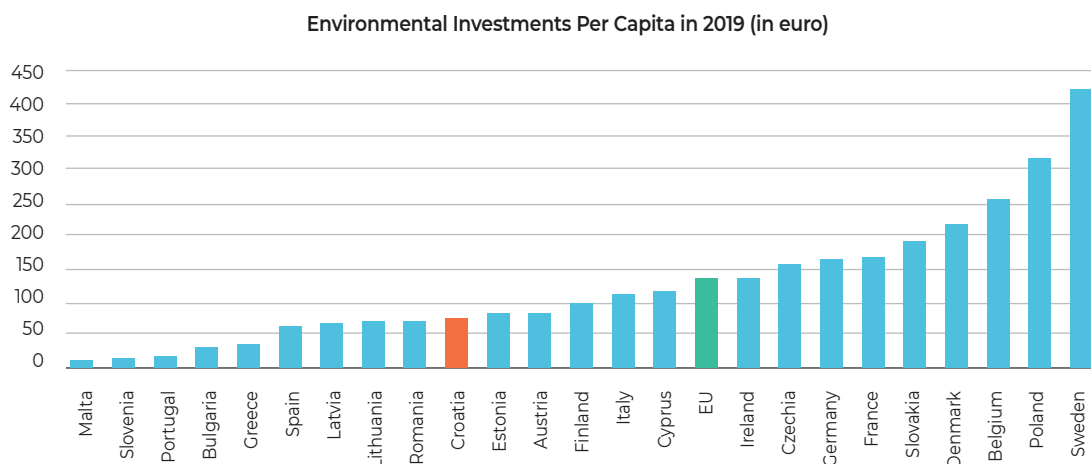
¹⁶² Ibid, p. 79.

¹⁶³ World Bank. Croatia Public Finance Review 2023.

In 2021, Croatia posted the highest ratio of GDP to total general government expenditure on environment (1.5 percent of GDP) among the EU27 countries¹⁶⁴ This is slightly higher than the Netherlands (1.4 percent of GDP), Belgium and Malta (1.3 percent of GDP each), and Greece (1.2 percent of GDP). Croatia spent 0.7 percent of GDP on 'environmental protection n.e.c.'¹⁶⁵, and 0.3 percent on 'waste management' (Figure 30). The latter is rather low considering the value of economic cost of environmental degradation—resulting in ecosystem loss, water, waste, and air pollution. Croatia

could adopt a more targeted spending approach to distinctly increase the resources for waste management and wastewater treatment to tackle the challenge. For instance, in 2021 Greece has spent on 'waste management' the highest share of GDP among all EU27 countries (0.8 percent of GDP) (Figure 29). The Netherlands spent 0.6 percent of GDP on 'waste management' and 0.4 percent of GDP on 'wastewater management'. Malta spent 0.6 percent of GDP on 'waste management' only. These numbers are closer to the 0.8 percent of GDP average across the EU member countries (Figure 29).

Figure 29. Environmental Investments Per Capita in EU



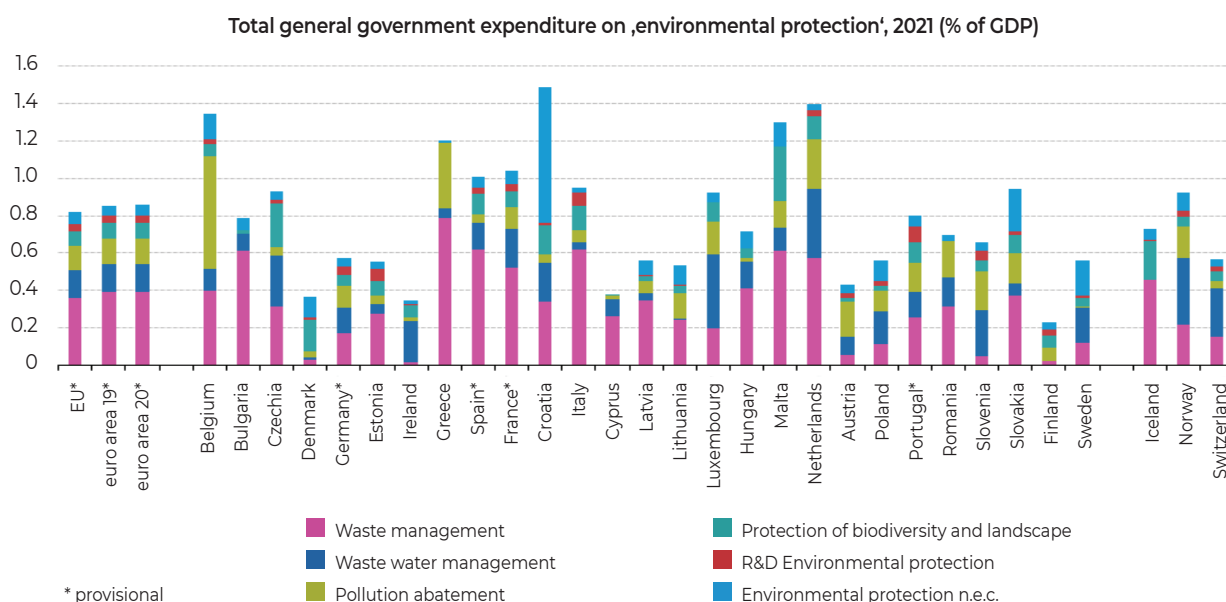
Source: Eurostat (gov_10a_exp). Data extracted in February 2023.

Croatia's environmental investment, including in the Adriatic area, are lower than the EU average. While Croatia performs better than some of its peers, the government spending on environment is contingent on the current state of the economy, including GDP per capita. Environmental investment decisions are guided by the EU principles on affordability, a limiting factor, when prioritizing environmental protection. Another limiting factor is the current demographic trend and decreasing population in the coastal areas. The possibility of introducing new taxes in the coastal areas is even more modest due to a declining taxation base of coastal counties, another crucial obstacle for implement-

ing costly environmental protection policies. There is an ongoing discussion on fiscal decentralization and on the opportunities to introduce new taxes and charges pursuing effective allocation of existing resources, such as property taxation, including taxes on non-exploited arable land, taxes on unused business premises and apartments. These, however, may not be implementable unless real property rights are defined. The role of the public sector in protecting the environment needs to go far beyond the limited budget resources. Using public funds to leverage private investments could lead to effective implementation of environmental policies and emphasizing spending preferences.

¹⁶⁴ Total general government expenditure on environmental protection, 2021 (% of GDP) – Source: Eurostat (gov_10a_exp). Data extracted in February 2023.

¹⁶⁵ Expenditure not elsewhere classified (n.e.c.) relating to environmental protection.

Figure 30. Structure of Total General Government Expenditure on Environment by Functional Classification (2021)

Source: Eurostat. EU10 represents unweighted averages of 10 EU member states from the Central and Eastern Europe

Since 2019, public investments in Croatia have increased and the level has been maintained to support better absorption of the European Structural and Investment Funds. Public investments which are more growth-friendly compared to most other spending categories—as they raise the level of country's physical capital—have been stable at around €2.6 billion annually, but the share in GDP remained below the average for EU peers.¹⁶⁶ However, public investment in percentage of GDP has remained below the average of the peers in the CEE region.¹⁶⁷ Countries such as Estonia, the Czech Republic, and Slovenia, all at a higher level of development and with less abundant access to grant funding from the EU budget, invest more than Croatia. When it comes to the composition of investment, like other EU countries, Croatia invests heavily in the transport infrastructure as well as in school and medical facilities and equipment, while investment in environmental protection remain subdued and less targeted.

With the right set of policy action, Croatia can both increase the returns on public investment—by effectively using EU funds in the current and

upcoming EU financing period to leverage strategic private investment to create economic opportunities. Croatia's mid-term development agenda aims to implement ambitious and sophisticated reforms to boost growth, build economic resilience, and maximize the benefits of Eurozone membership. These critical reform areas also need investments in human capital and natural resource management to preserve and leverage Croatia's natural assets and sustain the growth of key economic sectors. The success of these reforms will ultimately depend on Croatia's accelerated transition to blue economy.

Marine and maritime-related investments can get support through a variety of EU funding instruments. This includes the 'Horizon Europe' program and its mission on healthy oceans, seas, coastal and inland waters, and the new LIFE program. Helping the economy to navigate through the 'green and blue' and 'digital' transitions, additional EU-powered investment avenues for specific themes can be found under the EU BlueInvest platform¹⁶⁸ and the future InvestEU program (under infrastructure and research windows). The Connecting Europe

¹⁶⁶ World Bank. Croatia Public Expenditure Review 2023.

¹⁶⁷ *ibid.*, p. 80.

¹⁶⁸ BlueInvest aims to boost innovation and investment in sustainable technologies for the blue economy, by supporting readiness and access to finance for early-stage businesses, SMEs, and scale-ups. <https://webgate.ec.europa.eu/maritimeforum/en/frontpage/1451>.

Facility II (for example, related to upgrading port infrastructure, lowering the carbon footprint and compliance with air quality legislation), the new [Innovation Fund](#) (for demonstration of innovative low-carbon technologies related to renewable energy and shipping) and various programs launched by the European Investment Bank (for example, [Green Shipping Guarantee Program](#) and [Green Shipping Program Loan](#)) provides funds for eligible investment projects.

The blue economy transition is often constrained by the lack of adequate public resources, fiscal measures, and limited private investors. There-

fore, more and innovative financial approaches will be necessary to accelerate the transition to a blue economy and transcend beyond the conventional sources of financing. Nowadays, financial markets around the world witness growing interest of investors in sustainable financing. To tap into these new opportunities Croatia's national policies need to contour a framework for sustainable blue investments where everyone involved could benefit. This could change the investment landscape of Croatia by increasing the financial capability of blue economy stakeholders and help curtail the negative impacts on the marine environment.

Box 8. Blue Finance at a Glance

What is blue finance?¹⁶⁹

While sustainable finance is defined by applying Environmental, Social and Governance (ESG) principles in financial services decision-making, blue finance is generated where the use of proceeds or sustainability-linked loans or bonds direct finance is specifically toward projects and programs that have positive impacts for the ocean economy.

- Banks, insurers, and investors all have a part to play in providing finance for a sustainable ocean economy. The [Sustainable Blue Economy Finance Principles](#)¹⁷⁰ were launched in 2018 to provide guidance on how this can be done in a way that aligns with SDG 14, Life Below Water. The principles cover 14 characteristics that signatories endorse, which include protecting the marine ecosystem, being transparent with information, and using a science-led approach. The principles also provide guidance on how to finance a sustainable ocean economy.
- The [UN Blue Bond Initiative](#) has developed *practical guidance to issuing a blue bond*¹⁷¹ that meets the UN Global Compact and Sustainable Ocean Principles, building on the principles and framework developed by the International Capital Markets Association (ICMA) for the issuance of green, social, and sustainability-linked bonds. Green, social, and sustainability-linked loans can also be applied to financing the blue economy.
- The [EU Taxonomy for Sustainable Activities](#)¹⁷² directs finance toward activities aligned with meeting the EU's climate and energy targets. The taxonomy recognizes the role of the ocean economy and encourages investment flows into ocean-related activities. In 2022, the Platform for Sustainable Finance Technical Working Group issued guidance which included specific reference to blue economy activities, including sea and coastal transport, hotels and camping grounds, fishing and processing of fish; nature-based solutions for the protection of coastal waters, including the conservation of coastal wetlands, mangrove forests, and seagrass beds as a natural barrier for coastal defense; and coastal reef conservation and restoration.

¹⁶⁹ Based on summary by Darian McBain "What is Blue Finance?" – Grantham Research Institute on climate change and the environment (lse.ac.uk).

¹⁷⁰ The Principles – United Nations Environment – Finance Initiative (unepfi.org).

¹⁷¹ Practical-Guidance-to-Issue-a-Blue-Bond.pdf (ungc-communications-assets.s3.amazonaws.com).

¹⁷² EU taxonomy for sustainable activities (europa.eu).

Demand for Private Blue Finance

Financing the investments for Croatia’s blue economy development will require a combination of targeted financing with defined use of proceeds in addition to general purpose financing.

The blue economy-related investment demand can be broken down into three categories, depending on the specificity of the targeted use of proceeds with regard to water resource. The last category of projects meets for example the EU Sustainability Taxonomy’s “sustainable use and the protection of water resources” objective¹⁷³:

Category 1	Projects that generally support economic development, but do not specifically target sustainability or water-related objectives..
Category 2	Projects that meet sustainable financing objectives as defined for example in the EU Sustainability Taxonomy, which defines objectives and a list of concrete activities that qualify as sustainable.
Category 3	Projects that specifically target the improvement of the quality and availability of water as a resource, as defined for example in SDGs 6 and 14.

