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Margarita Stancheva, Editor
Norbert P. Psuty, Co-Editor

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Objectives: The Commission on Coastal Systems encourages the study of coastal systems throughout the world. The Commission sponsors and supports activities leading to the exchange of information regarding coastal systems among our members and throughout the IGU at large. The focus of attention is on interactive systems, both human and physical, and the areas of inquiry include issues such as sea-level rise, land-use changes, estuarine resources, coastal tourism and shoreline development, coastal recreation, and coastal zone management. The Commission will make concerted efforts to emphasize issues of Global Change. Copies of our Newsletter and announcements are on our website: http://igu-coast.org/

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MESSAGE FROM THE CHAIR
The global pandemic has disrupted so many people around the world; I hope that you and your coastal colleagues are safe and well. Please take a moment to enjoy the numerous items that Margarita has compiled into another CCS Newsletter. There continue to be many opportunities to network and to interact, through conferences and workshops, most of which are still being convened virtually. The Newsletter outlines a number of initiatives, new publications, and educational resources. Coasts and adjacent marine zones face many threats, particularly from anthropogenic activities. Please visit our website, join our coastal community, and share your exciting ideas and outcomes with us.

PHOTO OF THE ISSUE

Whitehaven Beach in the Whitsundays, on the Great Barrier Reef, is renowned for its especially white sand.

COLIN WOODROFFE
At IGC, CCS will convene a session entitled “Sustaining coastal and marine environments in the Anthropocene”. The burgeoning populations of the continents are placing increasing pressures on the coastline and the marine areas that surround them. The seaside is generally an area of beauty and bounty. People value these environments for their abundant resources, as well as for cultural and recreational sustenance. However, as the global population expands, the connections and conflicts between people and nature are nowhere more apparent than in Coastal Systems. The Commission on Coastal Systems encourages the study of coastal areas throughout the world and welcomes papers on sustaining coastal and marine environments in the Anthropocene. The focus of this session is on interactive systems, both human and physical. Coastal and adjacent marine zones are threatened by natural and anthropogenic activities in the catchments. The low-lying plains associated with deltas and estuaries support ever increasing populations engaged in agriculture, fishing, aquaculture and industrial activities. Rapid urbanization is being experienced with many of the world’s megacities on deltas associated with big rivers; deltaic cities are home to more than 150 million people and seem likely to exceed 200 million in the next two decades. These human activities are directly impacting coastal and marine ecosystem services through pollution and degradation. The pressures are exacerbated by climate change which is particularly evident in these areas through observed trends of sea-level rise. There is pressing need for adaptation along much of the world’s coastlines.

This coastal session will provide a chance for a wide range of physical and social scientists, students, administrators, stakeholders and decision makers to share their insights and invaluable experiences on the state of the coast, and to move towards much wiser use and management of coastal and marine resources so humans can protect and sustain these critical, yet vulnerable habitats for generations to come.

The session is being organized by Colin Woodroffe (Australia) and Margarita Stancheva (Bulgaria)

The 34th IGC conference has been postponed due to the ongoing global COVID-19 spread and it will be held at the same venue between 16-20 August 2021 as entirely virtual event.

The Commission on Coastal Systems will sponsor a special issue on this topic of the Journal of Coastal Conservation: Planning and Management. We believe that it is particularly appropriate to produce this special issue, with a focus on sustaining coastal and marine environments in the Anthropocene, at this time, at the start of the UN Decade of Ocean Science for Sustainability. The International Geographical Union has identified the Ocean Decade as a key initiative that it wishes to support in the IGU Strategy 2020-2024.

The provisional submission date is to 31 July 2021.


For more details, please contact Colin Woodroffe: colin@uow.edu.au
CoastGIS 2021 will be held on 16-18 September 2021 as an all-online symposium. It is being hosted by Novia University of Applied Sciences in Raseborg on the South Coast of Finland.

CoastGIS 2021 will be the 14th international Coastal GIS Symposium for an international exchange of knowledge, ideas and experience on how spatial data and information technologies aid marine and coastal zone managers and stakeholders in better understanding and managing coastal space and resources. The symposium theme "Sustainable Coastal Planning in a Changing World" refers to the challenges faced worldwide in light of sustainable development and emphasis will be on cooperation in spatial planning between countries. The symposium aims to address recent challenges in managing our coastlines effectively and sustainably.

Important Dates:

Registration is open until August 31!

What is CoastGIS?

CoastGIS is a biennial series of symposia that brings together practitioners and researchers in the fields of marine and coastal Geographic Information Systems, remote sensing and computer cartography. It is an established major international coastal and marine event attracting delegates from around the globe. A wide range of topics have been covered in previous years covering technological advances and progress, and the evolving challenges. The CoastGIS International Symposium is usually held once every two years under the joint scientific sponsorship of the Commission on Coastal Systems of the International Geographical Union (IGU/CCS) and the Commission on Marine Cartography of the International Cartographic Association (ICA/CMC). The first International Symposium on GIS and Computer Cartography for Coastal Zone Management, CoastGIS, took place at University College Cork in Ireland in 1995. The second CoastGIS meeting took place in Aberdeen, Scotland, two years later and, since then, CoastGIS symposia have been held in Brest, France in 1999; Halifax, Nova Scotia in 2001; Genoa, Italy in 2003; Aberdeen again in 2005; Sydney and Wollongong, Australia, in 2006; Santander, Spain in 2007; Santa Catarina, Brazil, in 2009; Oostende, Belgium, in 2011; Victoria, on Canada’s West Coast in 2013, Cape Town, South Africa in 2015 and Ísafjörður, Iceland in 2018. Over the years, the CoastGIS events continue to provide a showcase for new developments in information management and technology as well as a learning experience for all involved in coastal zone management, science and research.

CoastGIS 2021 in Raseborg is overseen by the International CoastGIS Committee (David R. Green - University of Aberdeen - Chair). The Symposium is planned by a local organising team in Finland at the host institution, Novia University of Applied Sciences.

Follow the conference website for further updates and details: https://www.novia.fi/coastgis2021/

For further information, please contact: coastgis2021@novia.fi

If you would like to be added to the CoastGIS newsletter mailing list, please send an email to coastgis2020@novia.fi with the subject line "Newsletter".

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The Geomorphology Session GM6.6/NH5 on: “Coastal Zone Geomorphological Interactions: Natural versus Human-Induced Driving Factors” was successfully conducted for the thirteenth time at the vEGU 2021 General Assembly, 19-30 April 2021 in Vienna, Austria. Actually, this year’s session was only organized from Vienna, while all the conference attendants joined via Zoom Meetings system. Despite some technical problems on the first day, the session ran smoothly, and all apart one presenter were present via online system.

Contributions to this session were focused on wide range of topics, including the mechanisms triggering coastal flow slides, vulnerability of coastal deltas, trends in shoreline variability driven by anthropogenic factors, coastal dunes as natural coastal protection measures - all these addressed also the many natural and anthropogenic factors. The session topics also included number of case-studies introducing innovative shoreline change monitoring methods combined with more traditional methods (Open source satellite images, old maps combined with UAV, Sentinel satellite images, geological and hazardous systematic cartography, etc.). Due to the climate change and resulting sea-level rise, studies related to beach nourishment are getting more popular and as a result, two studies introducing different approaches of beach nourishment were presented in our session. Discussion of the effects of human activities and their continuing contribution to coastal changes was active as usual. Finally, classifying coastal vulnerability in different coastal ecosystems (deltas, natural sandy shores, heavily engineered shorelines etc.) has been playing important role in more developed countries for more than a decade (U.S, Europe, Australia), this time, one study conducted in Kenya, Africa was also introduced.

The vEGU2021 GM6.6NH5 Session was held with 14 abstract submissions. 13 presentations were introduced in one vPICO session. Each presenter had the opportunity to show one slide and carry out two-minute talk. vPICO session was followed by nearly 45-minute chat session, where all participants had the opportunity to go and chat with each presenter in separate online room. Basically, it felt near real when interested attendees met around different presentations (in private online rooms) and they had an opportunity to continue more focused discussion and ask as...
many questions from the authors as needed. Around 75 unique users were present in our online session – near average for 2021 vEGU sessions.

The vPICO session was conducted on Wednesday, 28th of April. The program of the vPICO session was chaired by Dr. Hannes Tõnisson (Estonia) and detailed list of presentations can be viewed here: https://meetingorganizer.copernicus.org/EGU21/session/40296#

The **session has been sponsored by the Commission on Coastal Systems (CCS) of the International Geographical Union (IGU) for the eleventh year in succession**. With this success the EGU Session on coastal zone geomorphic interactions together with the support of CCS has taken on an important role in fostering the exchange of knowledge on coastal geomorphology and experience among researchers to explore the variety of natural and human factors that modify the coasts.

