



CORDIS Results Pack on the Black Sea

A thematic collection of innovative EU-funded research results

October 2020

Ambitious cooperation for a healthy, resilient and productive Black Sea



Research and
Innovation

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Another spotlight on successful EU-funded projects making a difference in Black Sea research

Editorial

Ambitious cooperation for a healthy, resilient and productive Black Sea

The Black Sea has always left a powerful impression on Europeans throughout history. Today, it is still one of the continent's most important seas. A unique sea basin, rich in biodiversity, heritage and natural resources, the Black Sea has been a prominent waterway for goods, ideas and people for millennia. But the Black Sea is facing significant challenges, ranging from environmental to human-induced, all contributing to degradation that began as early as the 1970s.

This CORDIS Results Pack highlights important and cross-sectoral EU-funded research initiatives that have been working towards ensuring the sustainable future of the Black Sea by supporting its research and innovation ecosystem.

The Black Sea region has around 20 million permanent inhabitants spread over seven countries: Bulgaria, Georgia, Moldova, Romania, Russia, Turkey and Ukraine. The region has an added influx of around 6-8 million tourists on average annually. Some 18 major seaports dot the almost 5 000 km long coastline; some of the more prominent being Constanta (Romania), Odessa (Ukraine), Varna (Bulgaria) and of course, Istanbul (Turkey), the largest city on the Black Sea.

In the last 50 years, there has been increasing environmental and ecological pressure on the Black Sea basin. This has mainly been due to the impact of human-induced factors, such as eutrophication (the growth of harmful algal blooms) and hypoxia (loss of oxygen), overfishing and the introduction of alien species. Finally, climate change is also having a clear detrimental effect on the Black Sea.

The importance of innovative research cooperation for the future of the Black Sea

The ecosystem services that the Black Sea offers should remain intact for future generations. Research, innovation and cooperation between key stakeholders and countries play a crucial role in increasing the understanding of the Black Sea ecosystem. Results of such cooperation and research feed into the development of evidence-based solutions and policies to address environmental and socio-economic challenges. The EU has encouraged such innovative research and international cooperation through joint initiatives under the umbrella of the Horizon 2020 programme, which will also continue with its successor Horizon Europe.

At a policy level, the EU has also been keen to promote research and innovation cooperation for the Black Sea. In May 2019, the Black Sea Strategic Research and Innovation Agenda (SRIA) was launched as the result of a joint venture between the six Black Sea riparian countries and Moldova, along with the involvement of marine experts and the European Commission.

The SRIA aims to advance a shared vision for a productive, healthy, resilient and sustainable Black Sea by 2030, while considering its special and unique ecosystem. The Black Sea SRIA constitutes the main science pillar of the Common Maritime Agenda (CMA) for the Black Sea, also endorsed in May 2019.

Highlighting Horizon 2020 projects working for the betterment of the Black Sea

In this Results Pack, we feature six new Results in Brief articles on projects that have recently ended, or are soon to do so. These are a perfect illustration of how initiatives from different marine disciplines have contributed to research on the Black Sea, with the participation of scientists and other stakeholders from the region. This Pack also includes two entirely bespoke articles, one on the continuing work and legacy of the SIMSEA project, that is still making waves today, as well as an article summarising earlier projects that have inspired current Black Sea research.

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Overall, the projects cover a wide variety of topics, such as: biodiversity science and ecosystem and pollution modelling; social innovation; ecotourism; sustainable mobility in ports; marine spatial planning; and sustainable and inclusive growth. Some of these projects are also key frontrunners for addressing the UN's Sustainable Development Goals and the European Green Deal, the EU's flagship climate initiative aiming to make the EU completely carbon-neutral by 2050.

This Results Pack also aims to serve as inspiration for a new generation of regional or local researchers and innovators. The work of the projects highlighted can encourage others to dedicate their knowledge and expertise to the improvement of the region's ecosystem and the lives of the millions of people who call it home. EU initiatives such as the Marie Skłodowska-Curie Actions programme and the Black Sea Young Ambassadors programme, the latter launched by Commissioner Mariya Gabriel, can serve as the right vehicles to support them.

The Black Sea, with its marine basin and coastal socio-economic systems combined, can be considered a natural laboratory of global significance, for fundamental and applied science along with sustainability policies for the Blue Economy. It's a true treasure trove of the natural world! In part, thanks to the initiatives discussed within this Results Pack, efforts to preserve and benefit from its uniqueness will, it's hoped, only grow stronger over the coming years.