To prioritize blue economy financing, it makes sense to differentiate the projects and resulting investment needs for each category, as they imply different financing instruments (discussed below) from broadly available general purpose investment financing and general sustainable financing from Croatia, which is discussed elsewhere.

The International Finance Corporation (IFC) has published Blue Finance Principles to address sustainable financing targeted at SDGs 6 and 14. IFC Blue Finance Principles¹⁷⁴ are building on the Green Bond Principles and focus on financing projects that directly contribute to SDGs 6 and 14 and improve availability and quality of water resources. These covers activities in the areas of

- Water supply and sanitation ('WSS')
- Fisheries, aquaculture, and seafood value chain
- Ocean-friendly and water-friendly products, chemicals, and plastic-related sectors
- Sustainable shipping and port logistics
- Marine ecosystem restauration
- Sustainable tourism services

- Offshore renewable energy production

Estimated investment needs into blue finance-eligible projects are estimated at €7.5 billion, of which €3.0 billion needs to be private sector funded. The main areas of specialized blue finance investment demand are water supply and sanitation, and seafood value chain investments. This does not consider investments, for example in tourism, which advance the blue economy overall but do not specifically address SDGs 6 and 14.

Croatia needs approximately €7.0 billion investments into the water supply and sanitation infrastructure to meet its obligation under the EU Water Directives, of which €2.6 billion are not yet funded by public financing. WSS projects directly aim at SDG 6 through reducing 'non-revenue' water losses in the supply system and improving the connection of users to the sanitation system. The total investment for Croatia comprises €3.4 billion for water supply and €3.6 billion for sanitation. While the Implementation Plan for Water Utility Directives calls for an implementation of ALL projects by 2028, we estimate

173 https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en
 174 <https://www.ifc.org/en/insights-reports/2022/guidelines-for-blue-finance>

that after delays 85 percent, that is, €6.0 billion of the investments will be implemented until 2030, while the remaining 15 percent can be deferred until after 2030. For these investments, €3.4 billion in funding are planned by the EU as well as co-financing by Croatian Water, the MESD, utility companies, and regional/local governments. This implies a demand for private sector funding of the balance, €2.6 billion.

Renewal of infrastructure and expansion of connections are core tasks. Currently the WSS setup is characterized by an aging infrastructure (pipes, treatment plants). Nationally, the level of public sewage service coverage was 57 percent (2018). Only 5 percent (244,000 people equivalent) of municipal wastewater discharged is sufficiently treated. To comply with the UWWTD, 4.9 million PE of wastewater load must be appropriately treated. Additionally, improvements in the treatment of technological wastewater are required. The 2028 objectives of the Implementation Plan for Water Utility Directives are (a) a reduction of non-revenue water to 20 percent, (b) an increase of connection rates to 95 percent for water supply/80 percent for sewage (98 percent in agglomerations), (c) treatment of 100 percent of wastewater in agglomerations, and (d) good water status for 100 percent of the surface water bodies.

Irrigation projects represent a specific challenge. Croatia has favorable conditions for diverse farming, but it covers less than a half of its needs and it is self-sufficient only in the production of wheat, corn, poultry, eggs, and wine. This is partially due to droughts, which occur as an extreme hydrological phenomenon in Croatia every third to fifth year and depending on the intensity and duration reduce the yields of crops. As only 2 percent (30,000 ha out of 1,500,000 ha) of agricultural land is irrigated in Croatia through irrigation systems or abstracted from wells. In the EU27, on average 18 percent of arable land is irrigated. Croatian Waters NAPNAV¹⁷⁵ action plan will enable irrigation on additional 25,000 ha of arable land in 2024–2030. All the new irrigated areas will require appropriate water-efficient equipment (included in the total investment above).

Project risk mitigation will be key. The 156 domestic utilities companies which will be at the heart of the implementation of the WSS projects are generally underfunded and lack required capacity. To successfully implement the plans, and manage the projects, careful planning, preparation, and oversight will be essential.

Croatia's seafood value chain requires investments of €0.5 billion, of which €0.27 billion is required from the private sector. Croatia's seafood value chain can be enhanced through (a) investments into small-scale fisheries (including electrification of boats), cold chains, intermediate processing facilities, traceability systems (VMS – vehicle monitoring system and REM – remote electronic monitoring), land-based seafood processing facilities and (b) aquaculture. The total investment potential for this sector is estimated at €0.5 billion, of which €0.23 billion is expected to be funded by public sources, leaving €0.27 billion in need of private sector funding.

Table 14 shows the details of the blue finance eligible private sector investment demand for Croatia. These, however, do not include public sector funding, for WSS and seafood value chain investments, as there is no specific blue finance category for public funding.



¹⁷⁵ NAPNAV – National Project of Irrigation and Land and Water Management in the Republic of Croatia.

Table 14. Blue Finance Eligible Private Sector Investments

Project description	IFC Taxonomy activity	Private Investment potential [€, millions]	Market readiness
Public water infrastructure projects focusing on water supply	A.1, A.2, A.4	1,730	Ready
Public water infrastructure projects focusing on wastewater/sanitation	B.1, B.2, B.3	1,240	Ready
Water-efficient irrigation for agriculture; investment in water-efficient irrigation equipment	A.4	221	Ready
Seafood processing; building and equipping seafood processing facility	F.5, F.6	100	Ready
Aquaculture	F.1, F.2	100	Ready
Small scale fisheries and small pelagic fisheries; green transition of boats (electrification), equipment, cold chain, medium processing and product development, labeling and branding, traceability systems, vehicle monitoring system and remote electronic monitoring	F.4, F.5	75	Ready
Wastewater treatment for food and beverage industry	B.1	31	Ready
Pesca tourism; green transition of boats (electrification) and equipment, reconstructing boats for reception of tourists, building and equipping catering facilities	H.1	20	Ready
Sewage sludge utilization; Treatment and utilization of sewage sludge	B.3	11	Ready in 3+ years
Improvement of environmental efficiency of tourist facilities	A.4	10	Ready
PET bottle recycling facilities	D.3, D.4	10	Ready
Wildlife sanctuaries; eDNA systems, aquariums, observation and recovery center	G.1	9	Ready in 3+ years
Re-use of treated wastewater for agriculture, horticulture investments into recycled water distribution network and water efficient equipment for irrigation using wastewater	B.3	4	Ready in 5+ years
Recycling yards at nautical and fishing ports; construction and equipping of a recycling yard, equipping a facility (drop-off point) for receiving sanitary wastewater from boats	E.6	1 mln	Ready

Source: IFC / Exergia opportunity mapping for Croatia.

Supply of Sustainable Financing

The Croatian funding market made some progress regarding general sustainable financing. In October 2022, Raiffeisen Bank Croatia issued the first sustainable bond, developed in alignment with International Capital Markets Association framework, and which attracted €200 million through fundraising. IFC was the anchor investor with €130 million. In July 2022, Meritus Ulaganja, a leading business process outsourcing provider, issued the first sustainability-linked bond by fundraising €40 million. In July 2023, Zagrebacki Holding issued the first municipal utility sustainability-linked bond in central and southern Europe. IFC was an anchor investor by subscribing €72.5 million in €305 million issuance.

Financial intermediaries in Croatia currently do not offer blue finance loans. No company has issued a blue finance bond. No specific blue economy financing instruments are available for investors and users. The private sector is encouraged to

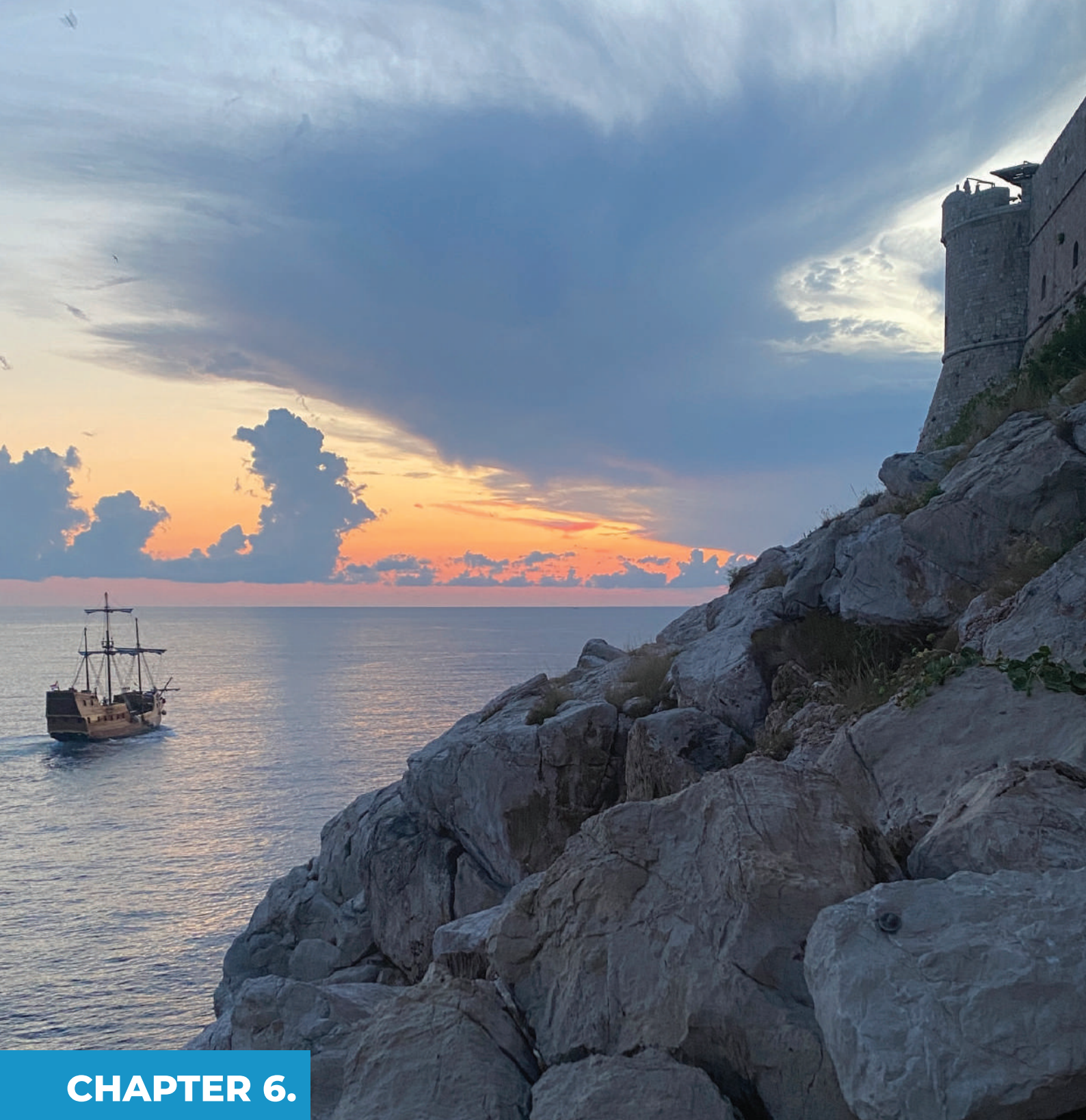
use blue finance initially in response to investor request or foreign owner implementing stricter ESG requirements to a subsidiary legal entity in Croatia. Self-starting promotion is not present and regulatory requirements (for example, through Securities and Exchange Commission or Financial Services Supervision Agency) in addition to national climate-related objectives have not directed climate change mitigation alignment.

It remains at the banks' discretion to assess whether imposing blue finance use limitations and reporting requirements is in their interest.

Sub-client perception often leads to primarily soliciting own exclusive financial advantages of blue capital in comparison to universal financing. Both supply and demand hurdles represent a financial cost without clear visibility of recovery. To achieve broader recognition, case studies and advisory services may be critical to bridge the gap in identifying climate risks and opportunities at governance, strategy, and investment levels.



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CHAPTER 6.