The next **EGU General Assembly 2022 will be on 03 – 08 April 2022 in Vienna, Austria**. Hopefully, next event will be held in real life and we can meet you all again. As usual, we are looking forward to your active participation again.

Submitted by: Hannes Tonisson, Institute of Ecology at Tallinn University, Estonia.

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**MEETINGS WITH COASTAL INTEREST**

**SEPTEMBER 6-9, 2021. ECSA 58 - EMECS 13, ESTUARIES AND COASTAL SEAS IN THE ANTHROPOCENE, STRUCTURE, FUNCTIONS, SERVICES AND MANAGEMENT, HULL, UK**

The **ECSA 58 - EMECS 13: Estuaries and coastal seas in the Anthropocene – Structure, functions, services and management** conference will be held online from 6-9 September 2021 and will be available afterwards on-demand.

This stimulating online event will bring together a specially selected line-up of expert speakers, contributed talks and ePosters outlining the latest innovative research and management practices and addressing key topics from our cancelled in-person meeting.

The structure and functioning of our estuaries and seas are shifting within what is now termed the Anthropocene due to diverse drivers and pressures from local to global scales. The resulting threats to the natural and human features of these systems are often all too apparent, yet such changes can also present new opportunities. The challenge is to harness these opportunities through new ways of thinking, scientific developments, innovative technology and more effective integration of science and management.

Register now to participate in an interactive conference experience direct from your desktop or mobile device: live-stream presentations and take part in discussion through live chat and Q&A.

**Supporting Publications are foreseen in:**
As part of the 2021 IEEE INTERNATIONAL WORKSHOP ON METROLOGY FOR THE SEA David R. Green (CCS Vice Chair) (UCEMM - University of Aberdeen, Scotland, UK) is running a Special Session on:

**UAVS FOR MONITORING, MAPPING AND MODELLING THE TERRESTRIAL, COASTAL AND MARINE INTERFACE**

This session seeks to explore some of the current and future applications of UAV technology to the terrestrial, coastal and marine interface. This will include coverage of for example: developing UAV technologies, soft-copy photogrammetry, surveying, ground-control, mapping, and 3D surface generation and 3D modelling. Novel applications of UAVs and technical solutions for monitoring, mapping and modelling are welcome, particularly where they provide insight into the practical use of low-cost UAV solutions. An international perspective is expected.

Further details may be followed on the conference website: [https://www.metrosea.org/](https://www.metrosea.org/)
This 4th symposium is part of a series of decadal symposiums organized by ICES (International Council for the Exploration of the Sea) and NAFO (Northwest Atlantic Fisheries Organization), where researchers will convene to review the variability of North Atlantic environmental conditions and marine ecosystems over the past decade. The intention is to understand the relationship between ecosystem components and how they influence the distribution, abundance and productivity of living marine resources. While the symposium focuses on reviewing the last decade, contributions related to sub-decadal forecast of ecosystem change and application of environmental data to ocean resource management are also welcome.

Reflecting on the scientific knowledge gained over the last decade will advance and shape our understanding of marine ecosystems in the North Atlantic and encourage new initiatives to improve ocean observation approaches that support the management and sustainability of marine resources. These insights will contribute to the United Nations Decade of Ocean Science for Sustainable Development (2021-2030), which aims to mobilize ocean stakeholders and resources worldwide behind a common framework in order to advance research and technological innovation needed to sustain a healthy and productive ocean.

The call for abstracts is now open and all relevant researchers are encouraged to submit an abstract to one of the four theme sessions:

- Ocean climate and physical environment in the North Atlantic and their linkages to changing marine ecosystems.
- Decadal change and trends in North Atlantic/sub-Arctic plankton and their ecosystems
- Trends and drivers of decadal variability in fish and invertebrates.


For more information about the symposium, visit the website: https://decadal2022.imr.no/

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MAY 30-JUNE 03, 2022. 4TH BALTIC EARTH CONFERENCE ASSESSING THE BALTIC SEA EARTH SYSTEM, JASTARNIA, HEL PENINSULA, POLAND

The conference covers the topics of the Baltic Earth Assessment Reports (BEAR), which reflect the majority of Grand Challenges and research themes of Baltic Earth over the past nine years. Conference participants will present their research around these topics and are invited to discuss both Baltic Earth achievements and the way forward. The conference is intended as discussion forum for scientists, students, managers and other stakeholders.
The sessions of this conference reflect the topics of the Baltic Earth Assessment Reports and other Baltic Earth topics. In discussing the different topics, we would like to include the perspectives from other marginal seas (like the neighboring North Sea, but also around the world). Contributions from other marginal seas shall help to evaluate the state of the regional Earth system (including human impacts) and management options in the Baltic Sea and elsewhere.

**Conference topics:**

- Salinity dynamics
- Biogeochemical functioning and development: From catchment to the open sea
- Natural hazards and extreme events
- Sea level dynamics and coastal erosion
- Human impacts and their interactions
- Sustainable management options
- Analysing and projecting past and future climate changes
- Comparing marginal seas around the world

A dedicated call for papers will be published in late 2021, specifying the scientific sessions with detailed descriptions. Results from any of the above topics are welcome, as well as contributions from related programmes. Invited and contributed papers will be presented in plenary and dedicated poster sessions. There will be a dedicated young scientist’s event.

**Time Table:** 2nd Announcement November 2021  
**Abstract Submission:** January 2022

Conference website: [https://www.baltic-earth.eu/](https://www.baltic-earth.eu/)

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**JULY 18-22, 2022. UGI-IGU PARIS, THE CENTENNIAL CONGRESS, PARIS, FRANCE**

The International Geographic Union will reach its 100th anniversary in 2022. To celebrate this creation, the evolution of the discipline over the last century, and its contemporary and future significance, the International Geographical Union and the French National Geography Committee, organized this exceptional congress.

Around the theme "Time for Geographers", the congress will mark the 100th anniversary of the International Geographical Union. The **Paris 2022 UGI Centennial Congress will take place between July 18 and July 22, 2022.**

The event will be organised in venues epitomising the living heart of geography in the city: Sorbonne, Institut de Géographie, Société de Géographie.
Sessions submission:
- The deadline for the session proposals is **July 31 2021**.
- The announcement of the accepted sessions is expected by **August 31 2021**.

Two types of sessions: The proposals can be of two different kinds. They can either be included in:
- The theme of the 2022 congress, “Time for Geographers”. In this case, the proposals will be assessed and managed by the scientific committee of the Congress.
- The perimeter of one the International Geographic Union’s commissions, see commissions list here. In this case, the proposals will be assessed and managed by the chairs of the various commissions.


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**SEPTEMBER 12-16, 2022. LITTORAL CONFERENCE 2022, COSTA DA CAPARICA, PORTUGAL**

The 16th conference Littoral has been postponed until September 2022, and will be hosted by nova School of Science and Technology of NOVA University Lisbon (FCT NOVA). **Conference Special topic: Adapt our coast to a sustainable future.** This event will take place between 12-16 September 2022 in Lisbon - Portugal, bringing together an opportunity for all participants to visit and enjoy our coast. The organisers also considering the possibility to offer online access - to ensure international accessibility to the conference and reduce the carbon footprint of those less likely to travel to Lisbon.

**CONFERENCE THEMES:**

1. **Literacy, education and governance**
Ocean literacy and Education for a sustainable future
Governance, active citizenship, and coastal communities

2. Planning and management
Marine and coastal spatial planning and green/blue infrastructure
Source to sea – River basin and coast interactions
Nature-based solutions for coastal ecosystem restoration and management

3. Blue and circular economy
Blue and circular economy in coastal areas
Fisheries, Aquaculture and other sea food resources
Tourism and Port Activities
Innovative energy production and mineral resources

4. Risks and climate change
Climate change adaptation processes and strategies
Risk assessment and management and emergency planning
Offshore and nearshore infrastructure for coastal protection
EU policy and projects – managing global change and environmental risks

5. Coastal monitoring, mapping and modelling technologies
Remote sensing and UAV (unmanned aerial vehicle)
Geospatial technologies (GIS)

6. Ecosystems, ecological services and biodiversity
Coastal Ecosystem restoration and management
Biodiversity, coastal ecosystems, nature conservation and ecosystem services

7. Aquatic ecology and quality
Ecotoxicology and risk assessment
Marine litter and microplastic
Bioremediation
Biosedimentary Dynamics of coastal environments
Wastewater treatment, emerging components, and coastal water quality

Get ready and submit your abstract!
The LITTORAL22 Scientific Programme Committee invites authors to submit an abstract for either an oral or a poster presentation.
Abstract submission date: 31 October 2021!

Visit the LITTORAL website – www.littoral21.com for more information and deadlines and stay tuned for further updates!

