

The role of science diplomacy in strengthening cooperation between the two shores of the Mediterranean

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ABSTRACT

The Mediterranean is facing multiple pressures and combined impacts of anthropogenic and natural disturbances at different scales and contexts, along with increasing social and economic risk perceptions and concerns about serious threats, such as political instability, fragile health systems, youth unemployment, climate change, poverty, and migration, among others. Mediterranean socio-economic activities rely on marine resources and maritime services. However, its sea and coasts are under pressure, with an urgent need for effective, efficient, and successful solutions for the protection of its habitats and ecosystems and for the safety, security, and prosperity of its population.

Recognizing the value of each country's specificity as a strength for the Mediterranean region, there is an opportunity for a cultural transformation to create a proud community that shares the same region as a common value for the benefit of the Mediterranean (Mare Nostrum). This chapter focuses on the role of the 5+5 Dialogue for research, innovation, and higher education in facilitating

scientific cooperation among countries on the Western Mediterranean shores. It presents the Dialogue as a best practice for using the instrument of science diplomacy and as a concrete contribution of Italy to the 5+5 Dialogue through the Blue Skills initiative, which supports the development of skills, capacity building, and mobility in the sustainable blue economy sector and aims to promote youth employability, valorize investment conditions to ease the interconnection between governance, industry, and academia, and create appropriate conditions for dialogue to pave the way toward spreading evidence-based policy and supporting decision-making across Mediterranean borders.

I. INTRODUCTION

The Mediterranean Sea is one of the most complex areas in the world (UFM - Union for the Mediterranean, 2021a). It is the largest of the semi-enclosed European seas and is surrounded by 22 countries, which together share a coastline of 46,000 km and are situated across three continents: Africa, Asia, and Europe. With approximately 542 million people living in the Mediterranean Basin in 2020, the number is expected to increase to 657 million by 2050 and 694 million by 2100 (Hilmi et al., 2022).

The Mediterranean is also one of the world's top biodiversity hotspots (United Nations Environment Programme/ Mediterranean Action Plan and Plan Bleu, 2020). This semi-enclosed sea presents multiple types of coastlines, including islands, deltas, coastal plains, high cliffs, and mountainous areas, providing various natural and anthropogenic landscapes and multiple types of seabeds hosting diverse ecosystems and habitats. It is home to more than 17,000 marine species. While only representing around 1% of the global ocean volume, the Mediterranean has the highest rate

of endemism at a global level (20% to 30% of species are endemic) (United Nations Environment Programme/Mediterranean Action Plan and Plan Bleu, 2020).

Land of civilization and place of inestimable cultural heritage and traditions, the Mediterranean is the world's leading tourist destination. It is also one of the busiest shipping routes. It is the crossroads of major global maritime routes, from the Strait of Gibraltar to the Suez Canal (Hilmi et al., 2022). The Mediterranean is, in fact, a sea of opportunities: 30% of trade and transport of oil goes through the Mediterranean, 20% of global maritime transport goes through the Mediterranean, and 10% of the global GDP is generated in the Mediterranean (United Nations Environment Programme/Mediterranean Action Plan and Plan Bleu, 2020).

With various levels of development and democracy and many differences from the cultural, religious, social, and economic viewpoints (Riccaboni et al., 2020), the divergent growth paths in the two shores of the Mediterranean have increased the gaps, creating new challenges that overlap with other crises. State fragility, conflicts, insecurity, and socio-economic inequalities have turned the area into one of the world's most vulnerable regions, whose geo-strategic importance goes far beyond its geographical borders, thus intensifying its fragmentation and instability.

To quicken the response to this urgent need to protect the Mediterranean and to promote socioeconomic development of the whole area, the use of an instrument such as science diplomacy could be of great benefit to ease dialogue among Mediterranean countries, spread transboundary cooperation at multi-level governance, support policy and decision-making at national levels, and, above all, give value to each country's specificity, which could be considered a strength for the Mediterranean region.