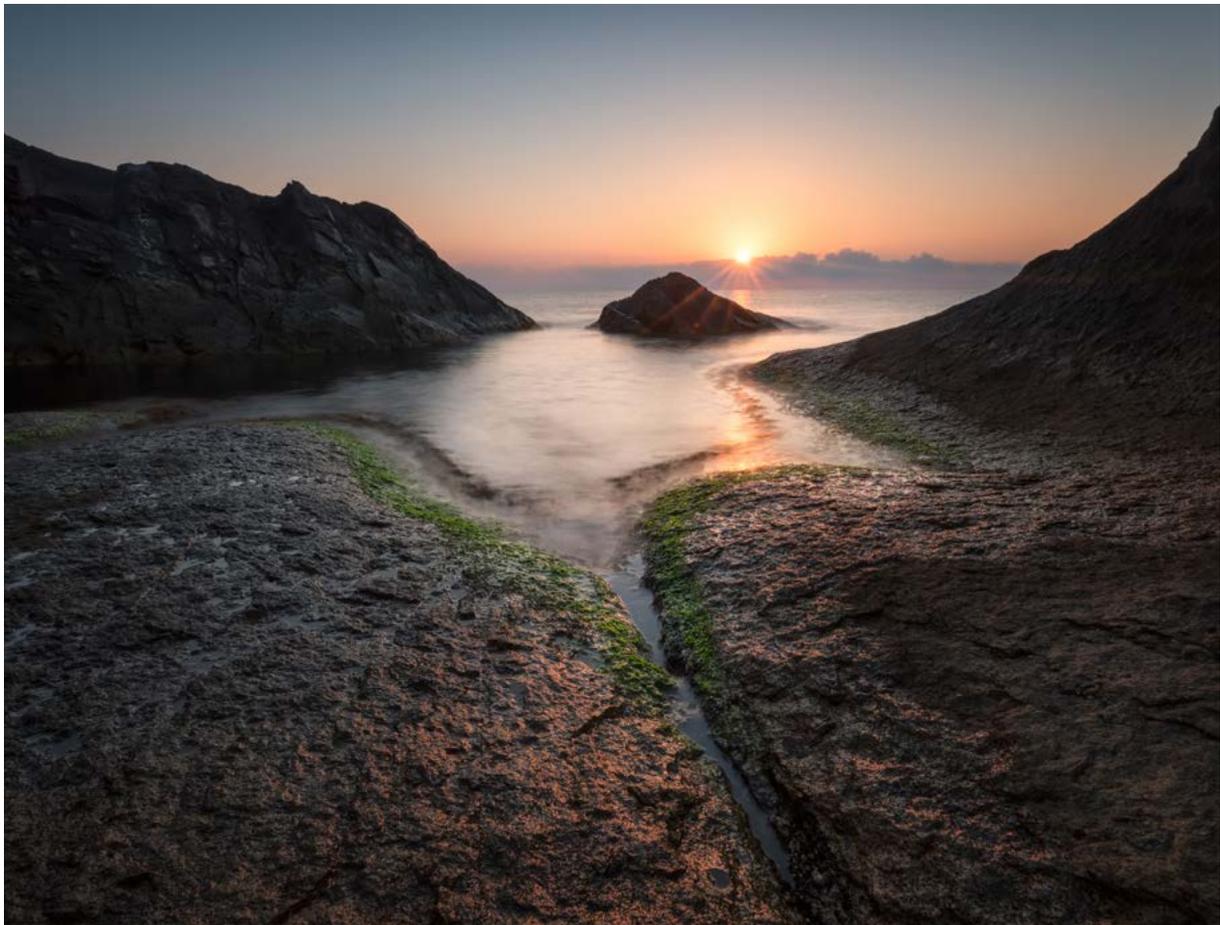


Bringing the Black Sea research community together

The groundbreaking BLACK SEA HORIZON project has connected funding agencies, academic institutes and scientists in the Black Sea region, identified shared research priorities and inspired new cooperation projects like Black Sea CONNECT.

The Black Sea, used as a communication route since the time of the ancient Greeks, continues to connect countries. “The Black Sea is not like the Atlantic, which marks where Europe ends,” says BLACK SEA HORIZON (Enhanced bi-regional STI cooperation between the EU and the Black Sea Region) project manager Martin Felix Gajdusek, from the Austrian Centre for Social Innovation (ZSI).

“This is a shared European resource that brings the countries in the region closer together. All these countries are affected by comparable challenges, such as environmental degradation, resource efficiencies, water supply and waste water treatment, and access to the sea as a transport corridor.”



This is also a region where geopolitical tensions exist. Shared science and technology objectives could therefore help to support regional political, as well as sustainable economic, co-development.

Identifying shared priorities

With this in mind, the BLACK SEA HORIZON project was launched in 2015, to foster regional cooperation in science, technology and innovation (STI). "The region boasts 500 000 researchers, 1 500 universities and some 3 000 research institutes," notes Gajdusek. "We felt that through enhanced coordination between funding bodies, and increased support for researchers to access EU funding, much more could be jointly achieved."



We wanted to create new opportunities to encourage the next generation to be a motor of change.

The earlier Black Sea ERA-Net project lay the groundwork for boosting cross-country research cooperation. This was built further in BLACK SEA HORIZON, through connecting funding agencies, ministries

and researchers from all Black Sea countries, as well as a number of EU Member States.

"The basic foundation of the project was to open up STI dialogue," adds Gajdusek. "Our aim wasn't to develop a strategic research agenda as such, but rather to identify concrete actions to encourage cooperation."

To begin, three key thematic areas relevant to all Black Sea countries were identified: sustainable agriculture; water resource efficiency; and applied chemistry and smart materials. "These fields are really important for all countries, with adequate capacities and room for more intensive research cooperation," notes Gajdusek.

"For example, Georgia, Moldova and Ukraine have all been working to improve cultivation of crops. Scientists in Armenia, Azerbaijan and Bulgaria have made advances in enhancing water quality for soil, through detoxification. Russian scientists have been pioneering new membranes for fuel cells."

Guidelines on developing regional industrial research clusters – institutes and businesses with complementary skills and shared interests – were developed. Stakeholders involved in research and development were brought together for workshops and conferences, to discuss how to better coordinate research investments.

"Trust-building was extremely important to bridge geopolitical differences," explains Gajdusek. "We also looked at ways of encouraging more mobility of researchers from Black Sea countries within the EU."

Building research capabilities

The project succeeded in encouraging Black Sea countries to participate directly in EU-funded projects, and inspired new cooperation projects like Black Sea CONNECT. Since the project was launched, there has been an increase of at least 10 % in the number of project proposals that include partners from non-EU Black Sea countries.

A Horizon 2020 Summer School successfully trained 25 young researchers from non-EU Black Sea countries, preparing them to participate in future EU-funded research projects.

The project also successfully identified at least 30 research-based industrial clusters in the partner countries. Around 15 industrial cluster managers from the Black Sea region were trained and put into contact with managers from EU Member States.

The partnership, comprising 19 partners in the region, including partners from Azerbaijan, Bulgaria, Georgia, Moldova, Romania, Russia, Turkey and Ukraine, has opened new avenues for young researchers in the region. "We wanted to create new opportunities to encourage the next generation to be a motor of change," the coordinator says. "For this to happen, the role of researchers and the direction of research need to be clearer."

Gajdusek also sees promising developments. "Moldova, for example, has restructured its science and technology funding system and established a dedicated agency," he adds. "In Georgia, there is now better awareness of the topic of social innovation and how research can contribute. This is really an ongoing process."