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OCTOBER 18-22, 2022. BALTIC SEA SCIENCE CONGRESS: UNDERSTANDING TRANSITIONS IN THE BALTIC, AARHUS, DENMARK

Aarhus University welcomes you to the 13th Baltic Sea Science Congress, 2021. The congress will take place at the Lakeside Lecture Theatres (Søauditorierne), beautifully decorated by the Danish artist Per Kirkeby, in the Aarhus University Park.
During the congress, the state-of-the-art in our scientific understanding of the Baltic Sea functioning will be presented and implications for ecosystem management discussed. In 2021, the update of the HELCOM Baltic Sea Action Plan is expected to be adopted and the UN Decade of Ocean Science will commence.

In light of these important milestones, a prime focus of the 13th BSSC will be to establish a platform for connecting scientists and decision makers.

**Topics in short:**
Theme 1: The Baltic Sea in transition – past, present and future
Theme 2: Baltic ecosystems – diversity, processes and functioning
Theme 3: Emerging threats and potential consequences
Theme 4: Introducing new technologies
Theme 5: Stewardship for the Baltic Sea

**Important dates**
15 June 2021: Registration open
15 June 2021: Abstract submission open
1 September 2021: Last day for abstract submission!

Visit the congress website for more details and further updates: https://conferences.au.dk/bssc2021/

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**HIGHLIGHTS & FEATURES**

**The International Geographical Union (IGU) and the International Geographical Congress (IGC)**

The International Geographical Union (IGU) promotes the study of geographical problems; initiates and coordinates geographical research requiring international cooperation; promotes scientific discussion and publication; provides for the participation of geographers in the work of relevant international organizations; facilitates the collection and diffusion of geographical data and documentation in and among its member countries; promotes International Geographical Congresses. See the IGU webpage - https://igu-online.org/

The International Geographical Congress (IGC) is the major congress of the IGU. It is traditionally held every fourth year. However, Covid-19 necessitated postponement of IGC 2020, which is now scheduled to be held 16-20 August 2021 in Istanbul. See https://www.igc2020.org/en/default.asp

The Executive Committee of IGU held their first online General Assembly in the IGU history in 2020, and Professor Mike Meadows took on the role of President, having previously served as Secretary.

The **Commission on Coastal Systems (CCS)** is one of the Commissions within IGU. The IGU Executive has approved the continuation of the Commission for another four years, but encourages broadening of the membership of the Steering Committee. Accordingly, we would be pleased to hear from coastal scientists who have an interest in contributing to the further development of the coastal network. The CCS has a website that can be found at: http://igu-coast.org/. Contact information for CCS Officers and Steering Committee members can be found on the website along with past and present newsletters.

The Commission is sponsoring a session at the 2021 IGC in Istanbul in August 2021. The focus of the session is: Sustaining coastal and marine environments in the Anthropocene. Abstracts for IGC 2021 are due 11 January 2021, and notice of acceptance will be provided 8 February 2021.

*If you are interested in becoming a member of the CCS, an on-line membership form is available.*

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SPLOSH – AN INTERNATIONAL FOCUS GROUP ON SUBMERGED PALAEOLANDSCAPES OF THE SOUTHERN HEMISPHERE

The study of submerged coastal landscapes and human occupation records has rapidly emerged as a key topic in Quaternary science in the last couple of decades aided by new and higher-resolution technologies and focused research programs. These are only beginning to be translated into the Southern Hemisphere which, with its wide range of latitudes (from ~12ºN to ~56ºS) and climatic and biogeographic contexts, presents a whole suite of different challenges and opportunities. In 2020, a new international focus group was set up on Submerged Palaeolandscaes of the Southern Hemisphere (SPLOSH).\(^1\) Funded by INQUA for 2020 – 2023 (see https://www.inqua.org/commissions/cmp), the SPLOSH focus group aims to increase awareness of submerged landscapes and environmental changes in the Southern Hemisphere and provide a platform for scientific exchange and interdisciplinary collaboration across to help strengthen the importance of research in this region.

The Southern Hemisphere comprises five continents, including over 8300 islands, and four oceans (80% water) and has been largely ice-free for much of the Quaternary. Vast coastal plains and hence a significant portion of prehistory, were drowned during the marine transgression, with estimates of up to 40% decrease in continental landmass (~ 190 sq. km/yr) within the Pacific and Indian Oceans since the Last Glacial lowstand (~120 – 130 m below present). Importantly there is increasing scientific evidence that traces of this unique prehistory have been preserved on SH continental shelves, with studies in Namibia (Kirkpatrick et al., 2019), South Africa (e.g. Cawthra et al., 2020; Cowling et al. 2020; Fisher et al., 2020; Green et al., 2020; Marean et al. 2020; Fig 1 and Fig 2) and South America (e.g. Carabias et al. 2014; López et al. 2016; 2018; Cooper et al., 2016; 2018; 2019; Cartajena et al. 2020; 2021; Fig 3) revealing landscapes that are at times different to those of the modern coast.

Alongside this geoscientific evidence is a growing awareness of cultural continuity with these inundated landscapes through oral history (Nunn 2018). Hence another aim of SPLOSH is to offer a voice to Indigenous partners and scientists from developing countries in the global discourse on submerged landscapes. These themes are timely at the beginning of the United Nations Decade of Ocean Science and the particular global initiative on heritage (see https://www.oceandecadeheritage.org/) and will be a particular focus of the 2022 SPLOSH workshop.

Another online workshop held on 14th and 15th June was ‘SHINE’ - a joint event organized with the INQUA Focus Group NEPTUNE in which participants were invited to present their field activities and study sites as Virtual Fieldtrips or Geotours of study areas and preliminary scientific and methodological results. The global tour included research from South Africa, southern Italy, Bulgaria, Croatia, Costa Rica, NW Australia and even Antarctica (see http://dist.altervista.org/neptune/news3.html). Other SPLOSH-themed workshops are planned in Perth (Australia) and Cape Town (Sth Africa) later this year.

In addition to the workshops, this year there are two Special Issue journals dedicated to the subject of inundated landscapes. The first is a Special Issue in Quaternary International entitled “Lost landscapes: reconstructing the evolution of coastal areas since the Late Pleistocene” (see http://dist.altervista.org/neptune/documents/flyer_PALEOCOAST.pdf). The second is a Special Issue of World Archaeology (see https://think.taylorandfrancis.com/special_issues/inundated-cultural-landscapes/) aimed at presenting recent advances in the discovery, analysis, and interpretation of inundated cultural landscapes and are

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1 SPLOSH website still under development but updates can be found at https://www.researchgate.net/project/SPLOSH-Submerged-Palaeolandscape-of-the-Southern-Hemisphere
particularly interested in papers that address inundated landscapes in the Southern Hemisphere and how this region might offer different perspectives to the north.

Figure 1  Looking out at the Palaeo-Agulhas Plain from the cave entrance at the Pinnacle Point research site, (left) 200,000 years ago during glacial phases and lower sea levels, and (right) today where the ocean is within yards of the cave entrances at high tides. Image by Erich Fisher.

Figure 2  23,000 years of changes to the palaeo-coastline of Ilha de Moçambique, SE Africa These data were generated by the Northern Mozambique Project (funded by Rising from the Depths Network and conducted by the Universities of Ulster (UK) KwaZulu-Natal (SA) and Eduardo Mondlane (Mozambique). The project examines cultural and geomorphological linkages around one of the earliest centres of trade in Africa.
Figure 3 (a) Location map for the study area in Quintero bay, central coast of Chile. (b) General contour map of Quintero bay sea-level change depicting the paleoshoreline at 28.9 kyr (2) and 21.5 kyr (3), the earliest and latest record for GNL Quintero 1 (GNLQ1), respectively. The paleoshoreline during the transgression of GNLQ1, estimated at 8.2 kyr (1), is also represented. (c) Cross section along transect AA’ with bathymetric profile (from Cartajena et al. 2021; their Fig. 1).

For further information on SPLOSH and SPLOSH-related activities, you can get in touch with the focus group lead Ingrid Ward (University of Western Australia) or any of the SPLOSH team leaders (see https://www.researchgate.net/project/SPLOSH-Submerged-Palaeolandscapes-of-the-Southern-Hemisphere). SPLOSH encourages you to dive in and join us!

References


Submitted by: Ingrid Ward, University of Western Australia | UWA · School of Humanities, ARC DECRA fellow.

SECOND WORLD OCEAN ASSESSMENT

The Second World Ocean Assessment (WOA II) was released on 21 April 2021, in connection with Earth Day 2021. The assessment involved contributions from more than 300 scientists from the UN’s group of experts chosen from around the world, and provides a comprehensive and integrated review of scientific information on the state of the marine environment. It will be no surprise to coastal scientists that the assessment places emphasis on the importance of coastal regions, including the coastal ocean and the land adjacent to the sea. The coast is both the most productive part of the ocean, and the most impacted. Many of our most significant gaps in understanding also occur in coastal waters.