2. MEDITERRANEAN AND YOUTH UNEMPLOYMENT

Unemployment affects 67.6 million young women and men, representing 13.6% of the youth labor force (ILO - International Labour Organization, 2020). Youth unemployment is on the rise in the Mediterranean. It is highest in Northern Africa and in the Arab states, at around 2.2 and 1.7 times the global rate, respectively.

The average youth unemployment rate in the Mediterranean is 25%. The eastern and southern shores of the Mediterranean witness an even higher youth unemployment rate, especially for women. Indeed, young women in the Southern and Eastern Mediterranean are 70–100% more likely to be unemployed than young men. Moreover, higher education (HE) graduates living in these areas experience higher unemployment rates than do people with basic education.

According to the Union for the Mediterranean (UFM - Union for the Mediterranean, 2021b), «almost 60% of the regional population is today under the age of 30, and the number of young people under the age of 15 is forecasted to increase over 18%. This represents an asset for the region; therefore, a positive and action-oriented regional agenda on youth employability is indispensable for unleashing the region's human and economic potential capital. As requisite for peace and stability in the region, priority actions must be built on promoting competitiveness and enhancing job opportunities, in particular for youth».

Despite youth in the Southern Mediterranean being the most educated generational group ever, young graduates in the region, especially in North Africa, experience the highest level of unemployment among higher education graduates in the world: around 29.8%.

To improve the current situation characterized by political instability, economic difficulties, social regression, and

environmental problems, national labor markets in the Mediterranean region need to focus on job creation for youth based on innovative employability models. Thus, universities and research centres are key actors in generating innovation and developing skills that help build vibrant and sustainable development in the Mediterranean and contribute to knowledge transfer to societies and economies. The recent pandemic situation has made the socioeconomic situation more critical and urged quick and strong policy responses.

One of the immediate actions is to look for a way to use and provide available skills to end unemployability. Another remedial action to unemployment is to develop those skills that are really needed by the existing labor market and reply to the requested workforce (the job I need, needs me). For a long-term strategic plan, developing specific skills, taking into consideration labor market needs, should be applied to both the evolution of the global labor market and the availability of skills, thus responding appropriately to local economies. By skills, we mean both vocational education and training (VET) and HE. VET responds to the needs of the economy (productive sector) but also provides learners with skills that are central for personal development and active citizenship, whereas HE helps create new profiles (the leaders of tomorrow), such as project managers in the specific economic sector.

To consolidate the development of skills, partnerships are needed to foster joint programs in HE and to facilitate the circulation of talent. This includes joint master's and Ph.D. programs, specialized training courses and workshops, and fostered scientific mobility and international science cooperation to establish joint university departments and labs in the Mediterranean region, including training-of-trainers and enhanced curricula that can respond to the labor market at any age.

3. THE 5+5 DIALOGUE AS A MECHANISM FOR REGIONAL COOPERATION

Over the last decade, science diplomacy has been conceptualized and institutionalized as a policy tool, diplomatic framework, and transdisciplinary research field, becoming increasingly adopted by national governments and multilateral and intergovernmental organizations, including the European Union (EU), the United Nations (UN), and the Union for the Mediterranean (Gual Soler and Perez-Porro, 2021). The EU is now carrying on a stakeholder engagement process with the aim of developing an EU Science Diplomacy Agenda, and there is an increasing number of scientific papers, conferences, workshops, webinars, and training courses organized by national and international institutions and scientific agencies all over the world, obviously showing wide attention to the topic.

Moreover, in view of the urgent need to spread evidence-based policy and support decision-making across the Mediterranean, there is a need to strengthen the interaction between science, diplomacy/policy, and society.

Specifically, considering the Mediterranean context, science diplomacy is a powerful tool, a set of practices, and a promising mechanism to address cross-border interests, taking into consideration each country's specific needs, to meet global challenges, and to strengthen collaborations between stakeholders for a common interest and give value to countries' specificities as a strength for the entire Mediterranean.