Toward the Blue Economy Pathway

Taking the blue economy path determined by integration and sustainability will open new development frontiers for Croatia. Blue economy offers a viable, indeed the only viable, maritime development path forward by providing an opportunity to combine environmental stewardship with economic growth by tapping into maritime-based industries that are projected to significantly outpace global economic growth. By strategically investing in and planning for a blue economy, Croatia can leverage its geographical advantages to achieve improved socioeconomic outcomes and sustainable development. The sooner Croatia identifies the national and regional opportunities for sustainable growth in the existing and emerging blue economy sectors, aligned with the shifting market trends, Croatia can take full advantage of these opportunities to chart a sustainable economic development in Adriatic Croatia.

Currently, Croatia's maritime economy is unsustainable and is already stretched (for example, over-tourism causing pressure on natural resources). Climate change will only compound these pressures. Most of these impacts will be concentrated on the coast. In-depth analysis and mapping of blue economy resources, impacts, risks, and status change as a result of the economic activities could contribute to Croatia's ongoing effort toward reducing the uncertainties for industry, government, and local communities. It may help fill the gap in relation to a lack of understanding of the full impacts of continuing business-as-usual activities. A few possible takeaways which Croatia could use to address the challenges and strengthen the transition of blue economy sectors follow below.

Policy Development, Planning, and Institutional Framework

Croatia has taken steps to strengthen the sectoral policies through transposition of EU legislation. This includes, among others, policies and legislation on environmental protection and water quality, transport and connectivity; waste management; energy efficiency; fisheries and adoption of sectoral strategies and plans. Nonetheless, for the transition to blue governance, Croatia needs alignment of issues relating to institutional power and

responsibility as well as effectively coordinated arrangements in policy and decision-making among sectors and in addressing institutions' capacity lag.

Croatia needs a National Blue Economy Vision and a Strategy, accompanied by a Roadmap to accelerate the sustainable transition of blue economy sectors. This will bridge the gaps that many strategic documents lack, such as the estimation of investment and potential funding sources and operational costs. On one hand, the BE strategy would facilitate a holistic approach and consolidation of the governance structures under a strong national leadership; on the other hand, the roadmap will identify common priorities and actions to be implemented in the coming years in an integrated, consistent, and comprehensive manner with a multi-sectoral approach and via continuous engagement of all stakeholders. Annex 4 provides an outline of the governance framework that could inform the preparation of the roadmap.

The review of sustainability threats in the existing blue economy sectors raises concerns about the increasing pressures and degradation of coastal and marine ecosystems. These can hamper Croatia's future development opportunities. Like in many other countries, marine uses, related activities, and resources are traditionally managed on a sectoral basis involving independent entities pertaining to different jurisdictions. The efforts to mitigate these risks will need to contend with the fragmented policy and legislative environment, which may not be sufficiently fit-for-purpose. While there are good examples of using blue economy tools such as MSP in several locations in Adriatic Croatia, there is limited knowledge of how marine uses, activities, and resources are managed by multiple marine sectors and jurisdictions and associated governance challenges. A wider adoption of good practices and tools used to identify sector priorities and contextualize their interlinkages will allow more efficient policy integration of strategic, regulatory, and institutional frameworks and goals.

Despite the progress in expanding spatial plans of Adriatic countries, their sustainability and MSP discourses have largely remained apart. The existing spatial planning regulations can serve as a framework for integrated spatial governance

of the coastal area, islands, and maritime space. However, specific aspects of the MSP and ecosystem approach need to be considered to address current challenges. Reducing the conflicting policy objectives of maritime sectors could help address a broader and systemic public sector issue. In line with EU objectives for just transition the social objectives of marine spatial plans could emphasize equitable access to resources and multidimensional sustainability aligned with national development goals. This includes a commitment to explore and incentivize cross-sectoral and co-located activities, including those pertaining to future sea-based renewable energy and aquaculture.

Insufficient intersectoral coordination can hamper the path toward sustainable blue economy.

In addition, a central coordinating institution governing the blue economy agenda could facilitate a resolution of potential conflicts between the responsibilities at national, regional, and/or local authorities (for example, in the case of management of maritime domain). Another practical approach will be to formalize the leading role of a ministry to act as a coordination body. As the sustainable blue economy strives to strike a balance between the environmental protection and economic activities, the MESD could be an obvious choice to take the lead in setting the new approach toward a sustainable blue economy. Two new framework laws have been passed in the Parliament that are considered crucial for setting the path for a sustainable blue economy. These are the **Law on Maritime Domain and Seaports** (adopted and entered into force on July 23, 2023) and the **Law on Sustainable Tourism** (pending adoption), both providing the new institutional setup for management of the coastal areas by giving more power to local self-government units. Thus, it is necessary to establish an effective system of cooperation and coordination at the management and professional-administrative levels, both nationally and regionally. Coordination in the development of regulatory, strategic, and planning documents relevant to the management and protection of maritime and coastal areas at the national and county levels needs to be strengthened. This may include capacity building and public administration training, improvement of data management, and monitoring of environmental conditions in the coastal area.

Protection of Marine and Coastal Resources

The insights from the institutional review suggest that Croatia needs to increase the capacity and agency collaboration for protection of marine ecosystems. Integration of blue governance structures and clear departmental responsibilities in the transition to sustainable blue economy will incentivize change-behavior formats promoting individual, corporate, and societal responsibility for protection of blue natural capital. This includes the government agencies with mandates to enforce various regulations for environmental protection and for delivering municipal services such as waste management and wastewater treatment. Addressing marine litter pollution and waste management gaps in the coastal and marine areas could prevent degradation of valuable landscapes and sustain the quality of bathing waters in compliance with WFD and MSFD implementation to achieve GES.

The missing link to sustainable use of coastal and marine ecosystems could be addressed by the stronger involvement of Croatia's scientific and research community. Scientific information and interpretation of sectors' user conflicts, pressure factors, shortfalls, and exclusions could stimulate synergetic solutions to reconcile and mitigate governance obstacles. The establishment of blue economy structures including a blue economy department and a research institute could provide the basic 'implementation architecture' necessary to support the government's blue economy agenda in a holistic manner. Precisely, the sustainable blue economy recognizes and taps into diverse knowledge systems to increase evidence-based decision-making and fully understand the adverse impacts and trade-offs of persistent user conflicts.

Inclusion and Stakeholder Participation in Transitioning to Blue Economy

Transition to blue economy is not just for and about government actions, it also involves business sector, civil society, academia, communities, and individuals. Redefining the roles of all communities in the coastal area and islands to ad-



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dress their concerns must be brought at the forefront to address the increasing demands for land resources and growing urbanization, marine pollution, and current and future climate change risks. Developing a comprehensive profile of stakeholder interests and contacts at the earliest will be essential to identify a wider pool of stakeholders. On one hand, these are the stakeholders to be considered in the MSP process. On the other hand, ensuring appropriate representation from different sectors and involving them early in management decisions will advise businesses on the economic and financial planning opportunities and local benefits.

The blue economy provides an enabling environment for integration of economic plans which considers the respective strengths of each sector, pressures on resources, and demographic issues.

The blue economy governance has the potential to enable effective integration of economic, social, and environmental dimensions of sustainability in cross-sectoral policy and planning coherence. The challenges which were identified range from high dependency of the maritime economy on a small number of economic activities (coastal and maritime tourism), to a lack of sufficient resources to sustain the industry development (fish food processing). These challenges could be addressed by commitment to a strategic resource oversight,

removing barriers to diversification, effective coordination across the three tiers of government, a formal collaborative mechanism in place across maritime sector agencies, including those responsible for allocation of public resources and for improving the investment environment.

Croatia needs to accelerate the local uptake of blue economy opportunities. The lack of clear avenues for stakeholder participation and for communicating the concept of blue economy and sustainability across the government and blue economy stakeholders was identified as a challenge. This would require a change in the local mindsets as well as skills and capacity to boost the uptake of blue economy opportunities.

Mobilizing Blue Finance

Croatia has built partnerships with international organizations that can be employed to secure access to finance for blue economy transition, expertise and local capacity, policy advice, and R&D collaborations. Starting with the adoption of a comprehensive Blue Economy Strategy and a Roadmap for implementation anchored on the national strategic development goals could attract the attention of strategic investors.

Prioritizing financing for sustainable blue economy in the coastal and island communities under a national BE strategy and 'green' the 'blue' investments in key sectors could promote business development and innovation, generate benefits to coastal and island communities, and safeguard the natural capital. A priority pipeline of such projects could be integrated in the Blue Economy Roadmap and complemented by an investment plan to take maximum benefits of the EU funds.

Increased public investments in R&D and innovation could help leverage private capital and mobilize external resources in support of growth of small and medium businesses in the blue economy. Prioritizing public support for innovative activities such as sustainable food and biomass production offshore as well as renewable energy in a way that preserves ecosystems could strengthen the sustainability profile of Croatia's maritime economy.

Local and regional authorities in the coastal counties could play a greater role in the definition of investment priorities and use of Integrated Territorial Investment and community-led local development tools.¹⁷⁶ Their involvement will offer multiple avenues for targeted and integrated solutions of territorial challenges especially in non-urban areas of the Adriatic coast related to the blue economy. The definition and implementation of 'joined-up' growth strategies among the NUTS2 coastal counties¹⁷⁷ and beyond could help improve the economic planning and implementation capacity of respective administrations and address their development needs and potential. In addition, such a bottom-up approach will facilitate access to sustainable financing of coastal counties and of EU-SAIR countries for sharing of the economic benefits from transitioning to blue economy.

Pathways of Croatia's Maritime Economy

Croatia's has a vibrant coastal economy which is still far from being sustainable. Continuing the past development trends could undermine the val-

ue of natural capital and the quality of life of the local people. To address the up-front questions posed in this Report, a set of complex socioeconomic challenges and ecological issues were reviewed, visualized, and discussed as a platform to present the business-as-usual course and two development pathways indicating different levels of ambition and time horizons in support of Croatia's transition to a sustainable maritime economy (Table 15):

- **Business-as-usual (BAU)** course is a continuum of current trajectories based on economic growth and sector conflicts for space and marine resources. It could potentially deepen the challenges and augment the negative impacts. The main environmental threats include pollution, inadequate management of waste, marine litter and plastic pollution, overfishing, and growing construction. Future growth prospects under BAU could be at an increasing risk due to fragmented economic planning and development and unregulated resource exploitation.
- **Toward Environmental Sustainability path** is an interim track with a horizon of about five years that reflects a higher degree of sustainability achievements while complying with EU environmental protection objectives including certain aspects of WFD and MSFD. This is a path that would allow for addressing the cumulative effects on marine resources from overuse, pollution, and a lack of adequate enforcement of regulations. However, concentrating solely on environmental protection could be socioeconomically challenging (for example, social affordability of new investment, impacts on local economy, innovations, competitiveness) without leveraging concessional financing and targeted support to low-income consumers. Nonetheless, the environmentally sustainable path could serve as a stepping-stone for transitioning to blue economy.
- **The Blue Economy path** has a longer-term implementation horizon; demonstrates a shift toward a holistic, integrated approach that replaces the previous individual sectoral focus; has the governance policies in place for resolv-

¹⁷⁶ Territorial agenda 2030 promotes place-based approaches and integrated territorial development in Europe, and cohesion policy is the EU's main policy tool to achieve this. <https://urban.jrc.ec.europa.eu/urbanstrategies/>.

¹⁷⁷ The current NUTS 2021 classification of territorial units for statistics in EU is valid from January 1, 2021 and lists 92 regions at NUTS1, 242 regions at NUTS2, and 1,166 regions at NUTS3 level; <https://ec.europa.eu/eurostat/documents/345175/629341/NUTS2021.xlsx>.

ing resource conflicts and tapping in new development opportunities. It is the one that makes it easier to remove critical barriers such as lack of infrastructure, climate change impacts, and unsustainable tourist density to enable other maritime sectors to grow. It employs blue sec-

tor governance to cultivate a greater sense of responsibility and accountability on the development outcomes and use of common maritime resources. It is the framework for incentivizing and leveraging more financial resources for sustainable blue economy sectors.