The United Nations General Assembly established the *Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects* in 2004 to evaluate the condition of the oceans, the services that they provide and the influence of human activities. The First World Ocean Assessment (WOA I) in 2015 established a baseline. WOA II focuses on trends observed since publication of WOA I, especially changes between 2010 and 2020, recognising knowledge gaps and the need to build further capacity.

The assessment is aimed towards people in all sectors who will be making decisions that affect the marine environment. The two volumes (> 1,000 pages) include an Executive Summary; an Introduction, which outlines the approach, adopting the drivers-pressures-state-impacts-response framework, and the five principal drivers (population growth and demographic changes; economic activity; technological advances; changing governance structures; and climate change). Volume I concludes with a comprehensive overview of trends in biodiversity.
(chapter 6G considers marine plants and macroalgae, which includes mangroves, saltmarsh plants and seagrasses), and a consideration of changes in a series of habitats, extending from the intertidal to the abyssal plains. Of the seventeen sections in chapter 7, nine are coastal habitats, and each is impacted by a combination of anthropogenic and climate change impacts. The major trends, and the key knowledge and capacity gaps outlined in each of those chapters is summarised in Table 1.

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<th>Major Changes and Trends</th>
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<td>Impacted by human activities, coastal modification, and climate change; Coastal squeeze</td>
<td>Inadequate baseline data. Further biodiversity study</td>
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<td>7B</td>
<td>Biogenic reefs, sandy, muddy and rocky shores</td>
<td>Multiple stressors as result of climate change, urbanization and human pressures</td>
<td>Inter-disciplinary research, and better governance to enhance resilience</td>
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<td>7C</td>
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<td>7D</td>
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<td>Declines in reef biodiversity from anthropogenic impacts, ocean warming (bleaching), and acidification</td>
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<td>7H</td>
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<td>Declining area, Coastal squeeze; impacts of sea-level rise</td>
<td>Strategies to cope with sea-level rise</td>
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</table>

Volume 2 of WOA II comprises a series of thematic chapters. A key feature of the assessment was relating present understanding to the UN Sustainable Development Goals, which were developed to promote human aspirations for a sustainable and equitable future. Sustainable Development Goal (SDG) 14 of the 2030 Agenda for Sustainable Development, supporting better stewardship of our oceans, is particularly relevant as it relates to life under water. The targets of SDG 14 are summarised in Table 2. Topics covered in chapters of WOA II are linked with these targets, and also with the intended outcomes of the UN Decade for Ocean Science for Sustainability which commenced in January 2021.

In launching WOA II, António Guterres, UN Secretary General, stressed that the ocean is the life-support system of our planet, but it is near its carrying capacity; that pressures from human actions are impacting important coastal ecosystems, such as mangroves and coral reefs; that processes on land are contributing pollutants to the sea, including plastics; that overfishing has resulted in enormous economic losses, and; that the carbon we are releasing into the atmosphere is driving warming and acidification that threatens biodiversity, and sea-level rise which is impacting coastlines. Sylvia Earle, President and Chair of Mission Blue, notes that we have only seen about ten percent of the ocean floor, and most of the seabed is yet to be explored. She reiterates society’s dependence on the sea and its
resources, saying “The ocean is in trouble. We need the ocean and the ocean now needs us to take care of the systems that make our existence possible.”

Table 2. A brief summary of targets of Sustainable Development Goal 14

<table>
<thead>
<tr>
<th>Sustainable Development Goal 14 – Life under water</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Target</strong></td>
<td><strong>Summary of target</strong></td>
</tr>
<tr>
<td>14.1</td>
<td>Prevent and significantly reduce marine pollution</td>
</tr>
<tr>
<td>14.2</td>
<td>Sustainably manage and protect marine and coastal ecosystems</td>
</tr>
<tr>
<td>14.3</td>
<td>Minimize and address the impacts of ocean acidification</td>
</tr>
<tr>
<td>14.4</td>
<td>Regulate fishing and end illegal and destructive fishing practices</td>
</tr>
<tr>
<td>14.5</td>
<td>Conserve at least 10% of coastal and marine areas</td>
</tr>
<tr>
<td>14.6</td>
<td>End subsidies contributing to over-fishing</td>
</tr>
<tr>
<td>14.7</td>
<td>Increase economic benefits from sustainable use of marine resources</td>
</tr>
<tr>
<td>14.a</td>
<td>Increase scientific knowledge, research and marine technology</td>
</tr>
<tr>
<td>14.b</td>
<td>Support small scale fishers</td>
</tr>
<tr>
<td>14.c</td>
<td>Enhance conservation and sustainability through international law</td>
</tr>
</tbody>
</table>

The latest assessment notes that the health of the ocean has not improved since WOA I, and that many of the benefits that the ocean provides to people such as food, jobs, medicine and climate regulation are increasingly being undermined by human activities.

Some key points noted in the assessment include

- The alarming pace of sea-level rise, combined with increasing storms and coastal urbanization, leading to coastal erosion and flooding in coastal cities.
- Rising carbon dioxide emissions leading to ocean acidification and together with warming and deoxygenation resulting in loss of biological diversity.
- The ocean heat content has more than doubled since the 1990s, severely affecting marine life and ecosystems.
- The number of “dead zones” or areas with reduced oxygen in the ocean has increased from more than 400 globally in 2008 to about 700 in 2019.
- Mangrove, seagrass, and marsh plant species, as well as many species of seabirds, are now threatened.
- Marine litter is present in all marine habitats, affecting the environment and marine organisms through entanglement, ingestion, and rafting of invasive species.
- Overfishing is estimated to have led to an annual loss of $88.9 billion in net benefits.
- Human-mediated movements have introduced about 2,000 marine non-indigenous invasive species, some of which pose significant biosecurity and biodiversity hazards.
- Many sandy beaches worldwide are experiencing retreating shorelines.

On the other hand, it is encouraging to see that innovations in various remote sensing technologies and improved observation platforms have been enabling researchers to monitor and track physical and biological parameters with greater confidence. It has enabled the discovery of nearly 11,000 new marine benthic invertebrate species and more than 200 species of fishes since 2015. The report also notes that some pressures have been reduced since 2015, partly through establishment of additional marine protected areas, and, in some regions, improved management of pollution and fisheries. However, these trends vary considerably from region to region; whereas sea ice is melting at alarming rates in the Arctic, there has actually been detectable increase in Antarctic sea-ice extent. Much of the geographical variation in the state of the ocean, and our stewardship of it, reflects disparities in infrastructure and capacity.

The assessment recognises the increasing impacts that population growth will have on offshore waters. With an estimated 71% increase in global population from 2000 to 2050, augmented by migration to coastal settlements, over 1 billion people will be living in coastal regions. There are obvious concerns that apply to the high seas: overfishing; decreases in dissolved oxygen and expansion of oxygen-depleted zones, and; the accumulation of pollutants,
including plastics. But this assessment also makes clear some urgent needs for a better understanding of the coastal ocean.

For example, although tide gauges have shown a trend of increasing sea level for over a century, and satellite altimeters since the 1990s record increases of more than 3 millimetres per year across much of the open ocean, synthesising these two different means of tracking the rising sea still leaves us with a poor understanding of coastal sea-level changes, those which will have the most immediate impact on humanity. Similarly, limitations on the observation of ocean currents apply particularly to coastal regions. There is broad consensus that more than 90% of the heat from global warming is stored in the ocean, which is also becoming more acidic, but the extent of the effects of increased heat waves and acidification on ecosystems and species populations in various shallow water habitats urgently requires much more research. There is also a need for ways to better attribute the changes that are observed to the specific processes that are driving them, in order to forecast future responses.

Some chapters have more of a coastal focus than others. Inputs from land to the sea, and more specifically of nutrients, continue to increase, despite improvements in some areas, and all shorelines are variously affected by marine litter, as every beachgoer knows. The chapter on changes in erosion and sedimentation notes that shoreline adjustments are caused by a range of factors, including sea-level rise and changes in the frequency and intensity of storms and wave climate, but also a wide range of anthropogenic interventions. This chapter, and that on infrastructure, recognises recent developments in coastal protection strategies that supplement structural engineering approaches with softer more environmentally sustainable forms of coastal stabilisation.

Coastal communities play a key role when it comes to the ocean economy, as a recent emphasis on the ‘blue economy’ has indicated. Ports support shipping which carries about 90% of the volume of international trade. Coastal tourism is growing, whether this comprises ‘sun, sea and sand’ tourists, or more focused ecotourism. There has been greater recognition of health benefits, both marine-derived pharmaceuticals and the well-being aptly termed the ‘blue gym effect’. Although, as with intensive fishing, it is important to ensure appropriate balances in order that the activities do not accelerate degradation of the very resources on which they are based. WOA II states that better information is needed on the threats that coastal communities face, especially indigenous communities.