In 2015, 10 ministers in charge of research, innovation, and higher education of the 5+5 Dialogue countries of the Western Mediterranean met during the Ministerial Conference held in Madrid with the participation, as observers, of the European Commission, the Secretariat General of the

Arab Maghreb Union, and the Secretariat of the Union for the Mediterranean. The ministers signed a declaration (Madrid Declaration) that aims to strengthen cooperation in research, innovation, and HE for promoting sustainable economic growth and social inclusion and creating new opportunities for youth in the Western Mediterranean.

As an intergovernmental forum, the *raison d'être* of the 5+5 Dialogue is to ensure closer collaboration between the five EU Member countries (France, Italy, Malta, Portugal, and Spain) and the five Arab Maghreb countries (Algeria, Mauritania, Morocco, Libya, and Tunisia) through political dialogue and cooperation and by encouraging more effective resource management as a means of strengthening interdependence, development, and regional dialogue.

The declaration underlines the importance of research, innovation, and HE for addressing challenges such as unemployment, economic underdevelopment, environmental degradation, shortage of natural resources, water scarcity, and food and energy security. Ministers emphasize the common determination to strengthen collaboration to reinforce the potential of youth and access to HE as fundamental to the development and prosperity of the Mediterranean region.

4. BOOSTING CROSS-BORDER COOPERATION IN THE SUSTAINABLE BLUE ECONOMY IN THE MEDITERRANEAN

The world ocean is the largest existing ecosystem on our planet. Oceans cover over 70% of the Earth's surface, carry out about 50% of global primary production, and support the greatest biodiversity. They are also one of the largest carbon reservoirs in the Earth's system, holding up to 54 times more carbon than the atmosphere. Therefore, the oceans, seas, and

inland waters are very important in regulating the Earth's system, supplying living and non-living resources, and providing social and economic goods and services. Water gives life and provides humanity with food, energy, and oxygen and regulates climate, but it can take life away as well when its scarcity leads to hunger and poverty and when its excess causes floods, landslides, and extreme hydrogeological instability.

Besides natural risks, anthropogenic activities damage the planet by overexploitation, leading to the depletion of natural resources and the destruction of ecosystems and pollution, causing severe socioeconomic and environmental impacts. Therefore, it is fundamental to reverse the process and maintain an ecological balance to benefit from the myriad opportunities that emerge from nature and oceans.

The objective is to encourage researchers of the 5+5 Dialogue countries to develop north–south and south–south collaborations dedicated to public and private research and HE through the interaction of experts and institutions across the Mediterranean. These collaborative networks will address priority issues with anticipated scientific, technological, and societal challenges, thus enabling researchers from both shores of the Mediterranean to formulate European collaborative research projects and submit them successfully.

The blue economy is the sustainable use of ocean resources for economic growth, improved livelihoods, jobs, and ocean ecosystem health. The blue economy concept was introduced in 2004 by Gunter Pauli (Pauli, 2012), who launched it «based on the ZERI (Zero Emissions Research & Initiative) philosophy, to engage a global network of experts and creative minds to seek solutions inspired by nature's design principles». His book *The Blue Economy: 10 Years – 100 Innovations – 100 Million Jobs* highlights that the «blue economy business model» will shift society from scarcity to abundance

by using available resources and tackling ecosystems' issues in an innovative way (Waldegrave, 2017).

Several initiatives fostering the blue economy ecosystem in the EU have seen the light. According to the European Integrated Maritime Policy (Breuer, 2022), macro-regional sea basin initiatives are being implemented in the seas bordering Europe, promoting growth and development strategies that exploit the strengths and address the weaknesses of each large sea region in the EU.

The cross-border blue economy alliance has been nurtured by some specific bilateral cooperation agreements that strengthen and consolidate integration among partner countries, such as the partnership agreement signed between the cluster Blue Italian Growth (BIG) and the Cluster Maritime Tunisian (CMT) in June 2020 as drivers to accelerate employability, entrepreneurship, and capacity building, especially in countries on the southern shore of the Mediterranean (Gibson, 2020). The importance of the marine and maritime industries will continue to grow in the Mediterranean region. The blue economy sector is an engine of human and economic development for the entire region. Taking full advantage of this sector's potential will require a multi-skilled workforce from a wide variety of marine and maritime professional backgrounds, which necessitates new knowledge, skills, and innovation. To achieve this goal, HE and VET must innovate and gain relevance and quality.