PROJECT

BLACK SEA HORIZON – Enhanced bi-regional STI cooperation between the EU and the Black Sea Region

COORDINATED BY

Centre for Social Innovation (ZSI) in Austria

FUNDED UNDER

H2020-SOCIETY

CORDIS FACTSHEET

cordis.europa.eu/project/id/645785

PROJECT WEBSITE

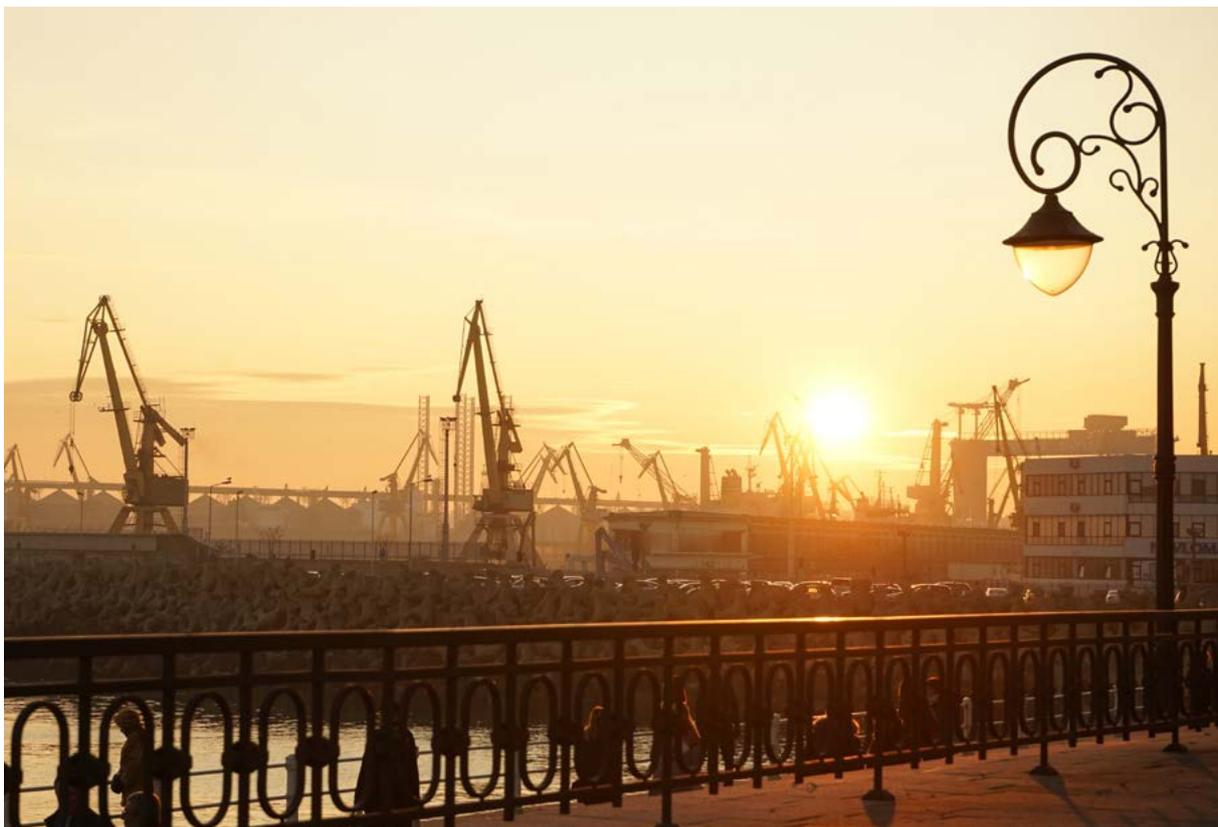
blacksea-horizon.eu

A boost for innovative SMEs in the Black Sea region

The B-SEENOVA project has helped SMEs from the Black Sea region with the most innovation potential to step their game up. The targeted SMEs now have enhanced innovation management capacity and are better prepared for participation in Horizon 2020 calls.

“Research and innovation is crucial for a healthy and sustainable Black Sea by 2030,” Carlos Moedas, former Commissioner for Research, Science and Innovation, said last year. On the bright side, the Black Sea region already benefits from a large pool of SMEs focusing on innovation. But they are still missing a key ingredient: the measures to promote innovation inside their walls in order to generate benefits.

“Almost no SMEs in the region have what we call an ‘innovation management system’. This results in many challenges during the concept stage and development process of innovations, which in turn causes the early death of the project or idea,” explains Cagri Isitan, innovation management capacities expert for the B-SEENOVA (Enhancement of Black Sea Innovation Capacity) project.



B-SEENOVA was initiated for one purpose: increasing the management capacity of SMEs. To do so, the team picked 35 SMEs with the highest growth and internationalisation potential, following a prior audit. These SMEs are active in different sectors, from medical devices to textiles, water pumps and elevator manufacturing.

Tailor-made action plans were prepared for these SMEs, including innovation process mapping from idea to result, as well as leadership, management and cooperation strategies. The action plans provide in-depth analysis of their innovation management, investigating possible gaps between innovation capabilities and innovation goals.

From planning to action

Following the planning phase, the rest of the work consisted in supporting the SMEs in the implementation of the action plans and providing them with detailed information on the Horizon 2020 SME Instrument. "B-SEENOVA raised their awareness level and encouraged them to prepare proposals for the SME instrument," Isitan notes.

Following this process, the majority of the selected SMEs showed they were now able to evaluate themselves in relation to their innovation management capacity. They also made substantial improvements based on the suggestions made by B-SEENOVA experts.

"One concrete example is an SME which had been running innovation activities and had developed a management system for its own internal processes. The problem was that their innovation management system targeted only the management of the company and its research and development department," Isitan adds.

"Other departments weren't included. Thanks to our support, the company management was able to see the bigger picture. They enhanced the innovation management system of the company and extended it to all departments."

Overall, the project team noticed improvements in the business processes of the firms, which in turn can lead to a reduction in production costs and cheaper products or services. "One direct impact from the action is significantly enhanced growth and profitability of SMEs receiving the services. But innovation studies/projects are long term, so observing impacts during the project life cycle is very difficult.

What's important is that they realised some of the things they could do to enhance their current innovation capacity via, among other elements, the tailor-made action plans," Isitan says.

All B-SEENOVA services were fully integrated with the ones offered by the Enterprise Europe Network consortium under the COSME Work Programme 2019. Despite the project coming to an end, the SMEs based in the Black Sea region will keep benefiting from the COSME services related to internationalisation and innovation capacity improvement.



One direct impact from the action is significantly enhanced growth and profitability of SMEs receiving the services.

PROJECT

B-SEENOVA – Enhancement of Black Sea Innovation Capacity

COORDINATED BY

Samsun Chamber of Commerce and Industry in Turkey

FUNDED UNDER

H2020-SME

CORDIS FACTSHEET

cordis.europa.eu/project/id/831213

Innovative aquaponics model shows the way to sustainable aquaculture

Sustainable fishing is critical to maintaining delicate marine ecosystems in the face of climate change. To this end, guidance has been developed to help conventional fish farmers in the Black Sea region move towards more sustainable aquaculture methods.