Of course we have known for some time that coastal and near-coastal marine environments are those parts of the ocean most affected by human activities and changing climate. Ten or so chapters address predominantly marine aspects, although fishing and aquaculture are heavily focused in coastal seas. The assessment stresses cumulative effects, whereby the increasing pressures leading to biodiversity loss and habitat damage are from multiple factors.

The ocean provides innumerable services and benefits to humans: provisioning, regulating, supporting and cultural. The implementation of the 2030 Agenda for Sustainable Development advocates management based on an ecosystem approach. This has resulted in broad efforts to accelerate marine spatial planning (chapter 26), with some of the better developed examples involving integrated coastal zone management.

Clearer dialogue between scientists and policy-makers is needed and the UN Decade of Ocean Science for Sustainability, which began in 2021, sets out a plan towards the 2030 Agenda for Sustainable Development.

There was a High-level Launch of the decade on 1 June 2021, focused on the theme: ‘the science we need for the ocean we want’ (https://oceandecade.org/assets/The_Science_We_Need_For_The_Ocean_We_Want.pdf)
The Second World Ocean Assessment gives plenty of cause for concern; the ocean is indeed in trouble. But a starting point to remedy this is a more thorough understanding of the state of the ocean across its many parts, including, indeed especially, the coast. In 2021, the world is embarking on working towards a better ocean. It is a great goal to which to aspire. A stimulating vision of how we might get there, particularly how fishing could be sustainable within a healthier and more biodiverse marine environment, is laid out by Sir David Attenborough in his inspiring book, *A life on Our Planet*, wherein he imagines a vision for the future. Collectively these efforts call to governments to: sustain ocean observations; connect with users and stakeholders; identify the benefits of such research to society; develop indicators of ocean health, and; foster trans-disciplinary approaches to research and management. Vladimir Ryabinin, Executive Secretary of the Intergovernmental Oceanographic Commission, advises that by continually strengthening science and building greater capacity, ‘we can save the ocean’, a prospect which he emphasises was previously unimaginable.

Submitted by: CCS Chair Colin Woodroffe, who also contributed to several chapters of the Second WOA.

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ECO MAGAZINE: LAUNCH OF A SPECIAL DIGITAL ISSUE ON THE OCEAN DECADE

The Ocean Decade marks a new era of ocean knowledge and understanding, and offers ocean stakeholders an unprecedented opportunity to drive global change. The ECO Magazine and the Intergovernmental Oceanographic Commission of UNESCO are delighted to reveal the latest issue of the magazine: a special digital issue on the Ocean Decade.

The Ocean Decade issue feature an impressive collection of stories about the global initiatives and debates contributing to each of the Ocean Decade’s seven societal outcomes:

- A clean ocean – whereby sources of pollution are identified, quantified and reduced, and pollutants removed from the ocean

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• **A healthy and resilient ocean** - whereby marine ecosystems are mapped and protected, multiple impacts (including climate change) are measured and reduced, and provision of ocean ecosystem services is maintained

• **A predicted ocean** - whereby society has the capacity to understand current and future ocean conditions, forecast their change and impact on human wellbeing and livelihoods

• **A safe ocean** - whereby human communities are protected from ocean hazards and where safety of operations at sea and on the coast is ensured

• **A productive ocean** whereby the ocean ensures the provision of food supply and alternative livelihoods

• **An accessible ocean** - whereby all nations, stakeholders and citizens have access to ocean data and information, and have the capacities to inform their decisions

• **An inspiring and engaging ocean** – whereby society understands and values the ocean

From **citizen science projects** and **innovative solutions** to diverse perspectives on **inclusivity** and **leadership**, this edition has it all! Click below to know more about inspiring projects implemented to deliver the science we need for the ocean we want: enjoy your reading now!

**READ THE OCEAN DECADE DIGITAL ISSUE**

Originally published by the Intergovernmental Oceanographic Commission of UNESCO.

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**COASTS FOR KIDS – THE SERIES**

Coasts for Kids is a collaborative experience between children and their parents, coastal scientists, community artists, teachers, animators, and coastal managers. The series is aimed at Primary School children, and it is narrated by five kids aged 6 to 8 years old from the Merseyside area in the NW of England. The scripts were developed by a group of scientists in collaboration with teachers and community writers. Children were an integral part of the process, prompting questions and adding their expressions and 'cool phrases' to the final episodes.

The series includes a trailer and five episodes, currently available for watching in our **YouTube playlist** (https://bit.ly/3gRt8rU).

**The series trailer** (https://bit.ly/3gOcHwn) introduces the topic, narrators, some of our characters, and the episodes.

**Episode 1** (https://bit.ly/2UnmpNw) defines 'coasts' and their significance for biodiversity, resources, and well-being. We describe increasing population densities around the worlds' coastlines, and the pressure people can exert on coastal environments. We also refer to global concerns such as storminess and rising sea levels and introduce kids to coastal squeeze, erosion, and flooding concepts.
Episode 2 ([https://bit.ly/3vS8hc4](https://bit.ly/3vS8hc4)) shows a simplified version of sandy coastline response to storms and aims to provide children with a basic understanding of coastal morphodynamics. We explain storm surges and use *Bar and Dune-protecting Superheroes* to elaborate on sandy coastlines, natural defence mechanisms against big waves, and the capacity to rebuild themselves following storms.

Episode 3 ([https://bit.ly/3wReO8z](https://bit.ly/3wReO8z)) introduces kids to processes operating at the regional scale. We show various coastal environments (e.g., cliffs, marshes, etc.) and explain that the sea connects them in extensive coastal networks. We define concepts such as *sediment* and *longshore drift*.

Episode 4 ([https://bit.ly/3gOrirK](https://bit.ly/3gOrirK)) encourages children to think critically and develop their understanding of human impacts at various temporal and spatial scales, including coastal squeeze, flooding, erosion, and more.

Episode 5 ([https://bit.ly/3d7DGkh](https://bit.ly/3d7DGkh)) explains several key coastal management concepts and the benefits of understanding that coastal areas are dynamic systems when it comes to coastal planning.

We close the series with brief references to coastal engineering, coastal communities, and the importance of local conditions and biodiversity. All animations aim to maximise kids’ abilities to link ideas from previous episodes. The series (trailer + 5 episodes) is free to download, and it can be viewed and shared for educational purposes. You are welcome to post the series on your website, add it to your class material, or enjoy it at home! Let us have your comments and feedback, and share with us your questions @IreneDelgadoFe2 or by contacting any members of our team (included in the animations credits).

**We hope you enjoy Coasts for Kids!**

Submitted by: Irene Delgado, Edge Hill University, United Kingdom.

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**A COASTAL SCENIC BEAUTY AND SENSITIVITY ASSESSMENT OF BULGARIA: MANAGEMENT IMPLICATIONS FOR NATURAL AND HUMAN PRESSURE AT MOST ATTRACTIVE SITES**

A coastal field trip was recently carried out along the 432 km Bulgarian Black Sea coast focused to determine scenic sensitivity to natural processes and human pressure. In total, 16 sites respectively located in Burgas (9), Varna (3) and Dobrich (4) districts were field-tested during May and June (2021). The study was performed in collaboration between University of Cadiz and Center for Coastal and Marine Studies under a Ph.D. project: “*Sensitive coastal beauty: an innovative approach to assess scenic sensibility to human and natural processes, in a Climate Change context, at very attractive sites along the coasts of Italy, Balearic Islands (Spain), Northern France and Bulgaria*”.

The field trip was conducted by Alexis Mooser, Ph.D. student in Environmental Phenomena and Risks Programme (Universities of Parthenope and Cadiz), Parthenope University of Naples, Italy and University of Cadiz, Spain, CCS
Secretary Dr. Margarita Stancheva (CCMS director) actively participated in the field trip, in particular along the North Bulgarian coast.

In a first step, aesthetic aspect is quantified according to the well-known Coastal Scenic Evaluation System (CSES) method, based on the evaluation of 26 natural and human parameters by means of weighting matrices parameters and fuzzy logic mathematics.

Among the parameters, the CSES considers (i) 18 physical components – Cliff (height, slope, features), Beach face (width, colour, type), Rocky shore (slope, extent, roughness), Dunes, Valley, Landform, Tides, Coastal landscape features, Vistas, Water colour and clarity, Vegetation cover and Debris— and (ii) 8 human aspects – Noise disturbance, Litter, Sewage evidence, Built and Non-built environment, Access type and Utilities—. This enabled to calculate an evaluation index value (D) for each site, allowing their classification into 5 five distinct classes ranging from Class I, extremely attractive natural sites with very high scenic values \( D \geq 0.85 \) to Class V, very unattractive urban sites with intensive development \( D < 0 \). The higher is the D value, the more attractive is scenery. In this study, 7 sites were included in Class I, 8 to Class II and 1 to Class III. Further, CSES allows to point out how sites scenic quality may be improved by judicious interventions relating to physical and human parameters.