Therefore, digital transformation and ecological transition, along with the development of skills, cluster development, and marine spatial planning (MSP), represent key tools to «drive» priority actions at national and regional levels and build conscious governance at local, national, macro-regional, and Mediterranean levels to optimize the skills and improve existing investment mechanisms.



Fig. 1. Cross-border sustainable blue economy in the Mediterranean region.

5. VARIOUS INITIATIVES AND ACTIVITIES THAT SEEK TO IMPACT POLICYMAKING IN THE MEDITERRANEAN

The Mediterranean has seen the development of various initiatives and activities that seek to impact policymaking by introducing a more systematic approach, such as the Barcelona Convention for the Protection of the Mediterranean Sea Against Pollution; the BLUEMED initiative and its Strategic Research and Innovation Agenda (SRIA); the EU Cooperation in Science and Technology (COST) Action on «Ocean Governance for Sustainability»; the EU COST Action for advancing knowledge and unifying concepts and approaches in the emerging field of Marine Functional Connectivity (Sea-Unicorn); the UN Mediterranean Action Plan for the UN decade of ocean science for

sustainable development and various training on science–society–policy interface in the Mediterranean promoted by UNESCO, the Union for the Mediterranean (UfM), and other actors. All these policy development and regional cooperation initiatives consistently speak of a gap in the skills and mindsets of policymakers and urge greater integration of knowledge and its proper communication, thus investing in a new generation of policymakers through dedicated capacity building, providing timely science advice to policy, and fostering dialogue within the knowledge triangle (academia–society–policy).

Research, innovation, and HE play an important role in facilitating cooperation, promoting youth employability, and valorizing investment conditions to ease the interconnection between governance, industry, and academia. The UfM is supporting this through various engagements tailored to specific stakeholders and target audiences, particularly youth and women, such as the Blue Skills project of the Italian National Institute of Oceanography and Applied Geophysics (OGS), which is headquartered in Trieste. The Blue Skills project promotes opportunities for «Blue» careers by developing skills, exchanging knowledge, and valorizing research for a more sustainable Mediterranean Sea. Its aim is to develop new curricula, increase employability in the marine and maritime sectors, and promote dialogue through the instrument of science diplomacy. The latter has the potential to spread the evidence-based policy and decision-making approach across borders through multilateral negotiations, transboundary cooperation, multi-level governance, and multi-stakeholders' approaches. Recognizing the value of countries' specificities as a strength for the Mediterranean region, there is the opportunity for a cultural transformation to create a proud community that shares the Mediterranean Sea as a common value.

The UfM's policy dimension is structured around regional dialogue platforms involving representatives from governmen-

tal institutions and experts, regional and international organizations, local authorities, civil society, the private sector, and financial institutions. The UfM is also advancing regional and sub-regional cooperation by supporting integration and partnerships within shared objectives, including strengthening cooperation on the blue economy and maritime governance and facilitating the transition to a sustainable blue economy.

In addition, the EU, through its several programs and dedicated actions, such as the European COST organization enabling research and innovation networks; Horizon Europe, particularly under the emerging «Ocean» mission; the EU's European Neighbourhood Instrument (ENI) for regional and bilateral cooperation projects; and the Erasmus+ program particularly for the actions that aim at forging partnerships (for innovation, knowledge alliances, etc.), is also exposing the academic communities from the non-EU neighbouring countries in the Mediterranean to the knowledge about the EU policies and motivating them to internalize them. Its ultimate objective is stimulating discussion and reflection with policymakers and the public on sustainable development of the Mediterranean Sea and its hinterland and the role and impact of the EU on European and non-European citizens—for example, the role of the EU in selected global policy processes related to the oceans (e.g., negotiations on the agreement related to marine plastic litter), which contributes to promoting the EU's sustainable imprint globally, and the role of the EU in engaging institutions of marine and maritime sciences that are not typically concerned with EU studies and institutions from outside the EU that are partners in implementing the EU's policies but too rarely targeted, thus being treated as mere instruments.