Table 15. Croatia's Maritime Economy: Development Pathways

Path	Description	Major change or trends
1. Business-as-usual	<p>Current development patterns represent the baseline conditions: national policies are harmonized with EU acquis marred by lagging implementation and lack of capacity and resources, fragmented institutional responsibilities, and coordination; ineffective pollution control and water quality regulation</p> <p>Silo-sector policies due to lack of effective coordination on sector development goals and lack of an integration mechanism</p> <p>MSP exists in a fragmented manner</p> <p>There is poor monitoring or evidence of solid waste related to tourism</p> <p>Air pollution from large cruise ships in the Adriatic Croatia is not properly monitored</p> <p>Adaptation to climate change partially implemented in coastal areas</p>	<p>Built-up areas in the coastal counties expand and the number of uninhabited housing units drastically increase</p> <ul style="list-style-type: none"> ■ In 2030, 1,562 km of coastline could be urbanized (24.8% of entire coastline) ■ In 2012–2030, the share of the coastline that could be urbanized would exceed all previous periods together ■ In 2031, there would be around two dwellings per household; or 50% of dwellings would be empty <p>Environmental quality in urban areas worsens and ecosystem losses increase</p> <ul style="list-style-type: none"> ■ Wastewater from nautical tourism boats will increase as toilets are flushed with seawater, increasing the pressure from higher effluent volumes. ■ Projected emissions of PM2.5 particles from cruise ships in the Split city port alone in 2022–2030 will amount to 515,81 tons causing a total of about 100 years of life lost (YLL), or environmental costs equivalent of €3,294,978 (Kanaet, 2022). <p>During peak season, tourist intensity rate increases. By 2035, the number of tourists and residents would be equal in peak seasons in Adriatic Croatia (if the present demographic trends continue, the ratio will even worsen)</p> <ul style="list-style-type: none"> ■ If the number of commercial beds is fixed at the level of 2022 numbers, occupancy rate will reach 99% in 2051. <p>Competition over marine and coastal resources increase</p> <ul style="list-style-type: none"> ■ Land-take for new housing will cause an annual loss of agricultural production (wine and olive oil only) of at least €2 million ■ Nautical tourism will rise and so will the occupancy of land and sea (occupancy rate is already over 70%)

2. Toward Environmental Sustainability

(Development based on corrective policy drivers for addressing interrelated economic and environmental issues)

Harmonization with EU environmental acquis for protection of resources completed

Developing and adopting an integrated blue economy policy and ensuring harmonization with EU blue economy directives

National BE Strategy and a roadmap adopted

MSP improved and covered the whole coastal area

Environmental monitoring improved

Positive trends in achieving GES on major descriptors.

Increased conservation efforts in MPA

Major urban agglomerations with plans for wastewater treatment plants

Beach water quality along the entire coast meeting 'blue flag standards' and EU bathing water quality norms

Adaptation measures to climate change picking up

Built-up areas continue expansion outside protected areas

Enforcement of environmental regulations improved but pressures and impacts remain an issue

Less marine pollution, including from untreated wastewater and from nautical and cruise tourism

Positive development trend in provision of environmental services in major tourist locations

Coastal defense infrastructure built to protect from climate hazards

Adverse demographic trends continue

Questionable affordability of new investments for local population (rise in living costs versus income rate)

Additional operational and maintenance costs for the coastal economy

3. The Blue Economy Path

(Transition toward a sustainable blue economy where environmental protection and economic activities go hand in hand)

A strategy for BE and roadmap implemented and regularly updated

MSP for the entire coastline completed and adopted

Ecosystem management approach adopted

Effective coordination and integration of blue economic sector goals

Interinstitutional mechanisms for coordination of BE sectors effective

BE policies informed by R&D

Enabling the development of innovative applications and services in new and emerging areas

Social and equity issues in the marine economy addressed to the extent possible.

Traffic connectivity along Adriatic Croatia, based on carbon-free solutions

A framework for BE financing adopted

Green fiscal reforms and budget climate tagging effective

Urbanization expansion subdued.

Built-up area relative to BAU decreased/sustained.

Resource competition subdued.

New blue economy sector projects under implementation

Environmental pressures controlled and checked.

Wastewater treatment and waste management improved and according to new EU directives.

Wider use of new energy renewable sources as well as transmission and distribution

EU funding opportunities realized and under implementation.

Stakeholders' inclusion attained.

Raised quality of living in urbanized coastal space and adjacent rural areas

Increased coastal economy resilience.

In the years to come, the blue economy in Adriatic Croatia will be shaped by the state of coastal and marine resources, human activities, and governance framework. The impacts from climate change, pollution and urbanization would linger and play a role. Extensive urbanization, and land-take, will lead not only to a loss of ecosystem services and value but may also hamper economic growth and quality of life. Current demographic figures are alarming. The population, especially of working age, is decreasing and emigrating; the elderly population is growing. At the same time, the number of foreign workers (generally with low education level) is increasing. Technological progress, innovations, new technology and products are slowly picking up due to a lack of readiness or willingness to embrace change and to adopt new cultures.

Integrated governance of maritime sectors can connect different scales of actions, mitigate conflicts, and open opportunities in the established blue economy sectors. Croatia can take full advantage of those to maximize the net benefits for coastal communities by focusing on industries that depend upon and can coexist with and benefit from healthier marine ecosystems of the Adriatic Sea. Establishing long-term, sustainable fisheries and aquaculture will be beneficial to both the environment, local economy, and country traditions. Aquaculture, or marine fish/shell farming, could increasingly play a greater role in food security, sustainability, product quality, and local sourcing in the tourism value chains. Ongoing construction of vacation properties and real estate boom consumes plenty of resources and may not offer viable economic propositions in future. Losing pristine coastal resources and overurbanization could cause recreation values to be lost and affect the incomes of local communities from tourism. While in the short-term marine and coastal recreation activities remain focused on beach going and recreational boating and fishing, other niches linking beach tourism to hinterland tourism offerings can contribute to local economic growth with relatively little environmental impact.

Undoubtedly, tourism will remain an important economic activity in Adriatic Croatia. Croatia is already picking up models for sustainable tourism that could open more growth opportunities.

Aiming for sustainable models that have multiplier effects on the local economy could shift the tourism sector on a sustainable path. However, tourism need not remain a dominant economic activity. Under almost all climate scenarios for Europe, it is projected that climate change will cause, sometimes, a dramatic drop of tourism arrivals in southern European countries (more than 7 percent in Greece and more than 8 percent in Cyprus). Contrary to that, Croatian coastal tourism could exhibit a modest rise until 2100 (between 0.05 percent and 1.08 percent). Whichever of these scenarios will materialize for Croatia, the decision-makers need to undertake necessary measures to address current challenges, which were discussed. The climate change impacts could prolong the tourist season and shift tourism from sea-sun-and-sand to other attractions because of high temperatures and potential health hazards. While the structure of the future blue economy of Croatia is hard to predict in the absence of an official stance on the issue, developing a strategic vision and a roadmap could chart new avenues for Adriatic Croatia. In the meantime, while markets continue to rule, and investment directions continue to be shaped by EU policies, the imperative of embracing sustainability goals for the coastal and marine economy of Croatia will prevail.

The World Bank Group aims to help Croatia to mainstream the blue economy approach and shift from single investments in individual maritime sectors to more systematic, integrated, holistic management of seascape resources. By identifying constraints, opportunities, and trade-offs between sectors at every phase of policy planning, investment-project design, and implementation, further WBG engagement could spur public resources for sustainable private sector growth (de-risking growth) and incentivize private investment, all underpinned by key cross-cutting sustainability considerations. Such a proposition is opportune as it may span between advisory assistance for the development of BE strategy and action plan, accompanied by analytical work assessing risks and opportunities for BE, support for building partnerships and enhancing stakeholder collaboration, as well as providing innovative or traditional financing for BE sectors' development, building on sectorial synergies and interactions.

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Annex 1: Notes on Terms and Definitions Used in The Report

The below definitions of the terms used in the Croatia Blue Economy report are not representative, or indicative of, official definitions provided by, or endorsed by, the World Bank. The definitions serve the sole purpose of informing the reader of the report, and do not reflect definitions or any other work conducted by the World Bank beyond this report.

Term	Definition	Source
Maritime Economy	Maritime economy encompasses the sum of all economic activities based on maritime assets, goods, and services. The term does not separate between sectors or geography, nor does it consider climate, environmental, or socioeconomic sustainability, with oil and gas falling under this definition.	Report Team
Coastal Economy	Coastal economy addresses the same activities as maritime economy, however, it is specifically oriented around maritime activities occurring in and around coastal areas. This term does not consider any dimension of the sustainability of activities but aims to capture the geography of the maritime activities.	Report Team
Blue Economy	Blue economy incorporates sustainability considerations into the concept of maritime economy, including only the maritime-based economic activities that align with the Paris Climate Accord and combine environmental stewardship with socioeconomically sustainable growth, without regard for where the activities occur. In contrast to maritime economy, this term usually excludes oil and gas.	Report Team
Adriatic Croatia	Adriatic Croatia is one of the four NUTS2 (Nomenclature of Territorial Units for Statistics) non-administrative regions of Croatia since 2021. The region forms the coastal part of the country.	Report Team
Natural Capital	Natural capital is another term for the stock of renewable and nonrenewable resources (for example, plants, animals, air, water, soils, minerals) that combine to yield a flow of benefits to people.	UN: https://seea.un.org/content/natural-capital-and-ecosystem-services-faq
Maritime Assets/Capital	A subsection of the term 'Natural Capital', describing the natural capital stemming from seas, oceans, and water, including ecosystems, species, freshwater, land, minerals, as well as natural processes and functions relating to maritime assets.	Report Team

Good Environmental Status (GES)	<p>In 2008, the EU adopted the MSFD to maintain clean, healthy, productive, and resilient marine ecosystems while securing a more sustainable use of marine resources. The directive requires member states to develop national marine strategies to achieve, or maintain where it exists, 'good environmental status'. Such status should have been achieved by 2020. The marine strategies comprise regular assessments of the marine environment, setting objectives and targets, establishing monitoring programs, and putting in place measures to improve the state of marine waters.</p> <p>The measures should also include spatial protection measures, such as a coherent and representative network of marine protected areas. All these actions must be done in close coordination with neighboring countries at the regional sea level. Annex III of the Directive, detailing lists of characteristics, pressures, and impacts that member states need to consider in their marine strategies, was revised in 2017.</p>	EC: https://environment.ec.europa.eu/topics/marine-environment_en#:~:text=The%20Directive%20defines%20Good%20Environmental,clean%2C%20healthy%20and%20productive%E2%80%9D .
Ecosystem Approach	The ecosystem approach is a strategy for the integrated management of land, water, and living resources that promotes conservation and sustainable use in an equitable way. The ecosystem approach is based on the application of appropriate scientific methodologies focused on levels of biological organization, which encompass the essential structure, processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of many ecosystems.	CBD: https://cbd.int/kb/record/decision/7748?Event=COP-07
Public Good	Public goods are those that are available to all ('nonexcludable') and that can be enjoyed over and over again by anyone without diminishing the benefits they deliver to others ('nonrival'). The scope of public goods can be local, national, or global.	IMF: https://www.imf.org/en/Publications/fandd/issues/2021/12/Global-Public-Goods-Chin-basics
Marine resources	Marine resources are the living and nonliving elements that can be found in the seas and oceans and have an intrinsic economic value that may be exploited for human beings. SGD 14 'Life below water' is about conserving and sustainably using oceans, seas, and marine resources.	Report Team
Marine Spatial Planning (MSP)	UNESCO-IOC defines MSP as "a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that have been specified through a political process" (Ehler and Douvere 2009).	Used by the World Bank: https://documents.worldbank.org/en/publication/documents-reports/document-detail/099813206062230702/idu0afe34d-600494f04ee009e8c0edf-0292c1a96