Figure 1. Shabla lakes located along the northern coast (A); Natural beach of Lipite surrounded by oaks massif forests dating from Tertiary (B); Kamchia-Shkorpilovtzi, the most extensive sandy beach of Bulgaria (C).

In a second step, the research aims to assess sites sensitivity to natural processes and human pressure by adopting a novelty method based on the calculation of three Coastal Scenic Sensitivity Indexes (CSSI): a natural sensitivity index (NSI), a human sensitivity index (HSI) and a total sensitivity index (TSI), as a result of the combination of the two previous indexes. Thereafter, investigated sites will be classified into three sensitive groups (not sensitive; sensitive; very sensitive). Hence, the aim is (i) to determine the intrinsic sensitivity of sites to erosion/flooding processes in a Climate Change context considering sites physical characteristics, forcing variables and regional trends of Storm Surge/Sea Level Rise; and (ii) to quantify the level of human pressure taking into account access difficulty, protected areas management categories and local trends of tourism intensity. For local managers, it could represent a powerful tool to anticipate medium and long-term environmental degradation and tourism growth scenarios, identify priorities in term of management/policies and, therefore, increase resilience of great scenic beauty sites.
The impressive coastal landscape diversity of the Bulgarian coastline makes this region an ideal field to assess. Indeed, Bulgaria exhibits a splendid variety of sceneries from vast plains constituted by coastal lakes (e.g., Durankulal, Shabla) (Figure 1), extensive sandy coastlines surrounded by remarkable developed dune systems (e.g., Kamchia, Arkutino) (Figure 1), shore platform (e.g., Shabla) and high cliff systems (e.g., Rakitnika) to impressive oaks pristine forest located in the southern coast of Burgas (e.g., Silistar, Lipite) (Figure 1). Some places clearly stand out from the rest with very high scenic values such as Ropotamo (D: 1.12), Lipite (1.04), Rakitnika (1.00), Kamchia (0.99) or Kara Dere (0.98). Obviously, coastal scenic beauty is a vital component for tourism economy but it is not a renewable resource.

Beach management is a very complex process that demands a holistic view but preserve the remaining undeveloped coast, avoiding irreversible damages, has turned into a global challenge for coastal managers. It would be interesting to promote and preserve sites of great scenic relevance, under the umbrella of sustainable tourism, by establishing, for example, a coastal Heritage award (e.g., Class I sites) or by publishing a pocket travel guide of most attractive investigated sites.

Submitted by: Alexis Mooser, Ph.D. student in Environmental Phenomena and Risks (Universities of Parthenope and Cadiz)

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IGCP 725 PROJECT FORECASTING COASTAL CHANGE

Photo: Jessica Pilarczyk

Brief outline of the project

The International Geoscience Programme (IGCP) serves as a knowledge hub of UNESCO to facilitate international scientific cooperation in the geosciences. The IGCP mission includes promoting sustainable use of natural resources, advancing new initiatives related to geo-diversity and geo-heritage and geohazards risk mitigation.

Coastal communities are prone to a range of geohazards, including sea-level rise, storms, subsidence, earthquakes and tsunamis. They can result in major changes to our coastlines, causing loss of life, damage to infrastructure, economic hardship, and degradation of coastal ecosystems. A key scientific goal is the ability to forecast coastal response to driving mechanisms, enabling effective decision-making about how best to manage the coastal zone and reduce risk.

Accurate forecasts of coastal change are best achieved by combining geological field and laboratory data with predictive numerical models. However, coastal geologists and numerical modellers often approach the issue in different and not always complementary ways. To overcome this key issue, the project will bring together scientists from coastal geology and numerical modelling to improve the predictive capacity of numerical models to fore- and hind-cast coastal change. The project will produce a ‘best practice’ guide for how geoscientists can effectively use
and integrate models into their investigations in a range of coastal settings, with a view towards directly informing management of the coastal zone. To this end, the project will also engage with stakeholders to develop guidelines for effective communication of evidence and science-based coastal policy.

Related information

- Duration: 2021 - 2026
- Geohazards theme

Submitted by: Jessica E. Pilarczyk, Assistant Professor, Canada Research Chair (Tier II) in Natural Hazards, Department of Earth Sciences; Simon Fraser University, Burnaby, BC CANADA, (778) 782-7288 I @SFUCoastalHaz I www.sfu.ca/chrg

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BOOKS & REPORTS ON COASTAL AND MARINE TOPICS

NEW SPECIAL ISSUE BOOK "COASTAL DYNAMIC AND EVOLUTION"

Editors: Giorgio Anfuso and Angela Rizzo
ISBN 978-3-03943-935-5 (Hbk)
ISBN 978-3-03943-936-2 (PDF)

The Special Issue reprint book "Coastal Dynamic and Evolution" has been published online and is freely accessible on the MDPI Books platform (http://www.mdpi.com/books/pdfview/book/3379)

This book includes papers published in the Special Issue titled “Coastal Dynamic and Evolution”, which aimed to collect multidisciplinary studies that involved the evaluation of coastal evolution at different temporal scales, from hours and days to months and years, as well as historical changes. The volume contains investigations carried out by means of aerial photos and satellite images, as well as results from in situ surveys and observations aimed at assessing morphological changes in shoreline and dune systems as a consequence of chronic flooding and erosion processes or the occurrence of specific weather-related events. Studies on the evaluation of past and future sea-level variations and related impacts have also been included.

In order to provide the reader with a wide overview of different coastal settings and methodological approaches, case studies from Russia, Italy, California (USA), Morocco, Spain, Indonesia, Ireland and Colombia have been included in this Special Issue.
The content may be of interest to those who perform a wide range of investigations related to coastal analysis and management, especially to researchers and academics who can exploit the provided approaches and methodologies. Please follow the MDPI Books Platform for more information and to access the book: http://www.mdpi.com/books/pdfview/book/3379.

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2021 EU BLUE ECONOMY REPORT – MAKE THE EU GREEN TRANSITION LEADING BY EMERGING SECTORS IN THE BLUE ECONOMY

The European Commission has published the fourth edition of “The EU Blue Economy Report”, providing an overview of the performance of the EU-27 economic sectors related to oceans and the coastal environment.

In its fourth edition, the yearly EU Blue Economy Report continues to analyse the scope and size of the Blue Economy in the European Union. It aims at providing support to policymakers and stakeholders in the quest for a sustainable development of the oceans, coastal resources and, most notably, to the development and implementation of polices and initiatives under the European Green Deal and in particular with the insight of the Sustainable Blue Economy Communication. Through its economic evidence, the Report takes stock of the Blue Economy, using the latest available data acting hence as a supporting tool for evidenced-based policy making. It also serves as a source of inspiration to all concerned stakeholders.

The European Green Deal and the European Strategy for data will necessitate reliable, accurate and centralised data for their initiatives. The EU Blue Economy Report 2021 intends to serve as a useful input to assessing the evolving contribution of oceans and coasts to the European economy. It is also intended to support the development of policies that pursue the EU strategic vision for a sustainable blue economy at all levels of governance.

The fourth edition of the Report provides a new perspective on the impacts that several factors have on the Blue Economy, including global challenges like climate change, emerging sectors such as maritime security and surveillance, enabling frameworks such as Maritime Spatial Planning, and innovative solutions from research & technological development. Most importantly, this edition also analyses the impacts of the COVID-19 crisis on the various sectors, as well as the effects of the mitigation measures put in place, such as the EU Recovery fund. The Report comprises an overview of the EU Blue Economy for each European sea basin, providing figures on employment and Gross Value Added. Finally, the Report is equipped with an Annex providing a short overview of the Blue Economy in each Member State.

The 2021 EU Blue Economy report can be read here!

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A NEW WORLD BANK POLICY NOTE "TOWARD A BLUE ECONOMY DEVELOPMENT IN BULGARIA" HAS BEEN LAUNCHED!

On 29 March 2021 the World Bank in collaboration with the Government of Bulgaria in support of Bulgaria's 2020 Presidency of the Common Maritime Agenda for the Black Sea has launched officially the Policy note "Toward a Blue Economy Development in Bulgaria" dedicated to pave the way to a national vision and strategy for a sustainable and resilient blue economy in Bulgaria.
The policy note, which was developed on the basis of a more detailed report entitled “Diagnostic of the Blue economy in Bulgaria”, takes a closer look at the blue economy sectors with strong growth potential and provides an overview of the blue economy as a mix of interconnected economic activities. It further highlights the development challenges and charts the alignment with European Union policies and directives in relation to blue economy, including the recent Roadmap to Sustainable Blue economy published by the European Commission.