Acting as an intergovernmental platform at the interface between science and policy and open to all EU Member States and associated countries that invest in marine and maritime re-

search, JPI Oceans identifies strategic joint actions to foster regional research and innovation and to implement the Mediterranean SRIA. The size, scope, and methods identified for each action vary depending on the research needs and the objectives to be achieved. To generate an impact through collaboration, JPI Oceans builds on national capacities and networks in the participating countries and on engagement with policy and science policy units in the EU and intergovernmental institutions: the Intergovernmental Oceanographic Commission (IOC), the Food and Agriculture Organization (FAO), the Convention on Biological Diversity (CBD), the United Nations Framework Convention on Climate Change (UNFCCC), the Union for the Mediterranean (UfM), the Organisation for Economic Co-operation and Development (OECD), and others. It allows countries to participate on a case-by-case basis according to their different priorities, needs, and capacities. JPI Oceans aims to enrich countries' coordination to encourage the development of integrated marine and maritime strategies and incentivize cross-ministerial and cross-institutional conversations.

All the above-mentioned initiatives target mid-career marine scientists and professionals who seek to streamline marine conservation and marine science into maritime spatial planning and the management of marine spaces and marine resources using participatory mechanisms that engage stakeholders, resource managers, and policymakers.

6. THE NEED FOR AN INNOVATIVE ECONOMIC MODEL

Interactions between academia (scientific research and university), industry (business and labor market), and governance (policy and the State) are important. More overlap between the three components contributes to generating ideas

for innovation coming from industries to universities to feed jobs with the required skills according to the labor market needs and to creating dedicated financial schemes to respond to the socioeconomic requirements.

Governments should raise awareness about the potential of the blue economy and learn from industry how to develop more innovation to minimize the loss of jobs. Additionally, they should ensure viable and lasting solutions for creating new opportunities, encourage private–public partnerships, and ease the dialogue between academia and the productive sector.

Today, as in all moments of historical change and because of the drastic economic situation caused by the COVID-19 pandemic, we can steer our future in a better direction to rebuild our economies and societies. To do this, there is a need to build trust in institutions and government engagement, reduce financial concerns, eliminate emotional distress, and prepare new leaders. A new generation will lead the change and introduce a new development model.

7. BLUE SKILLS: DEVELOPMENT OF SKILLS TO FEED JOBS

In line with the EU skills agenda for sustainable competitiveness, social fairness and resilience, and the EU strategy for blue growth, the National Institute of Oceanography and Applied Geophysics (OGS), in partnership with other public and private organisations (universities, research institutions, governmental bodies, and industries), is promoting an articulated training path that aims at overcoming the existing «skill mismatch» in the Mediterranean region between education and training and the labor market. This program has been evolving, and a project has been submitted to the national authority (Italian Ministry of University and Research)

and has been positively evaluated and approved. This project, named Blue Skills, is being considered by the Union for the Mediterranean as one of the successful best practices to take part in the Med4Jobs initiative. It is also often included in several initiatives, such as Blue Med, West Med, EUSAIR, and the Western Mediterranean Forum (5+5 Dialogue).

This training offers opportunities for «Blue» careers by developing skills, leveraging innovation, exchanging knowledge, and valorizing research for a more sustainable Mediterranean Sea. It aims to develop new curricula and increase employability in the marine and maritime sectors. By supporting the Euro-Mediterranean communities of the blue economy stakeholders through HE, research, and innovation, the project enhances the shared knowledge of the overall Mediterranean region.

In addition to developing skills and building capacities, the Blue Skills initiative aims to enhance geopolitical dialogue in the Western Mediterranean region through increased international scientific cooperation and science diplomacy.

8. THE ITALIAN CONTRIBUTION TO THE 5+5 DIALOGUE

To stimulate growth and employment, the 5+5 Dialogue countries are deploying more efforts to promote entrepreneurship—a powerful engine of shared prosperity. The creation and growth of enterprises promotes employment and the development of new skills, reinforces innovation, and increases market potentials.