Nature-Based Solutions (NBS)	NBS are actions to protect, sustainably manage, or restore natural ecosystems, that address societal challenges such as climate change, human health, food and water security, and disaster risk reduction effectively and adaptively, simultaneously providing human well-being and biodiversity benefits.	World Bank: https://www.worldbank.org/en/news/feature/2022/05/19/what-you-need-to-know-about-nature-based-solutions-to-climate-change
Integrated Coastal Zone Management (ICZM)	ICZM is a dynamic, multidisciplinary, and iterative process to promote sustainable management of coastal zones. It covers the full cycle of information collection, planning (in its broadest sense), decision-making, management, and monitoring of implementation. ICZM uses the informed participation and cooperation of all stakeholders to assess the societal goals in a given coastal area, and to take actions toward meeting these objectives. ICZM seeks, over the long term, to balance environmental, economic, social, cultural, and recreational objectives, all within the limits set by natural dynamics. 'Integrated' in ICZM refers to the integration of objectives and also to the integration of the many instruments needed to meet these objectives. It means integration of all relevant policy areas, sectors, and levels of administration. It means integration of the terrestrial and marine components of the target territory, in both time and space.	European Environmental Agency https://www.eea.europa.eu/help/glossary/eea-glossary/integrated-coastal-zone-management
Inclusive Growth	Inclusive growth is about raising the pace of growth and enlarging the size of the economy, while leveling the playing field for investment and increasing productive employment opportunities. It focuses on ex ante analysis of sources of and constraints to sustained high growth, and not only of one group, that is, the poor.	IMF: https://www.elibrary.imf.org/display/book/9781616353797/ch008.xml#:~:text=diversification%20and%20competition%20is%20about%20raising%20the%20pace%20of%20growth%20and%20enlarging,%3B%20that%20is%2C%20the%20poor.
Blue Energy	Blue energy, also known as ocean energy, refers to a diverse range of renewable energy technologies that harness the power of the oceans, seas, or any other maritime assets. This form of energy capitalizes on various aspects of the marine environment. For instance, wave energy exploits the physical properties of ocean waves, while tidal stream energy harnesses the kinetic energy of water flowing through channels.	Report Team
Blue Economy Development Framework (BEDF)	BEDF is a set of analytical tools and technical assistance to help countries define a roadmap to a diversified and sustainable maritime economy, while building resilience to climate change. The core components of the BEDF are (i) data, analysis, and dissemination; (ii) policy, institutional, and fiscal reforms; and (iii) fostering investment.	World Bank/EU: https://thedocs.worldbank.org/en/doc/e5c1bd-b0384e732de3cef6f-d2eac41e5-0320072021/original/BH023-BlueEconomy-FINAL-ENGLISH.pdf

Blue Governance	'Blue governance' is defined as the formal and informal processes of collective decision-making, planning, deliberating, and capacity building by government and civil society and market actors connected to marine and coastal environment.	Report Team (from report, Para 184)
Blue Growth	Relates to the governance of marine resources as a holistic management of complex marine and socio-ecological systems. Blue growth is an extension of the land-based policy strategy referred to as green growth, which the EU introduced in 2010. Blue growth relies on the integrated management of multiple economic sectors to optimally utilize maritime natural resources.	EUR-Lex – 52012DC0494 – EN (europa.eu); http://www.oecd.org/greengrowth/
Blue Finance	While sustainable finance is defined by applying Environmental, Social and Governance (ESG) principles in financial services decision-making, blue finance is generated where the use of proceeds or sustainability-linked loans or bonds direct finance specifically toward projects and programs that have positive impacts for the ocean economy.	Report Team (from Box 7).
Environmental Externalities	Environmental externalities refer to the economic concept of uncompensated environmental effects of production and consumption that affect consumer utility and enterprise cost outside the market mechanism. As a consequence of negative externalities, private costs of production tend to be lower than its 'social' cost. It is the aim of the 'polluter/user-pays' principle to prompt households and enterprises to internalize externalities in their plans and budgets.	UN, based on OECD: https://archive.unescwa.org/sd-glossary/environmental-externalities
EU Taxonomy	A cornerstone of the EU sustainable financing framework presenting an action plan on financing sustainable growth and a classification system which establishes a list of economic activities that can be considered environmentally sustainable. The Taxonomy Regulation entered into force on July 12, 2020. It establishes the basis for the EU taxonomy by setting out four overarching conditions that an economic activity has to meet to qualify as environmentally sustainable.	Pursuant to: EU taxonomy for sustainable activities (europa.eu)

Annex 2: Notes on the Approach and Data Used in the Analysis

The aim of the Report was to provide an overview of the present state and possible future pathways toward the development of blue economy in Croatia. Taking into account the already defined BE sectors as well as data and resource availability, the analysis was conducted in two main phases and at two levels.

First, an overview of the economic trends in Adriatic Croatia was provided, using official open data from different sources (both national and international), aiming to set up the context of the future development of BE sectors.

Second, the established BE sectors were analyzed, relying on available national data (sectoral statistics and documentation) on the one hand, and the focus group discussions (FGDs) on the other hand. FGDs were held for each of the established BE sectors, aiming to find out more details on sectoral challenges and opportunities, as well as their experiences regarding BE prospects, including the BE Governance Framework in Croatia. FGD was also held with the representatives of all relevant institutions to discuss the results and possible steps on the pathways to BE.

The data analysis is undertaken at two levels – an aggregate overview of the coastal economy and blue economy sectors.

The first level refers to the coastal economy, more precisely to the economy of Adriatic Croatia. Trends in volumes, shares in GVA and GDP by counties and economic sectors are presented for 2000–2020. These data are gathered from the National Bureau of Statistics.

It is important to note that data are available only for the first level of NACE aggregation, so they do not represent the level of aggregation necessary for the analysis of the individual BE sectors (for example, one of the group of sectors according to the first level of the NACE aggregation encompasses agriculture, fishery and aquaculture, and forestry, but there was no data available for fishery and aquaculture per se).

As it refers to the economic data, for instance, data on GDP/GVA, this is based on data related to the companies registered in Adriatic Croatia. Nevertheless, there are companies that operate in Adriatic

Croatia, but have their headquarters registered elsewhere in Croatia; their figures are not in the numbers presented, hence a part of the economic activities in Adriatic Croatia are missing (for example, INA, oil and gas company, is registered in Zagreb and its results and economic results are included in Zagreb County statistical accounts, regardless of where the company operations actually take place).

The background analysis aims to present the trends in maritime sectors applying the longest possible time series. However, depending on the available sources, the charts in the figures may differ in the starting years.

The second level of analysis covers the BE sectors. The sectors were already predefined by EU and other national documents. One could argue whether some other sectors, fast growing and/or contributing significantly to the coastal/national economy, using/influencing marine resources, should be considered as BE sectors as well.

Data used when analyzing these sectors were retrieved from national statistics (where possible) as well as national strategic (sectoral) documents.

However, for reviewing the trends and contributions of specific BE sectors, and especially in relation to EU countries, data from the BE reports were used. These data are calculated according to specific methodology applied to all EU countries¹⁷⁸. Thus, these data are not comparable to data retrieved from the national strategic documents/statistical sources.

There are also observations regarding the data used in the EU BE Report. First, some data inconsistencies stem from using different sources, for instance on the employment numbers. Second, there are data that refer to the aggregated activities and not solely related to the coastal areas (for example, including inland water transport).

Therefore, numbers and figures used in the current analysis encompass more activities than those in the EU Report on Blue Economy. Yet, the team is grateful for the opportunity to access data from the EU Blue report, specifically the dataset on Croatia's blue economy.

178 IEU Blue Economy Report 2022, Annex 3.

Annex 3: Economic Profiles of Adriatic Counties of Croatia

The following paragraphs provide a quick glance of the economic profiles of the counties on the Adriatic coast of Croatia:

Istria is the most developed county on the Adriatic coast, second only to the City of Zagreb. It boasts a diversified economy. Even though Istria has the most developed tourist sector and it accounts for one-third of the total national tourism income, tourism is only third in the economic structure of Istria, following the processing industry, trade, and the services sectors. The industry is based on manufacturing of building material (lime, cement, bricks, stone), tobacco products, electrical machines and devices, automotive components, and glass, as well as on the processing of metal, plastics, wood, and so on. The IT industry is surging, led by the world-famous company Infobip and smaller companies with a promising future. Investments in the agriculture sector have been growing, supporting top-quality agriculture produce. Istria boasts wine and food brands. The Istrian olive oils, wines, and organic products are renowned for their best quality. As an established tourist destination Istria's wholesale and retail trade, transportation, storage, accommodation, and food services have dominated the economic structure of Istria, followed by manufacturing, mining, and quarrying, indicating that the real sector (production) has been prioritized. Public administration and defense, education, human health, and social work activities are keeping a stable share, while real estate services and construction sectors are on the rise. Agriculture, fishery and forestry retain the slower share of the country's economy.

Primorje-Gorski kotar County is at the junction of central Europe and the Adriatic-Mediterranean routes. The county has the second highest GDP and GVA in Adriatic Croatia and along with Istria leads in GDP per capita indicator. The City of Rijeka, the county's administrative center, is the largest port in Croatia and an important port in Europe and the Mediterranean. The Primorje-Gorski kotar County and the City of Rijeka boast ancient culture, rich history, and modern economy, fueled by industrial manufac-

turing, ship construction, production of petroleum, petrochemical, pharmaceutical and other products, wood processing industry, tourism and services sector, R&D, and new technologies, in cooperation with the academic community. Recently, tourism, trade, and transport are taking over.

Lika-Senj County boasts rich natural environment, forests, and water reserves. The county has great hydropower potential and rich agricultural land, significant potential for aquaculture development and tourism since 58 percent of the national parks in the Republic of Croatia are in the Lika-Senj County. The main economic activities in Lika-Senj County include wood industry, food processing, logistics, and renewables power generation. Public administration and defense, education, health and social protection activities have the highest share of GVA in the county with wholesale and retail trade, transportation, storage, accommodation, and food services following suit. Tourism is on rise, both in the continental and coastal parts. The GVA share of agriculture, fishery, and forestry is 13 percent, which is a relatively important contribution. The position of the quarrying and mining sectors is similar, and to a lesser extent manufacturing. Construction has recorded a modest rise.

Zadar County has a scenic coastline with numerous islets, clear sea, and beautiful and diverse flora and fauna. The Paklenica National Park, three Parks of Nature (Telašćica, Velebit, and Vrana Lake) and protected natural sites with rich cultural and historical heritage, support tourism, as the mainstay of the economy of Zadar County. The county has significant potential for nautical tourism. Tourism, food-processing industry, fishing, mariculture, and seafaring are key economic activities making important contribution to exports and the development of Zadar County. More than 50 percent of the total fish catch on the Croatian side of the Adriatic is caught and landed in Zadar County. Three out of a total of the four tuna farms registered in the Republic of Croatia are in this county. In addition to blue fish, Zadar County is also a leader in the culti-

vation of white fish, especially sea bream and sea bass. Fish processing has a centuries-old tradition in Zadar County. The fertile land of Ravni Kotari, Zadar County supports agriculture with special emphasis on ecological production. Quality wines and olive oils, fruits and vegetables, and dairy products are produced in the county. Zadar County is a national leader in terms of investments in renewable energy resources, especially wind and solar energy. In 2019, 66 percent of the GVA was from wholesale and retail trade, transportation, storage, accommodation and food services, public administration and defense, education, human and social protection, professional, scientific, technical, administrative and support services, and also the real estate sector.

Šibenik-Knin County is in the central part of the Adriatic coast. Šibenik is the main urban center of the county. Tourism is extremely important for the economy of Šibenik-Knin County, supported by 2 national parks: Krka and Kornati, 3 nature parks, 6 significant landscapes, 2 nature monuments, and 61 ecological areas under the Natura 2000 network. There are 7 protected cultural assets (5 intangible and 2 tangible cultural assets) on the UNESCO's list of World Heritage Sites in the county. In addition, there are more than 3,000 berths in the 12 marinas. The tourist offer is still focused on the coastal belt, but the county has potential to diversify investments into other tourist products by expanding the value chains in other segments including in the rural tourism. Other important sectors of the economy of Šibenik-Knin are trade, construction, and metallurgy, which make a significant contribution to the economy. The county is home to the leading aluminum industry, shipbuilding and building materials industries. The main wine-growing areas are Pirovac-Skradin-Šibenik, Knin, Drniš-Promina, and Primošten. More opportunities for development of traditional agricultural products are outlined in the 'Irrigation Plan' Study focusing on traditional agricultural production (fruits, vegetables). Šibenik-Knin County is recognizable for its production of prosciutto, cheese, and shellfish. Nonetheless, the economy of Šibenik-Knin is primarily service oriented with 60 percent of GVA (2019) generated by wholesale and retail trade, transportation, storage, accommodation, food service activities, public administration and defense, education, health and social activities, and real estate services. Construction and manufacturing were on the rise, each contributing 9 percent

of GVA; professional, scientific, technical, administrative and support services around 5–6 percent, while ICT sectors, agriculture, fishery and forestry had the lowest share.