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While the Black Sea presents enormous economic opportunities, sustainable use of the sea's marine resources is critical to ensuring the long-term viability of fish stocks. One possible solution is aquaponics.

This sustainable production concept integrates fish farming for commercial purposes with the hydroponic cultivation of plants. In aquaponic systems, fish manure provides plants with nutrients, either directly or after bacteria have converted ammonia into nitrites or nitrates.

"A major advantage of aquaponics is that two production streams – vegetables and fish – are obtained with a single input of fish feed," explains ECOFISH (Research on the potential conversion of conventional fish farms into organic by establishing a model and good practice guide) project coordinator Adrian Turek-Rahoveanu, professor at the University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania.

"Vegetable production is incredibly efficient due to the permanent supply of water and nutrients. Vegetables can also be grown vertically, reducing the amount of land needed. No herbicides or pesticides are required."

A key challenge however is the fact that aquaponics requires high investment costs at the beginning, as well as specialised expertise. "Personnel need to have knowledge of both the fish and the plants to be cultivated," notes Turek-Rahoveanu. "Water pumps have to work permanently, which drives up electricity costs."

Overcoming these obstacles may help the region become more resilient in the face of global warming, drought and reduced water resources. "Aquaponic systems do not depend on the environment or climate," he says. "They are located in spaces with controlled temperature and are independent of the soil."

Environmentally friendly aquaculture

In this context, the ECOFISH project was launched in order to promote aquaponic systems in the region, and involved some Romanian partners, amongst others. This research was undertaken with the support of the Marie Skłodowska-Curie Actions programme.

"Our aim was to help aquaculture businesses adopt more environmentally friendly measures, to achieve greater resource efficiencies and to add more value to their end products," explains Turek-Rahoveanu.

To achieve this, the project team brought together several research institutes and universities to develop an aquaponic production platform. A study of fish farms in the south-eastern region of Romania was conducted.

These results fed into the design of an aquaponic recirculating system. The model is designed to meet the requirements of potential beneficiaries, such as existing fish farmers in the region, as well as entrepreneurs interested in the economic possibilities of sustainable aquaculture.

"In addition to defining the technological aspects, we also assessed economic risk, and how fish farms can use

aquaponics to increase their economic competitiveness," says Turek-Rahoveanu.

These findings are available in project papers such as the 'Economic Feasibility Analysis of Aquaponics'. The project's aquaponics model has since been widely disseminated to fish farmers in the region, as well as to local communities where there is potential for farming fish, crayfish and shrimp.

Future of fish farming

The ECOFISH project consortium intends to continue building on this work. Further research will include an in-depth study of recirculating systems, in order to achieve even greater production efficiencies. This work is very much in line with the 2018 Sofia Ministerial Declaration, which called for the Black Sea region countries to achieve more sustainable fishing and aquaculture.

"The research team that participated in this project is currently drawing up more detailed business plans for future aquaponic fish farms in the south-eastern region of Romania," notes Turek-Rahoveanu. "We are confident that this innovation will bring economic and environmental benefits to the region."

What the project team is really looking forward to, he adds, is witnessing the establishment of the first aquaponic fish farms in Romania: "Our project will have played a part in this, through the support and advice that our research teams have been able to give."



We are confident that this innovation will bring economic and environmental benefits to the region.

PROJECT

ECOFISH – Research on the potential conversion of conventional fish farms into organic by establishing a model and good practice guide

COORDINATED BY

University of Agronomic Sciences and Veterinary Medicine of Bucharest in Romania

FUNDED UNDER

H2020-MSCA-RISE

CORDIS FACTSHEET

cordis.europa.eu/project/id/645691

Port cities that move with (shorter) times

Port cities face important governance and mobility issues that can hinder their potential as engines for national and international growth. The PORTIS project, part of the CIVITAS initiative, has been solving these problems in five major pilot port cities across Europe.

The potential of port cities is only matched by the high number of challenges they're facing. Considered by the EU as a priority action area and one of Europe's major assets, these cities have nevertheless seen the difficulties of having a port of their own increase over time.

City-port governance, social exclusion, large infrastructure investments, weak integration between ports and city centres, car-dependent commuters and the rapid growth in freight transportation are among the greatest problems they need to tackle.



With PORTIS (PORT-Cities: Integrating Sustainability), a 33-strong consortium led by the City of Antwerp has been trying to bring a fully blown 'innovation system' to port cities. "We essentially explore two avenues," says Marijke De Roeck, coordinator of the project. "The first is more and better mobility of goods and services. The second is a better design and functionality of urban spaces and transport networks."

To tackle these mobility-related issues, the project designed, demonstrated and evaluated defined sets of measures in five major port cities: Aberdeen and Antwerp in the North Sea, Trieste in the Mediterranean, Klaipeda in the Baltic Sea and Constanta in the Black Sea.

In Constanta for instance, inadequate accessibility and the resulting congestion have been a major issue. The project consortium, including many partners from Romania, implemented 11 measures with three core objectives.

The first was to implement an efficient and integrated traffic management system between the city and the port. The second was to better integrate collective transport from the city to the

port to discourage the use of private cars. Finally, the third objective was to enhance access to the port area by increasing the number of entrances and the share of environment-friendly transport modes.

"The project enabled a dialogue with citizens and other stakeholders unlike anything seen before, with a decision support system based on relevant data. The port and city also co-signed

a cooperation protocol for less car-dependent commuting. New ways of commuting to the port were implemented," De Roeck explains. Public transport was expanded with 104 new buses, 41 of which are electric. The city added 39 new bus stops and 133 km of new bus lanes.

Off to a new start

Constanta post-PORTIS is like a brand-new city. According to statistics provided by the project consortium, 100 new jobs and 15 new businesses were created at the docks. Commuting travel time reduced by 10%, whilst car commuting went down 4%.

Meanwhile, cycling and walking increased by 36%. The PORTIS results could also serve as inspiration for other port cities in the Black Sea aiming for improved sustainability.