Many countries are engaged in processes of reforming their political, economic, and social systems to stimulate investment, encourage initiatives, and foster strong economic partnerships that are essential throughout the Western Mediterranean region.

The 5+5 Dialogue member countries need to revitalize their economies to promote smart, sustainable, and inclusive growth to develop disadvantaged regions and enhance job creation in line with international labor market standards. Research, innovation, and HE play a key role in job creation. There is a need for a framework of cooperation and synergies among the 10 countries. Confronted with several challenges, the 5+5 Dialogue member countries are invited to deepen their partnerships to further stimulate economic growth and social stability.

Italy, as a member country of the 5+5 Dialogue, has committed to developing, creating, and maintaining a sustainable blue economy platform for the benefit of Western Mediterranean countries. This initiative has been expanded to all Mediterranean countries and has been strongly supported by the UfM.

The main goal is to create the conditions to promote joint, complementary, and concrete actions to maximize the impact of investing in improving existing skills (upskilling) and training new skills (reskilling) in the identified field throughout HE (university degrees, such as advanced master's programmes, and training-of-trainers, such as summer schools) and VET and to bridge the gap between government–industry–academia in the blue economy sector through building strong partnerships for skills development in the Mediterranean region, with particular focus on youth skills. The specific goals are as follows:

- promoting capacity building and training offers on sustainable blue economy in the Mediterranean;
- transferring knowledge, promoting citizen science, and enhancing the involvement of stakeholders;
- boosting innovation, leveraging new technologies, generating transferable skills, and promoting youth employability;

- raising awareness of ocean governance, climate change and sea level rise, marine biodiversity and ecosystem functioning, sustainable blue economy and ecosystem-based management, maritime spatial planning and all fields related to the marine and maritime sectors; and
- strengthening regional cooperation and promoting dialogue in the Mediterranean (science diplomacy).

To reach these objectives, a tailor-made training offer has been developed, which is articulated as follows:

- a yearly summer school, organized in collaboration with the Euro-Mediterranean University in Portorož (Slovenia), which is addressed to young scientists and researchers (45–50 participants) from the Mediterranean;
- an advanced master's degree in sustainable blue economy jointly organized by OGS and the University of Trieste (25 students per year);
- access to research infrastructures, international mobility programs, and job shadowing (10–12 fellowship grants per year);
- support of 2–3 scientists and researchers for conducting Ph.D. research programs;
- and public outreach, dissemination, and scientific communication for the benefit of local communities.

Young scientists, researchers, and Ph.D. students have benefited from this training offer; project managers, economists, engineers, and other professionals have updated their skills; policymakers, administrators, and the public have been involved; and young individuals and children have been reached.



Fig. 2. Summer school on blue growth in the Euro-Mediterranean region organized every year by OGS with the financial support of the Italian Ministry of University and Research.



86 Fig. 3. Master's degree in sustainable blue economy organized every year by OGS with the financial support of the Italian Ministry of University and Research.

9. CONCLUSIONS

As a mechanism for regional cooperation and with the aim of strengthening partnership and scientific and technological cooperation among member countries, the 5+5 Dialogue on research, innovation, and HE encourages and supports the link between research, academia and industry in the Mediterranean. Partner countries believe in science diplomacy and in supporting scientific cooperation as a means to boost cross-border alliances in the sustainable blue economy sector and to contribute to the exchange of knowledge, goods, and services and to the circulation of talents between the two shores of the Mediterranean.

Science diplomacy plays an important role in easing dialogue among Mediterranean countries, spreading trans-boundary cooperation at multi-level governance, supporting policy and decision-making at national levels, and, above all, giving value to each country's specificity, which could be considered as a strength for the Mediterranean region.

In conclusion, establishing strategic partnerships to foster synergies with existing platforms for developing blue skills and making available investment tools and financial services beneficial to all Mediterranean countries is the only key to success for the entire region.

From an African Proverb: «if you want to go fast, walk alone. If you want to go far, walk with others». This is the real meaning of diplomacy and international cooperation.