The Split-Dalmatia County is the most populous and the largest county in the Adriatic coast of Croatia. The city of Split is the administrative center of the county which is strategically situated at the intersection of road, rail, and sea routes of national and international importance. The shipbuilding industry is traditionally one of the most significant local industries, with two of the large shipyards situated in the cities of Split and Trogir. Rich sea resources stimulated the development of fishery and fish food processing such as olive oil, jams, spreads, honey, traditional cakes, and liquors. The Split-Dalmatia County is renowned as a prime tourist destination and a center for industrial development, business zones, production of car parts, metal, and electric components. The county's GVA structure is dominated by the service sectors, especially tourism. In 2019, 58.5 percent of the county's GVA comprised service sectors and trade, transport and storage, public administration and defense, education, health, social and real estate service. The manufacturing sector grew and contributed 8 percent; professional, scientific, technical, administrative and logistics services contributed 8 percent and construction 7 percent. The Split-Dalmatia County is an important ICT hub, with multiple ICT investments and companies (more than 300 business entities). The county posted a steady growth of tourist visitors. The motorway connecting Split with the continental part of Croatia and capital Zagreb and the south of the country (the city of Dubrovnik) and the development of air traffic, including numerous low-cost flights, resulted in the increase of foreign visitors. This growth was fueled by construction and renovation of many hotels and other accommodation facilities, both on the coastline and the islands in the Split archipelago. Notably, these are the islands of Brač, Šolta, Hvar, and Čiovo.

Dubrovnik-Neretva County is the southernmost county of Adriatic Croatia, covering a narrow and inhomogeneous coastal strip separated from the hinterland by a steep mountain. Dubrovnik is the main administrative center of the county. The county has two distinct zones – a relatively narrow longitudinal coastal area with a cape extending to the open sea and nearby islands, and the Neretva Valley

– an agricultural area with an adjacent coastal strip. The magnificent landscapes of Dubrovnik-Neretva are rich in biodiversity and thus a unique biodiversity spot in the Mediterranean. Tourism is the most important driver of the county's economy. Agriculture and fishing also have significant potential. The fertile agricultural lands located in the Neretva valley, 'Konavosko polje', the Pelješac peninsula, and the island of Korčula are nationally important, especially for the production of citrus fruits. Fishing is developed in the Mali Ston Bay, the Neretva Channel, and the area of the islands of Mljet and Korčula. The peninsula of Pelješac and island Korčula, contribute a significant share of the viticulture and olive growing.

The tradition of wine making in the county has historical and touristic value. In terms of GDP and GVA per capita, the Dubrovnik-Neretva County is among the above-average developed counties. Wholesale and retail trade, transport, storage, accommodation and food services account for 41 percent of the county's GVA. Public administration and defense, education, health, and social services follow with 15 percent, construction comes next with 12 percent, and the real estate services with 10 percent. All other sectors together contributed with 22 percent. The county's economy is highly dependent on tourism and related services which makes the value chains vulnerable to market volatility.

Annex 4: Outline of the Blue Economy Governance Framework

Based on the findings of the institutional and policy analyses, an outline of the blue economy governance framework for the BE roadmap is proposed. The outline is not exhaustive and can be further elaborated during the development of the BE roadmap and action plan. Institutional coordination and feedback from public consultation could validate

and enrich the content. The roadmap defines the objectives to be attained in each governance pillar to foster blue economy development. In addition, the priorities are ranked as high and medium within each pillar. The tables also include suggested institutions responsible for leading the way toward attainment of specific objectives.

Table 4.1. Governance framework – objectives and priorities

Pillar	Priority	Objective	Lead institution	Supporting institutions
Governance framework	High	Establish the blue economy management structure at all levels, Prime Minister Office on top	MESD	Other relevant ministries, counties, cities and municipalities, other relevant stakeholders
	High	Create and implement campaigns for raising awareness of the blue economy	MESD	
	High	Strengthen the capacities of the institutions and stakeholders involved	MESD	Ministry of Finance
	Medium	Increase the active and responsible participation of the public in the elaboration and implementation of blue economy strategy	MESD	
	Medium	Strengthen and capacitate control mechanisms	State inspectorate	MESD Ministry of Finance

Table 4.2. Strategies and policies – objectives and priorities

Pillar	Priority	Objective	Lead institution	Supporting institutions
Strategies and Policies	High	Elaborate blue economy strategy with clear vision and action plan (including indicators) linking it to the development priorities of the National Development Strategy (NDS) till 2030	MESD	Other relevant ministries, counties, and agglomerations, other relevant stakeholders
	High	Improve physical planning process, implement MSP and ICZM tools	Ministry of Construction, Spatial Planning and State Property	Counties, cities, and municipalities, other relevant stakeholders
	High	Map the competences needed to work in blue economy sectors and supporting institutions	MESD	Ministry of Labour and Pension System, Family and Social Policy Ministry of Science and Education
	Medium	Harmonize development strategies/plans (resource, sectoral and territorial) with the blue economy strategy	MESD	Other relevant ministries, counties and agglomerations, other relevant stakeholders
	Medium	Additionally support and facilitate the development and application of innovations in the blue economy	MESD	Ministry of Science and Education
	Medium	Improve existing educational programs, develop a scheme of education for new competences within the lifelong education system	Ministry of Science and Education	

Table 4.3. Financial framework – objectives and priorities

Pillar	Priority	Objective	Lead institution	Supporting institutions
Financial Framework	High	Improve investment climate for blue economy	MESD	Ministry of Finance
	Medium	Identify priority projects (project pipeline) for financing development of blue economy	MESD	Ministry of Regional Development and European Union Funds Other relevant institutions
	Medium	Clearly determine the sources and support the preparation of priority projects for the use of existing public sources	MESD	
	Medium	Develop new financing mechanisms and accountability principles within the Republic of Croatia (for example, blue bonds)	Ministry of Finance	MESD
	Medium	Enable counties, cities, and municipalities to support specific blue economy activities in their administrative units	Ministry of Finance	Ministry of Justice and Administration
	Medium	Set the foundations for introducing environmental services valuation into the national accounting system	Ministry of Finance	MESD

Table 4.4. Protection of the natural capital value – objectives and priorities

Pillar	Priority	Objective	Lead institution	Supporting institutions
Protection of the Natural Capital value (Marine and coastal ecosystem services)	High	Establish a comprehensive monitoring and data management system (data collection and management) for the blue economy sectors with reporting protocols on standard procedure for receiving, managing and using related data	MESD	CBS Other relevant institutions
	Medium	Improve data bases in terms of accuracy, being open source, and user-friendly	MESD	Other institutions in charge for relevant data bases
	Medium	Cooperate with R&D sector as to set fundamentals for natural capital valuation and ocean accounting within blue economy monitoring and reporting	MESD	Ministry of Science and Education
	Medium	Develop and systematically apply various education/information tools to increase awareness of the importance of the environment and ecosystem services at all levels and of all stakeholders	MESD	Ministry of Science and Education

Annex 5. List of National Policies Harmonized with EU

	EU legal act	National transposition	Priority action
1.	MSPD 2014/89/EU	<ul style="list-style-type: none"> Spatial Planning Act (<i>Zakon o prostornom uređenju</i>), OG no. 153/13, 65/17, 114/18, 39/19, 98/19 Act amending the Spatial Planning Act (<i>Zakon o izmjenama i dopunama Zakona o prostornom uređenju</i>), OG no. 65/17 has ensured transposition of the Marine Spatial Planning Directive (MSPD) 	High
2.	MSFD 2008/56/EU	<ul style="list-style-type: none"> Regulation establishing a framework for action by the Republic of Croatia for the protection of the marine environment (<i>Uredba o uspostavi okvira za djelovanje Republike Hrvatske u zaštiti morskog okoliša</i>), OG no. 136/2011 Environmental Protection Act (<i>Zakon o zaštiti okoliša</i>), OG no. 80/2013, 153/2015, 78/2015, 12/2018, 118/2018 Regulation on the provision of information to the general public and stakeholders and their participation in environmental matters (<i>Uredba o informiranju i sudjelovanju javnosti i zainteresirane javnosti u pitanjima zaštite okoliša</i>), OG no. 64/2008 Regulation on the development and implementation of documents of the Marine Environment and Coastal Zone Management Strategy (<i>Uredba o izradi i provedbi dokumenata Strategije upravljanja morskim okolišem i obalnim područjem</i>), OG no. 112/2014, 112/2018 	Medium
3.	Bathing Water Quality Directive 2006/7/EC	<ul style="list-style-type: none"> Regulation on sea bathing water quality (<i>Uredba o kakvoći mora za kupanje</i>), OG no. 73/2008 Environmental Protection Act (<i>Zakon o zaštiti okoliša</i>), OG no. 80/2013, 153/2015, 78/2015, 12/2018, 118/2018 Regulation on bathing water quality (<i>Uredba o kakvoći vode za kupanje</i>), OG no. 51/2010, 51/2014 Water Act (<i>Zakon o vodama</i>), OG no. 66/2019 	Low
4.	Habitats Directive 92/43/EEC	<ul style="list-style-type: none"> Nature Protection Act (<i>Zakon o zaštiti prirode</i>), OG no. 80/13, 15/18, 14/19, 127/19 Regulation on the ecological network and the competences of public institutions for the management of ecological network areas (<i>Uredba o ekološkoj mreži i nadležnostima javnih ustanova za upravljanje područjima ekološke mreže</i>), OG no. 80/19, 119/23 Ordinance on conservation goals and conservation measures of targeted bird species in ecological network sites (<i>Pravilnik o ciljevima očuvanja i mjerama očuvanja ciljnih vrsta ptica u područjima ekološke mreže</i>), OG no. 25/20, 38/20 	Medium

- Ordinance on the list of habitat types and habitat map (*Pravilnik o popisu stanišnih tipova i karti staništa*), OG no. 27/21, 101/22
- Ordinance on conservation goals and conservation measures for target species and habitat types in the areas of the ecological network (*Pravilnik o ciljevima očuvanja i mjerama očuvanja ciljnih vrsta i stanišnih tipova u područjima ekološke mreže*), OG no. 111/22
- Ordinance on strictly protected species (*Pravilnik o strogo zaštićenim vrstama*), OG no. 144/13, 73/16
- Law amending the Water Law (*Zakon o izmjenama i dopunama Zakona o vodama*), OG no. 84/21
- Hunting Law (*Zakon o lovstvu*), OG no. 99/18
- Ordinance on the hunting season (*Pravilnik o lovostaju*), OG no. 94/19
- Act on the prevention and management of the introduction, spread, and management of alien and invasive alien species (Zakon o sprječavanju unošenja i širenja stranih te invazivnih stranih vrsta i upravljanju njima)*, OG no. 15/18, 14/19
- Ordinance on the forest regulation (*Pravilnik o uređivanju šuma*), OG no. 79/15
- Decision on harvesting indigenous wild species whose and sustainable use is allowed (*Odluka o zavičajnim divljim vrstama čije je uzimanje iz prirode i održivo korištenje dopušteno*), OG no. 17/15, 68/16

Funding program for the Natura 2000 (Program financiranja ekološke mreže Natura 2000), OG no. 54/2022

Strategy and action plan for nature protection of the Republic of Croatia for the period 2017–2025 (Strategija i akcijski plan zaštite prirode Republike Hrvatske za razdoblje od 2017. do 2025. Godine), OG no. 72/17