Positive trends were observed in other pilot cities, too. The city of Antwerp created a multimodal travel planner to collect data and inform or nudge citizens. Locals reduced their car use by 7% while cycling increased by 6% between 2017 and 2019. Aberdeen saw its traffic flows during rush hours decrease by 8%, while the punctuality of public transport in Klaipeda increased by 12%.

"By working with port cities, the project will generate a strong replication potential. This is true for other port cities, but also for other types of cities presenting major transport nodes and magnets. We could think of industrial poles, freight villages, commercial districts, entertainment complexes or cities located on Trans-European Transport Network (TEN-T) nodes," De Roeck notes.

Whatever the future holds, PORTIS is sure to inspire improved governance and the creation of more sustainable and healthier environments in port cities. Its results will help shape more integrated transport systems while improving the efficiency of urban freight transport. But most importantly, it will help port cities climb back to their rightful place as growth poles for the whole of Europe.



The project enabled a dialogue with citizens and other stakeholders unlike anything seen before, with a decision support system based on relevant data.

PROJECT

PORTIS – PORT-Cities: Integrating Sustainability

COORDINATED BY

City of Antwerp in Belgium

FUNDED UNDER

H2020-TRANSPORT

CORDIS FACTSHEET

cordis.europa.eu/project/id/690713

PROJECT WEBSITE

civitas.eu/portis

Unique Black Sea and Caspian Sea biota is disappearing at a worrying pace

When thinking of biodiversity losses, widely known species like tigers or elephants often come to mind. But recent research in the Black Sea and Caspian Sea region shows how hundreds of other unique species have been silently disappearing amidst general indifference.



The Black and Caspian Seas and their biota are under threat. Known for their unusual salinity regimes and widespread occurrence of low-oxygen zones, these landlocked waters are seeing a huge share of Pontocaspian species disappear. Climate change, habitat destruction, invasive species and pollution are largely responsible for this phenomenon.

"We are witnessing the demise of a 15 million-year evolutionary experiment," notes Frank Wesselingh, molluscan palaeontologist at the Naturalis Biodiversity Center. "Species unique to the region, which adapted to unusual and variable salinity settings over this very long period – like sturgeons, the Caspian seal and hundreds of small species of fish, crustaceans and molluscs – are suffering badly."

Take the Caspian zebra mussel for instance. This species, which used to be the most common mollusc in both seas and has a fossil record of 5 million years, became extinct 20 to 30 years ago. The consequences of this disappearance remain unpredictable to this day.

With the PRIDE (Drivers of Pontocaspian biodiversity Rise and DEmise) project, Wesselingh aimed to study ecosystems' responses to such events and human perturbations in general. "We know much better now which groups are sensitive to change and which groups are more resilient. Whilst we can try to preserve some species, it is now clear that we won't be able to save them all."

"We know for instance that the Caspian seal is about to lose its major pupping grounds due to the projected warming and sea level drop which is expected to reach 18 metres over the next 80 years. Meanwhile, all six sturgeon species in the Black Sea and Caspian Sea are threatened, and some tiny snails might also be worthy of additional protection."

PRIDE research involved biologists, geologists and climatologists in the study of the entire region, instead of individual basins. Its main goal was to understand the drivers of past and current biodiversity crises. In 4 years, the team, including members from Azerbaijan, Romania, Russia, Turkey and Ukraine, has managed to identify which groups would be most affected by current perturbations and why.

A bleak future

"The future looks bleak," Wesselingh says. "A number of species from the region such as zebra mussels have become massive invaders in western Europe and North America. They have very

strong impacts there, either beneficial or very negative, on ecosystems and humans. That's the 'good' part as these will survive. But beyond that, the harsh truth is that we have lost almost all natural communities over the past decades. And I am pretty sure that we will lose a major part of what remains of the unique Pontocaspian biota."

All in all, between half and three quarters of local species have become threatened, highly threatened or extinct over the past 50 years.

While Wesselingh insists that it is worth increasing conservation efforts for these unique species, the continued onslaught of invasive species, environmental degradation and climate change certainly make for a tough battle. "In the end, an aquatic biota will remain, but it will most likely consist of a few global species rather than the plethora of unique species that used to characterise this region."

Now completed, PRIDE leaves behind a wide network that will continue to expand knowledge in conservation action. It also provides a taxonomic information platform on the Pontocaspian biota and an information system on climate data, anthropogenic pressures and biodiversity in the Caspian Sea-Black Sea region.



We are witnessing the demise of a 15 million-year evolutionary experiment.