The policy note aims at revealing the blue economy potential in Bulgaria by highlighting the synergies and interlinkages between the various sectors in the blue economic space and together offer opportunities for sustainable growth. At the same time, the note’s recommendations reflect the need to protect the marine environment and natural resources as the basis for development of the blue economy sectors. Another key objective of the Policy note is to support the work of the institutions working on maritime policy-related issues, especially during the 2020 Bulgarian chairmanship of the Common Maritime Agenda for the Black Sea – but also after that the event, with regard to the preparation of the country’s strategic framework to 2030 as well as in support of the programming and absorption of the new EU Multiannual Financial Framework (2021-2027). Last but not least, the policy note aims to inform and support Bulgaria’s active role at the regional table of the Black Sea cooperation.

The policy note has undergone a peer review involving global blue economy specialists and including experts from the European Commission who have confirmed its alignment with the Commission’s new approach towards realising a sustainable blue economy in the EU.

CCS Secretary Dr. Margarita Stancheva (CCMS Director) was key expert in preparation of Diagnostic for the policy note of the World Bank: the background analysis, including Blue economy sectoral diagnostics and recommendations. The objective of the Diagnostic is to inform the vision and strategy for transitioning to Blue Economy in Bulgaria by identifying the challenges and opportunities for shaping a development framework, based on a holistic ecosystem approach to management of coastal and marine resources. It reviews the baseline of the established and emerging Blue economy sectors in Bulgaria that have high potential for sustaining growth and assesses the synergies and potential conflicts between them over coastal and marine resources. Additionally, the main threats to the quality of Black Sea coastal and marine environment and sustainable use of natural resources are highlighted, including existing gaps and recommendations. The MSP process in Bulgaria is pointed as a key tool used to enhance integration of cross-sectoral planning and governance, and stakeholder engagement.

Follow the published policy note in English and Bulgarian on the World Bank website!
Future Earth Australia has released a strategy for achieving sustainable oceans and coasts across Australia by 2030.

This can be accessed at: https://www.futureearth.org.au/publications/sustainable-oceans-and-coasts-strategy

The strategy addresses what it calls the ‘blue ribbon’ around Australia, focusing on the connections from estuaries to coasts to the oceans that encircle the country. It recognises that these are under immediate and increasing threat from a number of compounding and overlapping pressures, including climate change, pollution, invasive species, habitat and biodiversity loss, and a growing population catalysing coastal development and greater infrastructure needs. Healthy oceans and coasts can support: a robust blue economy that uses sustainable techniques to ensure long-lasting prosperity for many generations to come; resilient coastal communities, encompassing both people-centred communities and ecosystems that are equipped for changes and damaging events; and sustained cultural heritage, especially Aboriginal and Torres Strait Islander heritage, that connects people and their health and wellbeing to the land, coasts, and oceans.

The themes that emerged from wide consultation included empowering Aboriginal and Torres Strait Islander knowledge, connectivity through bottom-up actions and top-down institutional frameworks, and regulatory capability that exemplifies leadership through reliance on science, data, and independent oversight.

The strategy includes seven recommendations intended as steps towards achieving sustainable oceans and coasts. The recommendations aim to 1) empower indigenous knowledge and practices in co-management, 2) restore, protect, and sustainably utilise ocean and coastal ecosystems to enable resilient coastal communities, 3) actively decarbonise the blue economy while sustainably fostering energy security, 4) adopt an integrated and ecosystem-based management approach to ocean and coastal planning coordinated across all levels of government, 5) use best available data and science to support decision making in ocean and coastal management and planning, 6) support grassroots initiatives that increase community trust and promote local stewardship of oceans and coasts, and 7) foster champions and incorporate cultural values into ocean and coastal policies and plans.

There are differing roles for federal, state and local governments in Australia, and this strategy sets out a roadmap for implementing a shared vision for the future of oceans and coasts. It outlines where responsibility lies for delivering
each of the activities. Alongside these recommendations, tangible actions are listed that can be taken, including ideas for the design and implementation phases of the actions, and further suggestions relating to the monitoring and evaluation of the successes or learning opportunities that arise.

A BLUEPRINT FOR COASTAL ADAPTATION: UNITING DESIGN, ECONOMICS, AND POLICY

Authors: Carolyn Kousky, Billy Fleming and Alan Berger

Tens of millions of Americans are at risk from sea level rise, increased tidal flooding, and intensifying storms. The design and policy decisions that have shaped coastal areas are in desperate need of updates to help communities better adapt to a changing climate. A Blueprint for Coastal Adaptation identifies a bold new research and policy agenda and provides implementable options for coastal communities.

In this book, coastal adaptation experts discuss the interrelated challenges facing communities experiencing sea level rise and increasing storm impacts. These issues extend far beyond land use planning into housing policy, financing for public infrastructure, insurance, fostering healthier coastal ecosystems, and more. Deftly addressing far-reaching problems from cleaning up contaminated, abandoned sites, to changes in drinking water composition, chapters give a clear-eyed view of how we might yet chart a course for thriving coastal communities. They offer a range of climate adaptation policies that could protect coastal communities against increasing risk, while preserving the economic value of these locations, their natural environments, and their community and cultural values. Lessons are drawn from coastal communities around the United States to present equitable solutions. The book provides tools for evaluating necessary tradeoffs to think more comprehensively about the future of our coastal communities.

Coastal adaptation will not be easy, but planning for it is critical to the survival of many communities. A Blueprint for Coastal Adaptation will inspire innovative and cross-disciplinary thinking about coastal policy at the state and local level while providing actionable, realistic policy and planning options for adaptation professionals and policymakers.

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ISBN-10: 1642831395
Publisher: Island Press, https://islandpress.org/books/blueprint-coastal-adaptation
Publication Date: May 20th, 2021

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Dynamic Sedimentary Environments of Mangrove Coasts provides knowledge on the importance of sedimentary dynamics in managing mangrove forests. In the first part of the book, the editors seamlessly offer a general introduction of mangrove sedimentary dynamics. This leads into more in-depth information on soil surface elevation change, sea level rise, and the importance of sedimentary dynamics in the loss or gain of blue carbon. The book concludes the discussion of mangrove sedimentary dynamics by addressing the issues of climate change (e.g. sea level rise and blue carbon) on mangrove restoration and sediment.

This book will assist coastal managers and academics in addressing the gaps in mangrove restoration and coastal management. As such, it will be a valuable reference for advanced undergraduate students, graduate students, researchers, academics in the field of coastal restoration, and coastal management practitioners.

The organization of the IGU Commission on Coastal Systems and the current member list of the Steering Committee of the CCS is as follows:

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The IGU Commission on Coastal Systems (CCS) website is at: http://igu-coast.org/
Contact information for CCS Officers and Steering Committee members can be found on the website along with past and present newsletters. If you are interested in becoming a member of the CCS, an on-line membership form is available at the end of the Newsletter.

Mike Meadows, Professor at the Department of Environmental & Geographical Science, University of Cape Town, South Africa, President of the International Geographical Union (IGU), is our liaison with the executive committee of the IGU: michael.meadows@uct.ac.za.

THE STEERING COMMITTEE MEMBERS: WHO WE ARE

Colin Woodroffe (CCS Chair since 2015)

Colin is Professor in the School of Earth, Atmospheric and Environmental Sciences at the University of Wollongong. He has a PhD and ScD from the University of Cambridge. Colin has studied the stratigraphy and development of coasts in Australia and New Zealand, as well as on islands in the West Indies, and Indian and Pacific Oceans. He has written a comprehensive book on Coasts, form, process and evolution, co-authored a book on The Coast of Australia, and is also co-author of a book Quaternary Sea-Level Changes: a global perspective. Colin was a lead author on the coastal chapter in the 2007 Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment report. He teaches coastal geomorphology and the application of geospatial techniques to coastal environments.

Margarita Stancheva (CCS Secretary, Editor of Newsletter)

Margarita is Co-founder and Director of the Center for Coastal and Marine Studies (CCMS) in Bulgaria. She has special interests in coastal geomorphology, coastal processes, sand beaches/dunes, coastal erosion/cliff retreat, shoreline changes, MSP and sustainable coastal development. She has a PhD in Oceanology with thesis: “Beach dynamics and modifications under impact of port and coast-protection structures". Since 2009 she has been convener of Geomorphology Session at the EGU General Assembly: "Coastal zone geomorphologic interactions: natural versus human-induced driving factors”. Research Fellow to the Programme for the Study of Developed Shorelines (PSDS), WCU – USA. Author of a chapter for Bulgaria in a book on Coastal Erosion and Protection in Europe - A Comprehensive Overview, co-author in coastal atlas on Sensitivity Mapping and Analysis of the Bulgarian Black Sea Coastal Zone and primary author of a book on Burgas Case Study: Land-Sea Interactions.
David R. Green (CCS Vice-Chair since 2020)

David is Director of the Aberdeen Institute for Coastal Science and Management (AICSM); Director of the M.Sc. Degree Programme in Geographical Information Systems (GIS); and Director of the UAV Centre for Environmental Monitoring and Mapping (UCEMM) at the Department of Geography and Environment, University of Aberdeen, Scotland, United Kingdom. His interests lie with Remote Sensing, UAVs, GIS and Mobile GIS, Digital Mapping and Hydrography, Coastal Management, and Marine Spatial Planning (MSP).