5. Birds Directive 2009/147/EC	<ul style="list-style-type: none"> ■ Nature Protection Act (<i>Zakon o zaštiti prirode</i>), OG no. 80/13, 15/18, 14/19, 127/19 ■ Regulation on the ecological network and the competences of public institutions for the management of ecological network areas (<i>Uredba o ekološkoj mreži i nadležnostima javnih ustanova za upravljanje područjima ekološke mreže</i>), OG no. 80/19 ■ Ordinance on conservation goals and conservation measures of targeted bird species in ecological network sites (<i>Pravilnik o ciljevima očuvanja i mjerama očuvanja ciljnih vrsta ptica u područjima ekološke mreže</i>), OG no. 25/20, 38/20 ■ Ordinance on strictly protected species (<i>Pravilnik o strogo zaštićenim vrstama</i>), OG no. 144/13, 73/16 ■ Hunting Law (<i>Zakon o lovstvu</i>), OG no. 99/18 ■ Ordinance on the hunting season (<i>Pravilnik o lovostaju</i>), OG no. 94/19 	Medium
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	<ul style="list-style-type: none"> ■ Act on the prevention and management of the introduction, spread and management of alien and invasive alien species (<i>Zakon o sprječavanju unošenja i širenja stranih te invazivnih stranih vrsta i upravljanju njima</i>), OG no. 15/18 ■ Ordinance on the forest regulation (<i>Pravilnik o uređivanju šuma</i>), OG no. 79/15 ■ Ordinance on the certificate of origin of game and parts thereof and on the method of marking game (<i>Pravilnik o certifikatu o podrijetlu divljači i njihovih dijelova te načinu obilježavanja divljači</i>), OG no. 15/19 ■ Decision on indigenous wild species whose taking from nature and sustainable use is allowed (<i>Odluka o zavičajnim divljim vrstama čije je uzimanje iz prirode i održivo korištenje dopušteno</i>), OG no. 17/15, 68/16 	
6. Water Framework Directive 2000/60/EC	<ul style="list-style-type: none"> ■ Water Act (<i>Zakon o vodama</i>), OG no. 66/19, 84/21 ■ Regulation on water quality standards (<i>Uredba o standardu kakvoće voda</i>), OG no. 96/19, 20/23 ■ Ordinance on the conditions for determining zones of sanitary protection of water sources (<i>Pravilnik o uvjetima za utvrđivanje zona sanitarne zaštite izvorišta</i>), OG no. 66/11, 47/13 ■ Act amending the Water Management Financing Act (<i>Zakon o izmjenama i dopunama Zakona o financiranju vodnog gospodarstva</i>), OG no. 66/19 ■ Ordinance on the content of the River Basin Management Plan (<i>Pravilnik o sadržaju plana upravljanja vodnim područjem</i>), OG no. 74/13, 53/16, 64/18 ■ Law on exploration and exploitation of hydrocarbons (<i>Zakon o istraživanju i eksploataciji ugljikovodika</i>), OG no. 52/18 ■ Act amending the Maritime Code (<i>Zakon o izmjenama i dopunama Pomorskog zakonika</i>), OG no. 17/19 ■ Ordinance on wastewater emission limit values (<i>Pravilnik o graničnim vrijednostima emisija otpadnih voda</i>), OG no. 26/20 	Medium
7. UWWTD 91/271/EEC	<ul style="list-style-type: none"> ■ Water Act (<i>Zakon o vodama</i>), OG no. 66/19, 84/21 ■ Regulation on water quality standards (<i>Uredba o standardu kakvoće voda</i>), OG no. 96/19, 20/23 ■ Ordinance on wastewater emission limit values (<i>Pravilnik o graničnim vrijednostima emisija otpadnih voda</i>), OG no. 26/20 ■ Decision on determining sensitive areas (<i>Odluka o određivanju osjetljivih područja</i>), OG no. 79/22 	High
8. Waste Framework Directive 2008/98/EC	<ul style="list-style-type: none"> ■ Waste Management Act (<i>Zakon o gospodarenju otpadom</i>), OG no. 84/21 ■ Environmental Protection Act (<i>Zakon o zaštiti okoliša</i>), OG no. 80/13, 153/13, 78/15, 12/18, 118/18 ■ Administrative Procedure Act (<i>zakon o općem upravnom postupku</i>), OG no. 47/09, 110/21 	High

	<ul style="list-style-type: none">■ Criminal Act (Kazneni zakon), OG no. 125/11, 144/12, 56/15, 61/15, 101/17, 118/18, 126/19, 84/21, 114/22■ Ordinance on waste management (Pravilnik o gospodarenju otpadom), OG no. 106/22■ Ordinance on by-products and end-of waste status (Pravilnik o nusproizvodima i ukidanju statusa otpada), OG no. 117/14■ Ordinance on thermal treatment of waste (Pravilnik o termičkoj obradi otpada), OG no. 75/16		
9.	SUP (EU) 2012/904	<ul style="list-style-type: none">■ Waste Management Act (Zakon o gospodarenju otpadom), OG no. 84/21	High
10.	Port Reception Facilities Directive (EU) 2019/883	<ul style="list-style-type: none">■ Ordinance on the conditions and method of maintaining order in ports and other parts of Croatia's internal marine waters and territorial sea (<i>Pravilnik o uvjetima i načinu održavanja reda u lukama i na ostalim dijelovima unutarnjih morskih voda i teritorijalnog mora Republike Hrvatske</i>), OG no. 72/21	High

Annex 6. State of the Environment and Pressures in the Adriatic Marine Environment – Measuring Selected GES

The monitoring program of Croatia covers 11 descriptors (D) in accordance with the requirements of the MSFD. 'Good environmental status' (GES) is defined through 11 qualitative descriptors, with a set of specific criteria and methodological standards. The MSFD in conjunction with the WFD provides a framework for the management of marine pollution and is the first EU legal instrument to explicitly address marine litter.

Biodiversity and habitats (D1)

The overall adequacy of GES for Descriptor 1 was assessed as 'good' by EC (2022) (MoESD 2022) although the state of most marine species is referred to as 'unknown' due to insufficient data.

Only the state of Glavata želva (*Caretta caretta*) and Dobri dupin (*Tursiops truncatus*) were reported as 'favorable' while the status of Nobel periska (*Pinna nobilis*), Prstac (*Lithophaga lithophaga*), and red coral (*Corallium rubrum*) were determined as 'unfavorable'. The status of 13 other marine species were reported as 'unknown'. Half the marine habitat types were assessed as 'unfavorable' while the other four were reported as unknown which indicates that there is an urgent need for improvement in the monitoring of marine habitats. The status of Posidonia habitats, estuaries, reefs, and flooded or partially flooded sea caves is unsatisfactory. The status of the other four types of marine habitats were reported as 'unknown' due to insufficient data for assessment of their conservation status (MoESD 2022).

Pressures on marine species

Marine species	Pressures
Common bottlenose dolphin (<i>Tursiops truncatus</i>)	<ul style="list-style-type: none">Professional and recreational fishing and shell fishing (affects diversity/prey)Disturbances by geotechnical research
Loggerhead sea turtle (<i>Caretta caretta</i>)	<ul style="list-style-type: none">Geotechnical research
Loggerhead sea turtle (<i>Caretta caretta</i>)	<ul style="list-style-type: none">Marine transportGeotechnical researchAccidental catch (moderate)
Red coral	<ul style="list-style-type: none">Illegal collectionmarine pollutionclimate change
The noble pen shell (<i>pinna nobilis</i>)	<ul style="list-style-type: none">Widely affected by a disease spread which started in Spain in 2019
Slipper lobster (<i>Scyllarides latus</i>), hatpin urchin (<i>Centrostephanus longispinus</i>), and algae <i>Lithothamnium corallioides</i> and <i>Phymatholiton calcareum</i>	<ul style="list-style-type: none">Poorly monitoredFishing (expected impact)Habitat degradation (expected impact)

Source: Adjusted from MoESD (2022).

Pressures on marine habitats

Habitat type	All types	Coastal habitats	Posidonia
Pressures	Use of certain fishing tools, Pollution from mariculture Land-based pollution Marine pollution Marine waste Nutrient intake Alien species Climate change	Construction, beach filling, municipal waste, various tourist and recreational activities	Anchoring

Source: Adjusted from MoESD (2022).

Non-indigenous species (D2)

Four new non-indigenous species were identified in addition to the eighteen previously identified.¹⁷⁹ The new non-indigenous species were reported in areas with extremely dense settlements, and with probably a significant impact on native species.¹⁸⁰ Introduction of foreign species is an issue of a cross-border nature. The national prevention measures need coordination among all the countries of the Adriatic subregion. (MoESD 2022) and stricter implementation of the Convention on Management of Ships' Ballast Water¹⁸¹ (International Maritime Organization 2004).

Population of commercial fish species is healthy (D3)

According to the GFCM199 assessment in 2019, commercial fish stocks are overfished (MoESD 2022). However, fish resources in the Croatian territorial waters are in a better condition compared to the rest of the Adriatic Sea (Republic of Croatia 2019). Also, it seems that the protection of Jabuka pit had a positive impact on increasing of demersal fish stock.

Eutrophication (D5)

Eutrophication is linked to anthropogenic pollution from municipal wastewater and agricultural runoffs. The analysis of ecological status of Croatia's transitional, coastal, and marine waters according to the trophic TRIX index¹⁸² indicates a satisfactory state. However, the status at Šibenik bay, Bakar bay (Rijeka), and Vranjic (Split) were unsatisfactory and there is a need for systematic monitoring of such locations (MoESD 2022, 190) and measures to reduce inflow of organic P and N.

Sea floor integrity (D6)

For proper assessment of GES descriptor D6 needs additional monitoring and coordination among various institutions (Republic of Croatia 2019, 123). The stressors affecting the status of marine seabed are presented below:

¹⁷⁹ IOR (<http://baltazar.izor.hr/azopub/bindex>).

¹⁸⁰ IOR (<http://baltazar.izor.hr/azopub/bindex>).

¹⁸¹ <https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Control-and-Management-of-Ships%27-Ballast-Water-and-Sediments-%28BWM%29.aspx>.

¹⁸² The trophic index (TRIX) is a **eutrophication index** proposed by Vollenweider et al. (1998) to assess the trophic state of marine waters, characterized by high nutrient levels and phytoplankton biomass. First used along the Emilia-Romagna coastal region (northwestern Adriatic Sea), later the index has been applied in many European seas (Adriatic, Tyrrhenian, Baltic, Black Sea, and North Sea).

Pressures on marine seabed

Marine seabed	Coastal waters	Open sea
Pressures	Construction of coastal infrastructure and sand extraction Aquaculture River inflows Pollution sources (for example, wastewater). Dredging and beach filling	Fishing with bottom trawls and dredges Permanent anchoring of different objects, Extraction and disposal of the materials, Installation of offshore exploitation objects.

Hydrological changes (D7) can occur during infrastructural projects and due to climate change impacts.

Concentrations of contaminants (D8)

GES was assessed in 23 out of 26 water bodies in 2017, which is in 88 percent water bodies (Republic of Croatia 2019). Increased values of Tributyltin (TBT) were found at Bakarski zaljev, Luka Pula, and Luka Split which are linked to the intensive maritime transport. Namely, the use of TBT in antifouling paints is prohibited by the law. Such finding indicates the need for stricter enforcement and regular inspection services (Republic of Croatia 2019, 174).

Marine waste (D10)

Croatia's monitoring systems cover waste washed up on the coast, large floating waste on the surface and bottom of the sea, microplastics and marine waste swallowed by marine organisms. However, due to insufficient financial resources during 2017 and 2018, sampling and subsequent analyzes were performed on smaller scale than the regulatory provisions. Also, the system of threshold values has not been sufficiently developed at the EU level.

Marine noise (D11)

The main source of anthropogenic low- and medium-frequency noise is shipping. There is large seasonal variability of anthropogenic underwater noise due to seasonal increase of vessels during the tourist season (MoESD 2022, 174). Although systematic noise monitoring started in 2017, yet it was not possible to determine the environmental status of the Adriatic Sea for this descriptor.

Annex 7: SWOT Analysis of Established Maritime Sectors

The driving forces for the established maritime sector have been identified using the four dimensions of SWOT analysis. Several issues that may hamper the development potential of maritime sectors if not properly addressed were determined and considered as disadvantageous. The weaknesses of the internal environment concern

institutional incapacity for tourism product development and innovations in service provision. Threats are posed by external environmental issues, climate vulnerability, and lack of infrastructure. The results of the SWOT analysis could assist in sector planning, coordination, monitoring, and promotion of new activities.