PROJECT

PRIDE – Drivers of Pontocaspian biodiversity Rise and DEmise

COORDINATED BY

Naturalis Biodiversity Center in the Netherlands

FUNDED UNDER

H2020-MSCA-ITN

CORDIS FACTSHEET

cordis.europa.eu/project/id/642973

PROJECT WEBSITE

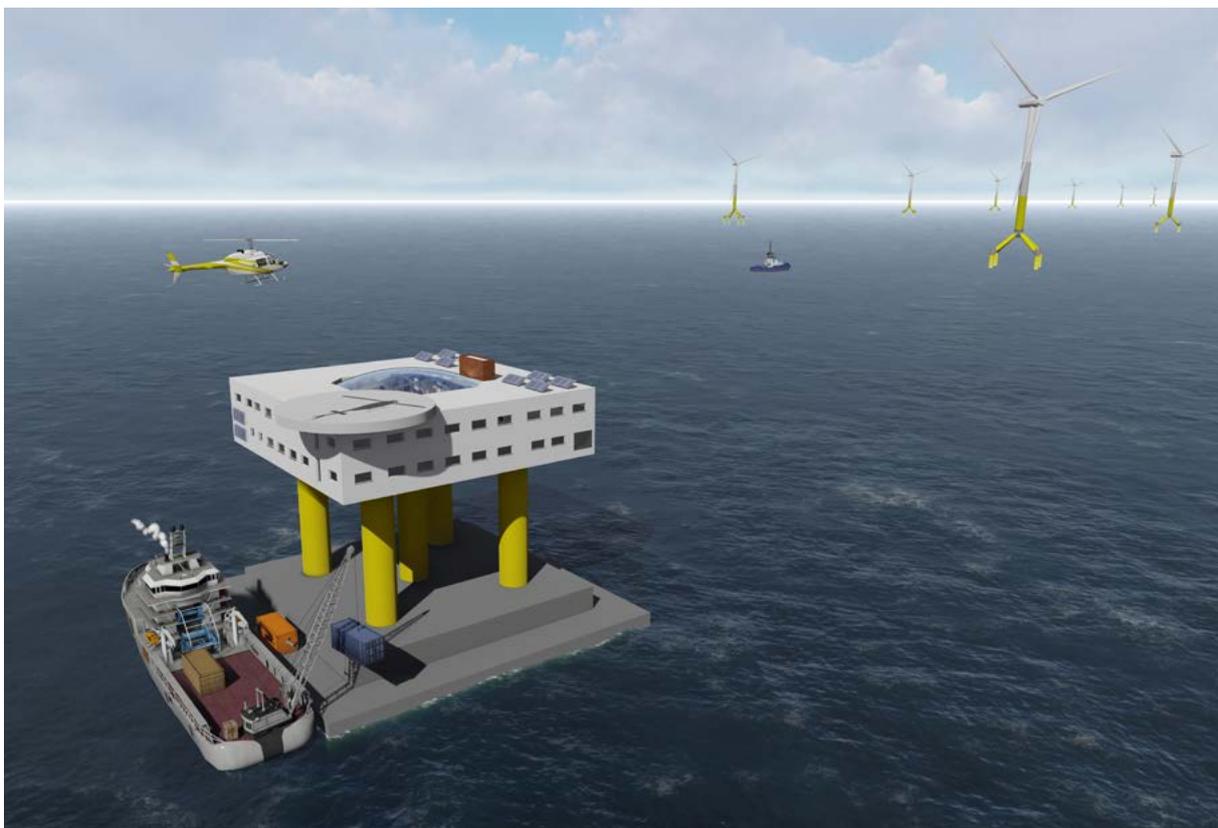
pontocaspian.eu

Floating islands to work and live on

Large, artificial floating islands are potentially cheaper, more sustainable and more flexible than new land created through poldering or infilling. In the face of increasing need for offshore activities and expansion of coastal areas, the Space@Sea project provides new designs and technologies enabling such projects.

Soon enough, Europeans living on water could become a thing. We're not talking boats here, but rather gigantic floating platforms with housing sitting on top of them. If you're still in doubt, three statistics could help convince you. The European population is growing and will soon hit 450 million, urbanisation is expected to increase to approximately 83.7% in 2050, and 40% of Europe's GDP is generated in coastal regions. Meanwhile, offshore activities quite literally have had the wind in their sails.

"Harvesting energy from the wind at sea is more efficient than on land because of the more constant winds. Besides, the sea itself is more and more seen as a source of food and materials. If we combine the trends of population growth, the shift to cities and coasts, sea level rise and increased activities at sea, we can see this all calls for solutions to add 'space at sea,'" says Maarten Flikkema, coordinator of the Space@Sea (Multi-use affordable standardised floating Space@Sea) project on behalf of MARIN.



Multipurpose solutions

Space@Sea aims to deliver multipurpose floating islands with a low environmental impact, demonstrate them at small scale, and evaluate business cases for two European regions. By the end of the project's life cycle, the consortium hopes to validate a logistics hub in the North Sea and an energy hub in the Mediterranean. Both hubs will include aquaculture and living facilities. Moreover, the project has considered the creation of a floating logistic hub as a single-use option in the Black Sea.

Earlier projects had already focused on multi-use business cases for floating islands. But Space@Sea goes further by focusing on cost reduction, sustainability and the development

of technical solutions related to island shape, floater type and mooring. As Flikkema notes: "There are currently no technical solutions for large-scale floating islands due to a lack of regulation and governance. All activities at sea involve ships, small platforms or new land created by poldering or infilling. The latter option, which the Netherlands is

famous for, has two main drawbacks: it's irreversible with a very large impact on the environment, and it's only technically and economically feasible up to a water depth of approximately 25 metres."

Such constraints would irremediably rule out the Black Sea, where the Romanian port city of Constanta has been looking for a modular island solution to welcome ongoing development and expansion projects. These include: an extension of approximately 150 ha by means of an artificial island; the development of an LNG terminal to meet growing energy demand; the development of a wind farm field and wind power plant; and a barge terminal expansion.

Now close to its completion, the project has successfully demonstrated three core designs. The first is the basic floater design – a rectangular floater with a side length of 45 or 95 metres. The second is the mooring system for the modular

platform, which can flexibly and efficiently cope with the platform-imposed mooring. Finally, there is the operation and maintenance platform for floating wind farms. The two-level platform's working and living rooms offer space for approximately 32 people. It should enable the storage of spare parts and fuel reserves while reducing costs of ship and helicopter transfers. The Romanian project partner, ICEPRONAV Engineering, has contributed with engineering of the floater design and its applications.

"The Space@Sea philosophy is that living follows work. As working activities require comfortable living conditions, our platforms will attract a larger workforce and even encourage them to take their family offshore. We expect the floating island to gradually grow in size and require a growing number of functions," Flikkema explains. "Likewise, cities may face the need to grow but have no space to extend inland. They would naturally turn to the sea for a solution."

In the short term, Flikkema says the energy hub has the most potential for further offshore applications. It will act as an accelerator for the development of floating islands. Other applications such as living, leisure activities, logistic services and aquaculture should rapidly follow. "We will conclude our work with a roadmap for the deployment of floating islands," he adds. "Now that a technical solution is available, further discussions on regulations and governance can be initiated."



The Space@Sea philosophy is that living follows work. As working activities require comfortable living conditions, our platforms will attract a larger workforce and even encourage them to take their family offshore.

PROJECT

Space@Sea – Multi-use affordable standardised floating Space@Sea

COORDINATED BY

MARIN in the Netherlands

FUNDED UNDER

H2020-FOOD

CORDIS FACTSHEET

cordis.europa.eu/project/id/774253

PROJECT WEBSITE

spaceatsea-project.eu

Advancing the legacy of SIMSEA to solve the mysteries of the Black Sea

The EU-funded SIMSEA project, supervised by the European Commission's Joint Research Centre, worked to create an advanced ecosystem model for the complex Black Sea ecosystem that can be used to generate baseline and first-scenario simulations, and consider different policy options and climate change scenarios. Whilst the project officially ended in 2017, the JRC has continued to build upon and advance its modelling tools in the years since.