Edward Anthony (Past Chair)

Edward Anthony is currently professor of coastal geomorphology at Aix-Marseille University and Editor-in-Chief of Marine Geology. Author of nearly 130 published papers, E.A. has carried out research over the last 30 years on the Amazon-influenced coasts of South America, the coasts of West Africa, the Mediterranean, the English Channel and North Sea coasts, and recently the Mekong and Irrawaddy River deltas. His scientific interests focuses on the inter-related connections between the human and natural dimensions of coasts, and how human activities and developments impact on coastal geomorphology, sediment dynamics, ecology and management, especially in the face of global change, sea-level rise and sediment supply perturbations on river systems. A particular area of focus is river deltas, largely based on experimental field (measurements and observations) and laboratory work, and employs innovative techniques in remote sensing and modelling based on statistical and cartographic data. This activity is supported by various on-going grants and projects and involves collaboration with French universities, the IRD, Japanese, American, Indian, Vietnamese and Moroccan colleagues specialised in coastal studies. EA has supervised nearly 30 PhD thesis, and teaches at both undergraduate and post-graduate levels.

Françoise Breton

Emeritus Professor at the Universitat Autònoma de Barcelona, she is involved in research on coastal and sea socio-environmental systems and resource management. Anthropologist, geographer and environmental science expert, work focused on integrated management, co-management of ecosystems and habitats, and governance. Formed in Paris X University, later at the Boston University (1978-1980), and at the UAB, she created and directed the Centre for Sea study in Sitges, Barcelona Diputación (1981-90), working on fisheries, fishermen knowledge, and fishery anthropology in collaboration with A. Geistdorffer and the Museum of Natural History of Paris. Head of the UAB Interfase Research Group since 1990. After different collaborations with international institutions in Europe, she coordinated the EU FP7 project PEGASO, on ICZM and governance in the Mediterranean and the Black Sea (2010-2014). She developed with IRD responsible research with local communities on ecosystem services and food security in the West-African coast. Since 2015, she focussed research on marine mammals in the Arctic and their interactions with people, collaborating with the Norwegian College of Fishery Sciences, University of the Arctic - Tromso, and the Svalbard University, Norway. The Research Center on the ARCTIC was Inaugurated the 1st December 2017 at the Universitat Autònoma de Barcelona, together with the 2017 Stefansson Memorial Lecture, by the Stefansson Arctic Institute (Iceland), where she is Associate Professor, and the Institute of Arctic Studies, Dartmouth College, USA. In February 2016, she
awarded the Narcís Monturiol medal of the Catalan govern in recognition to her high research and innovation trajectory.

**Paolo Ciavola**

Paolo is an Associate Professor of Coastal Dynamics and Geomorphology in the Department of Physics and Earth Sciences of the University of Ferrara, where he teaches Physical Geography and Geomorphology, Coastal Risk, GIS and Remote Sensing. His current main research interests include coastal processes, the impact of climate change on coastal morphology, the role of extreme storm events in generating coastal risk, river delta and estuarine dynamics, sedimentation in coastal lagoons. He is on the Editorial Board of the Journal of Coastal Research, Continental Shelf Research and the Journal of Integrated Coastal Zone Management of Portuguese Speaking Countries. He was an expert reviewer of the IPCC WGII AR5 report- Europe Chapter and is currently a Science Officer of the European Geoscience Union for the Natural Hazard sub-group. Recently he has published for Wiley two books dealing with coastal storms (*Management of the Effects of Coastal Storms: Policy, Scientific and Historical Perspectives; Coastal Storms: Processes and Impacts*).

**Abdelmounim El M’rini**

Abdelmounim is Professor at the Department of Earth Sciences at Abdelmalek Essaâdi University of Tetouan (Morocco). He has a PhD from Abdelmalek Essaâdi University and from Nantes University (France). His research activities focus on the characterization of coastal systems and the impacts of human activities on their processes at the short, medium and long terms. He has participated at many projects that focus on coastal areas with technical approaches (coastal morphodynamics, coastline kinematics, impact of coastal facilities, coastal flooding hazards, sedimentological, geochemical and isotopic studies), as well as coastal planning and management (in this context, in Integrated Coastal Zone Management projects). This works are done mainly in collaboration with Moroccan, French, Spanish and Italian colleagues. He teaches coastal geomorphology, interactions on coastal systems, Integrated Coastal Zone Managements and the application of remote sensing to coastal environments.

**Jeffrey Ollerhead**

Jeff Ollerhead is a member of the Geography and Environment Department at Mount Allison University in Sackville, NB, Canada. He is a coastal geomorphologist who studies beaches and salt marshes. In recent years, he has been particularly involved in designing and monitoring salt marsh restorations in the upper Bay of Fundy. He was Dean of Science and Graduate Studies for 10 years and is now Provost and VP, Academic and Research, at Mount Allison.
Norbert Psuty

Norb is Professor Emeritus at Rutgers University and is currently Director of the Sandy Hook Cooperative Research Programs. He is a coastal geomorphologist whose research encompasses the dynamics of the coastal zone, incorporating process-response studies of beaches, coastal dune processes and morphology, sediment budget studies, barrier island dynamics, estuarine sedimentation, and sea-level rise. His research has been conducted primarily in various portions of coastal New Jersey and New York and it has both a basic science component as well as an applied side. He has been and continues to be consultant to the U.S. National Park Service and the U.S. Fish and Wildlife Service on shoreline dynamics and change in coastal parks and refuges.

Paul Rooney

Paul is the Deputy Head for the Department of Geography and Environmental Science at Liverpool Hope University, United Kingdom. Following studying at university, Paul became a Coastal Ranger on the Sefton Coast, the largest area of open dunes in England. In 1995 he was appointed as the Project Officer for an EU funded LIFE-Nature project to implement species and habitat restoration and to develop a conservation strategy for the Special Area of Conservation (SAC) for that dune coast. Paul joined the Liverpool Hope University in 1999 and established the UK Sand Dune and Shingle Network in 2006. The aim of the network is to help to conserve sand dunes and shingle as dynamic landscapes by linking science and management. Paul’s research interests are mainly in coastal dune ecology, change and management. He is a Chartered Environmentalist, a full member of the Chartered Institute of Ecology and Environmental Management, a Chartered Geographer through the Royal Geographical Society (with IBG), and a Fellow of the Higher Education Academy (now part of Advance HE).

Marinez Scherer

Marinez has a degree in Biological Sciences (Federal University of Santa Catarina / Brazil) and a PhD in Marine Science at University of Cadiz / Spain. She has been teaching Integrated Coastal Management at Federal University of Santa Catarina, and is the Research Leader of the Integrated Coastal Management Group and Laboratory. Marinez is also visiting professor at the University of Cadiz. She is the executive secretary of the Brazilian Sea Forum and the Technical Director of the Brazilian Agency for Coastal Management. She is also one of the Brazilian Coordinators of the Ibero American Network on Coastal Management (IBERMAR). Her main research interests are on integrated coastal and marine management, ecosystem based management, coastal and marine protected areas, and networks.
Toru Tamura

Toru is senior researcher at the Geological Survey of Japan, National Institute of Advanced Industrial Science. He has a PhD in Geology at Kyoto University, and is also a visiting associate professor at Graduate School of Frontier Sciences, University of Tokyo. His primary research interest is multi-temporal scale evolution of the coastal landform in sandy beach and muddy deltaic systems. He has studied many coastal systems mainly in Asia and Australia using a combination of sediment cores, radiocarbon dating, optically-stimulated luminescence dating, remote sensing and ground-penetrating radar, for better understanding of the present and predicting future coast. He also manages an OSL dating laboratory at the Geological Survey to enhance the dating of Pleistocene and Holocene coastal landforms and stratigraphy.

Dhritiraj Sengupta

Dhriti is a Post-Doctoral research fellow at the State Key Laboratory of Estuarine and Coastal Research SKLEC, East China Normal University, Shanghai, China. His research involves mapping spatial trends and patterns of large scale coastal land reclamation using advanced geospatial technology to understand the current status of coastal adaptation in major Asian cities. Besides, he actively involves himself in Volunteered Geographic Information (VGI) related task by working with community members for flood mitigation in coastal areas. At CCS, he manages our website and web presence for effective coastal science communication.
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Thank you for your cooperation. Margarita and Norb

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