I. Swot Analysis of the Croatian Coastal Tourism

Strengths	Weaknesses
<ul style="list-style-type: none"> ■ Presence of favorable climate, human capital, attractive natural environment and protected land and sea ■ Proximity to EU (source) markets ■ Rich and diversified natural and cultural (tangible and intangible) tourist resources ■ Attractiveness of coastal area based on rich history and heritage (UNESCO heritage sites) and local tradition of tourism ■ High level of safety which meets tourists' security concerns ■ Stakeholders' awareness of responsible and sustainable business ■ Sufficient private stakeholders' receptiveness to accelerate technological change and meet tourist demand. 	<ul style="list-style-type: none"> ■ High concentration of tourism in Adriatic Croatia leading to imbalance with other regions ■ Seasonality of tourism and consequent pressures on the built infrastructures and natural environment ■ Insufficient human resources (number and quality) for tourism activities ■ Lack of wastewater treatment infrastructure ■ Lack of accommodation for high-value tourists ■ Unfavorable business and investment environment for quick adaptation of the sector to technological advancement in tourism ■ Highly centralized and insufficient communication between central, regional, and local authorities ■ Insufficient cooperation between public, private, and civil society stakeholders ■ Insufficient networking of tourism entities with other economic activities (for example, connecting tourism and agriculture and other economic activities) consequently leading to underdeveloped value chains ■ Underused potential of rural areas for special forms of tourism ■ Low awareness of responsible and sustainable business practices ■ Unsustainable growth of nautical tourism ■ Environmental and social pressures due to cruise tourism.
Opportunities	Threats
<ul style="list-style-type: none"> ■ EU funding opportunities available through the National Plan for Recovery and Resilience (NPRR) and Marine and Fisheries Fund ■ Favorable investment environment due to the introduction of euro and accession to Schengen 	<ul style="list-style-type: none"> ■ Lack of comprehensive consideration of nautical/ cruise tourism in the Croatian Sustainable Tourism Development Strategy ■ High level of complexity and volatility of global markets

<ul style="list-style-type: none"> ■ Public-private partnership in the implementation of tourism projects and product development ■ Growing tourist interest in sustainable and eco-tourism destinations ■ Recognition of the viability of local products and handicrafts ■ Stronger integration in international/regional networks and associations ■ New developments solutions for increasing the sustainability of tourism business within the BE framework. 	<ul style="list-style-type: none"> ■ Prevailing perception of Croatia as a summer tourist destination ■ Increasing global competition in the development of tourist products and special forms of tourism in competing countries ■ Negative trend of guest loyalty ■ Rapid changes in trends in the global tourism market, tourism value chains underdeveloped. ■ Interrelationship between tourism and climate change together with the negative impacts of tourism on the environment and nature ■ Land-use development leading to increasing pressures on real estate market and depopulation of main tourism destinations ('ghost areas') ■ Further expansion of tourism activities in the coastal zone can increase the infrastructure needs and affect natural resource (for example, water availability).
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II. Swot Analysis of the Fisheries

Strengths	Weaknesses
<ul style="list-style-type: none"> ■ Community traditions in fishing and dependency of small local communities for their lifestyle ■ Large number of commercial species (multispecies and multi-gear fishery) ■ Alignment with relevant EU policies ■ Management plans (catches, fleet, species) in place ■ Jabuka-Pomo pit FRA experience as a good practice ■ Data collection and monitoring systems established ■ VMS and ERS systems implemented in fleet segments under the management plans ■ Existing FLAGs, fishery cooperatives, producers' organizations ■ Cooperation among stakeholders ■ Active participation in EU and other relevant international organizations ■ SSCF can fish 12 months a year ■ SSCF catches of high value, shortest way to market with prices affordable for fishermen and local community. 	<ul style="list-style-type: none"> ■ High (Total) fishing capacity (of all countries exploiting stocks in Adriatic) exceeds demersal fish stocks ■ Main pelagic varieties (sardine and anchovy) are overfished ■ Imbalances in main fleet segments ■ Low economic sustainability (insufficient equipment, safety on sea, working conditions, food quality, energy efficiency) ■ SSCF – insufficient revenues versus large social dependence of fishery ■ Insufficient infrastructure (fishing ports, warehouses, landing and management sites, and so on) and weak market provisions ■ Shortcomings in data collection ■ Insufficient and low capacity for control.
Opportunities	Threats
<ul style="list-style-type: none"> ■ Adjustment of fishing capacity and efforts based on cooperation of all stakeholders and holistic, bottom-up approach ■ Implementation of new technological solutions for decrease of operational costs ■ Development and application of new techniques and tools for exploitation of foreign species as well as decreasing by-catches and discards ■ New market niches and income generation in synergy with tourism 	<ul style="list-style-type: none"> ■ Lack of Impacts of climate change affecting marine ecosystem including introduction of foreign species ■ Decrease in marine services due to pollution from economic activities and urbanization ■ Demographic trends and low interest for fishery jobs among young population ■ Loss in traditions and traditional skills ■ Transborder pollution ■ Global trends and rise in operational costs.

- Use of IT solutions for improvement of data collection, monitoring and control
- Availability of EU funds and other external sources
- Development of farmed seafood, including the production of seafood with a low carbon footprint and algae cultivation.
- EU fisheries management measures could hamper economic and social sustainability of small fisheries.

III. Swot Analysis of the Fish Processing

Strengths	Weaknesses
<ul style="list-style-type: none"> ■ Long tradition in fish processing ■ Availability of raw materials for processing industry ■ Established domestic market for fresh fish and shells ■ Established sales markets in the EU ■ Established tuna market in Japan ■ Increase in consumption trends of demersal farmed species ■ Established standards in operations related to processing and marketing of fish and seafood products. 	<ul style="list-style-type: none"> ■ Low number of value-added products. ■ Poor implementation of innovations ■ Lack of cooling and warehousing facilities ■ Lack of infrastructure necessary for efficient market operations (auction and distribution centers) ■ Insufficient number of producers organizations ■ Lack of branding, marketing, and promotion strategies ■ Relatively low domestic consumption per capita.
Opportunities	Threats
<ul style="list-style-type: none"> ■ Modernization of fish processing industry, including energy efficient solutions ■ Development of cold chains and processing of mariculture products ■ Diversification and new products (for example, potential for sales of fresh shells through domestic market chains; prepared products and meals based on shellfish with longer shelf life; new niches for supreme quality of farmed tuna; potential for increased sales of demersal farmed fish on domestic market and tourist consumption) ■ Use of new marketing techniques (direct, online sales) ■ Potential for sales increase via tourism and hospitality industry. 	<ul style="list-style-type: none"> ■ Increase of operational costs (raw materials and energy in particular) ■ Prices at global market (cheap imports; competitors lower' market prices due to lower production costs) ■ Poor purchasing power at domestic market ■ High prices of fish and seafood products on domestic market compared to other food products. ■ Market volatility and distortions leading to constraints in sales (for example, pandemic outbreak, war in Ukraine).

IV. Swot Analysis of the Ports and Port Activities

Strengths	Weaknesses
<ul style="list-style-type: none"> ■ Geographical position and geomorphologic characteristics of the coast ■ Existing legislative framework for running of the ports open to public traffic and ports for special purposes ■ Present liner transport in ports open for public transport ■ Demand and supply of port services locally are expected to increase. 	<ul style="list-style-type: none"> ■ Insufficient capacities of ports of county and local importance ■ Inconsistency of guidelines and criteria for determining the justification, priorities, and approval of infrastructure and other development projects in the maritime sector ■ Legal and technical challenges for digitalization (especially in smaller ports) of port services ■ Location of port terminals in the central part of the cities, which creates issues from environmental and urban planning perspective

Opportunities	Threats
<ul style="list-style-type: none"> ■ Opportunity for securing funding for port infrastructure developments under NPRR 2021–2026, and other EU programs, for example, the EU Connecting Europe Facility program ■ Implementing innovative solutions for the development of smart ports ■ Development and application of technologies that contribute to reducing environmental and infrastructure impacts. 	<ul style="list-style-type: none"> ■ Insufficient seaports for servicing passengers and fishing activities. ■ Possible failure to take advantage of new digital technologies for the efficient operation of seaports as their implementation can reduce costs, simplify business processes, and improve transparency ■ Discrepancies in the development of road and maritime infrastructure, as well as development of comprehensive connections to TEN-T networks in all ports of country interest.

V. Swot Analysis of the Aquaculture

Strengths	Weaknesses
<p>Demersal species</p> <ul style="list-style-type: none"> ■ Large firms lead in innovations, production and processing technologies, as well as strategic marketing ■ Young people interested to enter the industry ■ Good geographical position (in terms of marine environment and proximity of the EU market) ■ State of marine environment is still rather good ■ Introduction of new species (meagre) in farming. <p>Tuna farming</p> <ul style="list-style-type: none"> ■ Excellent rating at global market ■ High-quality products ■ Availability of highly skilled labor ■ Implementation of modern farming technologies ■ Availability of food from imports ■ Good organization of producers ■ Good cooperation with R&D sector ■ Active participation in professional organizations at all levels (from regional to international) ■ Good cooperation with local communities. <p>Shell farming</p> <ul style="list-style-type: none"> ■ Croatia is one of the few last resorts of autochthonous European oyster that could achieve high prices in the European market (adequate marketing provided) ■ Existing demand at domestic market ■ Good cooperation with local communities. 	<p>Demersal species</p> <ul style="list-style-type: none"> ■ High import dependence (food for farming as well as import of milt) ■ Insufficient specialization of production technologies (lack of gene selection and use of Recirculating Aquaculture Systems) ■ Small producers suffer high operational costs and cannot afford huge investments. ■ Small producers do not use modern technologies. ■ Lack of cooperation with R&D sector, state agencies and other producers ■ Weak participation in professional organizations at all levels (from regional to international). <p>Tuna farming</p> <ul style="list-style-type: none"> ■ High dependence on tuna quota ■ Entire business model depends solely on one market (Japan) ■ Drop in prices at sales market due to rise in quotas. <p>Shell farming</p> <ul style="list-style-type: none"> ■ Prevailing small (family) producers ■ Obsolete technologies used; low interest for innovations ■ No commercial spawning facilities ■ Lack of purification centers ■ Lack of processing facilities ■ Only fresh products sold; no diversification and/or value added ■ Weak organization of producers ■ Lack of cooperation with R&D sector ■ Absence of participation in professional organizations at all levels (from regional to international).

Opportunities	Threats
<p>Demersal species</p> <ul style="list-style-type: none"> ■ Potential for mariculture is still high since the catches of wild seabass and seabream are not that significant. ■ Existing market niches, for example, eco products in Croatia and abroad (seabass and seabream) ■ Very good prospects for meagre farming and sales of meagre-based products (prepared dishes) ■ Production and marketing of new species (for example, common dentex, greater amberjack) ■ Growth of fish processing industry, upward trends in consumption of fish fillets, ready-to-cook-fish as well as other value-added products ■ Market potential in tourism has not yet been fully use ■ Growing demand at domestic market ■ Small producers can set up producer organizations. <p>Tuna farming</p> <ul style="list-style-type: none"> ■ Potential new markets (market niches) in Croatia and abroad for the supreme-quality products (well-off clients, hotels, and restaurants) ■ New markets for new products. <p>Shell farming</p> <ul style="list-style-type: none"> ■ Possibilities to raise production and product quality ■ Use of best available technologies ■ Creation of new value-added products for sales at domestic and foreign markets (including prepared meals and dishes with longer shelf life) ■ Sales of fresh products from shells could be increased through retail network ■ New market niches for products with eco-labels and high value added ■ Production of new species based on new spawning technologies (for example, Escallops). 	<p>Demersal species</p> <ul style="list-style-type: none"> ■ Warming up of the Adriatic Sea hampers production of some species (for example, seabass) ■ Occurrence of various diseases ■ Invasive species and inadequate emergency services ■ Foreign producers penetrating the markets of high-quality demersal mariculture products as well as eco products niches with more affordable prices. ■ Market volatility ■ Accidents and fish losses because of the weather conditions (storms, and so on). <p>Tuna farming</p> <ul style="list-style-type: none"> ■ Sudden appearance of diseases ■ Accidents, damages, and fish losses because of the weather conditions (storms, and so on) ■ If quotas were introduced on domestic food (sardine), the costs would rise, with possible insufficient availability from imports. <p>Shell farming</p> <ul style="list-style-type: none"> ■ Sea temperature raise due to climate changes ■ Risk of closure due to pollution (wastewaters, agriculture, industry) ■ Projects in coastal area in conflict with shell farming ■ Occurrence of foreign species (e.g. Pacific oyster) especially in Istria ■ Insufficient and inadequate technologies for combating predators ■ Insufficient cross-border cooperation related to the control of both production of new species and occurrence of invasive species.

VI. Swot Analysis of Shipbuilding and Ship Repair

Strengths	Weaknesses
<ul style="list-style-type: none"> ■ Available shipyard/ship repair infrastructure ■ Developed education curricula (that is, specialized university-level education programs) ■ Existing companies that have vast experience in the design, construction, and repair of merchant ships, warships, multipurpose and specialized vessels, sailing ships, and so on. 	<ul style="list-style-type: none"> ■ Decline of country shipbuilding in the last 20 years ■ High costs of production and of restructuring for optimizing the supply chain ■ Technological challenges in existing shipbuilding infrastructure.

Opportunities	Threats
<ul style="list-style-type: none"> ■ Building production and human resources capacities in designing innovative solutions for production of clean propulsion and/or autonomous vessels ■ Growing experience and competitiveness in the manufacture of vessels' parts of other Croatian sectors ■ Forming of regional value chains between shipbuilding and other industries. 	<ul style="list-style-type: none"> ■ Fall of international demand for vessels ■ Governmental financial support provided to save and preserve the national shipyards in many international competitors (such as South Korea, Japan, and China), contrary to the EU Competition Law.