Implementing ecosystem models for all European regional seas was a task taken up by the Joint Research Centre (JRC), but the Black Sea proved particularly problematic. “For several years, the complex hydrodynamics of the Black Sea defeated our efforts and even resulted in a failed PhD study,” says Adolf Stips, from the JRC, who is currently responsible for marine modelling. “Eventually we were able to implement first the Black Sea hydrodynamic and later the biogeochemical model, including invasive jellyfish species and thereby completing our overall European marine modelling tools.”

Building on the SIMSEA model

The SIMSEA (Scenario simulations of the changing Black Sea ecosystem) project itself was a Marie Skłodowska-Curie individual fellowship granted to Bulgarian researcher Svetla Miladinova, who proved herself to be an invaluable addition to the JRC’s modelling team. “When I joined the team, which during SIMSEA consisted of just three people, they were fantastic in helping me begin the research and were there to guide me through the whole project,” she explains. “And because of its success, I’ve continued to work closely with them.”

In particular, she’s currently looking at the fate of pollutants and the spread of floating debris in the Black Sea. “These ongoing studies are definitely built on the foundations of what we achieved in SIMSEA and this will be

keeping me busy for the foreseeable future.” In particular, these new studies have been made possible due to the extension of the SIMSEA model with tools capable of simulating the transport of marine floating litter, as well as the advection and diffusion of contaminants, typically entering the sea from rivers.

A wider policy impact

SIMSEA’s legacy is also being utilised from a policy perspective as well. Stips and his team are currently supporting the European Commission’s DG Environment by using freshwater and marine modelling tools to monitor the policy implementation process, assess measures proposed by EU Member States and provide

scientific advice across all of Europe’s regional seas. “Regarding the Black Sea specifically, we have just signed a large contract with DG Environment to support our work there until 2023,” Stips comments.

However, despite all of their recent work, Stips does concede that the Black Sea, when compared to the other regional seas (Baltic and North), is clearly much less well known and investigated, so there are still many possible research options open for further study. The JRC though is focusing on scientific issues with policy relevance, such as algae blooms, marine litter, contaminants and overfishing. “Finally, we’ve just started working to develop and implement a new Black Sea food web model comprising fish, turtles, dolphins and seabirds that is intrinsically coupled to our biogeochemical model that we initially developed through our work on SIMSEA,” Stips concludes.

So, whilst the Black Sea does indeed continue to hide many mysteries below its murky depths, the scientific work of Stips, Miladinova and their fellow colleagues within the JRC is definitely contributing to unlocking its secrets and bettering our understanding of one of Europe’s most important seas.

PROJECT

SIMSEA – Scenario simulations of the changing Black Sea ecosystem

COORDINATED BY

Joint Research Centre, European Commission in Belgium

FUNDED UNDER

H2020-MSCA-IF

CORDIS FACTSHEET

cordis.europa.eu/project/id/660841

PROJECT WEBSITE

bit.ly/3jcPMJk



Regarding the Black Sea specifically, we have just signed a large contract with DG Environment to support our work there until 2023.

Another spotlight on successful EU-funded projects making a difference in Black Sea research

Whilst this Results Pack has already comprehensively introduced you to several important Black Sea-related projects, in order to highlight further the variety of work that contributes to Black Sea research, five other projects also definitely deserve a positive mention. These range from sectorial aspects to research policy governance and networking, to name but a few!



The **ALFF** project, supported by the Marie Skłodowska-Curie Innovative Training Network (ITN), aimed to better understand algal biology and its role in how the ecosystem functions. The team specifically studied and monitored both beneficial and harmful microbes, collectively known as the algal microbiome.

ALFF was an international cooperation aimed at training early-stage researchers in the field, advancing algal cultivation and contributing to new biocontrol strategies. Project partners worked to identify naturally occurring algal symbionts and pathogens and characterise their interactions through state-of-the-art genomics, molecular and biochemical techniques. Importantly, one of the PhD researchers within the training network, Kathryn Morrissey, was seconded from Ghent University to a university in Turkey where she was able to conduct part of her research on algae.

Essential knowledge generated during ALFF will help address the challenges associated with the commercial exploitation of algae and enhance the rapidly developing algal aquaculture industry.

The second project highlighted is the **GreenBubbles** project, dedicated to maximising the benefits associated with diving, while minimising its negative impacts. The aim was to achieve environmental, economic and social sustainability in scuba diving.

This Marie Skłodowska-Curie Research and Innovation Staff Exchange (RISE) project produced a comprehensive set of guidelines and recommendations, a quality labelling system for the diving industry and an innovative underwater 3D mapping approach. This consists of new devices and online tools for use by researchers, managers of Marine Protected Areas, dive operators and citizen scientists. The project co-created a number of programmes linking diving, citizen science and ocean literacy. It also released a VR gaming experience and an online database and tool dedicated to diving safety.

The knowledge generated during the project was used to develop new or improved services, devices and tools, which targeted areas for the sustainable expansion of the

diving sector. A set of tools linked ocean literacy and citizen science with scuba diving, and included a modular teaching manual stemming from school curricula and official diving training programmes, a suite of university-level courses, and 'train-the-trainers' activities.

Coordination and Support Actions (CSAs) are another type of project, supporting research policy, funding cooperation or networking.

The first example of a **CSA** is **Oceans 2**, which contributed to the first developments of the Joint Programming Initiative on 'Healthy and Productive Seas and Oceans' (JPI Oceans), building further on the outcomes of the 7th Framework Programme's first CSA Oceans project.

JPI Oceans is an intergovernmental platform, established in 2011, that currently consists of 20 member countries, including Romania and Turkey which border the Black Sea. It adds to the value of national research and innovation investments by aligning national priorities and implementing joint actions. The CSA supported the implementation of joint transnational activities, facilitated the organisation of activities with stakeholders, information management and outreach, and provided a framework for evaluating, assessing and monitoring joint actions.

Finally, **BioHorizon** (including Moldova and Turkey) and **NCPs CaRE** (including Moldova) are two networking CSA projects for National Contact Points (NCPs) for research. They created a network of NCPs to significantly strengthen transnational cooperation, enabling all NCPs to share knowledge through distributed knowledge and collective development and training. This increases the mutual understanding of different approaches and requirements in the daily work of an NCP, including complex and multidisciplinary aspects of Horizon 2020.

**ALFF – The Algal
Microbiome: Friends
and Foes**

Coordinated by the Scottish
Association for Marine
Science in the United
Kingdom

Funded under MSCA-ITN

CORDIS FACTSHEET
[cordis.europa.eu/project/
id/642575](https://cordis.europa.eu/project/id/642575)

**GreenBubbles – Green
Bubbles RISE for
sustainable diving**

Coordinated by the
Polytechnic University
of Marche in Italy

Funded under MSCA-RISE

CORDIS FACTSHEET
[cordis.europa.eu/project/
id/643712](https://cordis.europa.eu/project/id/643712)

PROJECT WEBSITE
greenbubbles.eu

**BioHorizon –
Cooperation between
NCPs for Horizon 2020
Societal Challenge
2 on “Food Security,
Sustainable Agriculture
and Forestry, Marine,
Maritime and Inland
Water Research and the
Bioeconomy” and the
Key Enabling Technology
– Biotechnology**

Coordinated by
the Institute of
Fundamental Technological
Research, Polish Academy
of Sciences in Poland

Funded under H2020-FOOD

CORDIS FACTSHEET
[cordis.europa.eu/project/
id/652637](https://cordis.europa.eu/project/id/652637)

PROJECT WEBSITE
ncp-biohorizon.net

**CSA Oceans 2 –
Coordination action
in support of the
implementation of the
Joint Programming
Initiative on ‘Healthy
and Productive Seas and
Oceans’**

Coordinated by
the Federal Science Policy
Office (Belspo) in Belgium

Funded under H2020-FOOD

CORDIS FACTSHEET
[cordis.europa.eu/project/
id/696324](https://cordis.europa.eu/project/id/696324)

PROJECT WEBSITE
jpi-oceans.eu/csa-oceans-2

**NCPs CaRE – National
Contact Points for
Climate action, Raw
materials, Environment
and Resource Efficiency**

Coordinated by
FZ Jülich in Germany

Funded under
H2020-ENVIRONMENT

CORDIS FACTSHEET
[cordis.europa.eu/project/
id/642025](https://cordis.europa.eu/project/id/642025)

PROJECT WEBSITE
ncps-care.eu

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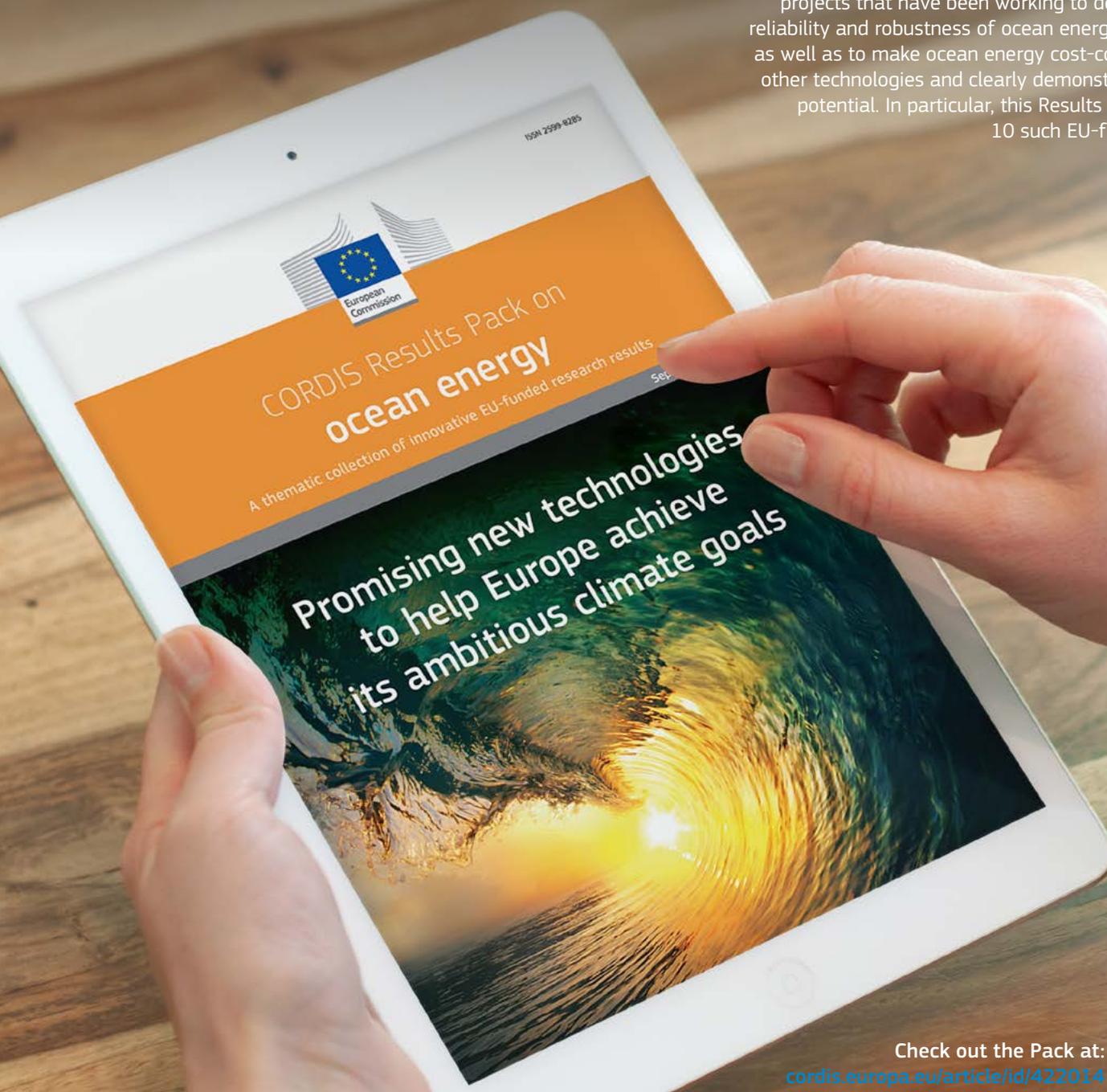
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RESULTS PACK ON OCEAN ENERGY

Horizon 2020 has been active in providing support to projects that have been working to demonstrate the reliability and robustness of ocean energy technologies, as well as to make ocean energy cost-competitive with other technologies and clearly demonstrate its market potential. In particular, this Results Pack highlights 10 such EU-funded projects.



Check out the Pack at:
cordis.europa.eu/article/id/422014



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