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AZTI Summer School 2025

Joint action from GES4SEAS, OBAMA-NEXT, BioBoost+, GuardiAS, ANERIS, POMP

**Artificial intelligence and
citizen science in
monitoring and assessing
biodiversity and invasive
species at sea**

Aquarium of San Sebastian
(Spain)

3 - 5 June 2025

Supported by:



Biographies of the teachers

Ángel Borja

Director of AZTI SUMMER SCHOOL



Ángel Borja is PhD in Biology (1984, Basque Country University, Spain); Doctor in Sciences (Honoris Causa) (2015, Hull University, UK). Principal Investigator at AZTI (Spain, 1985). Distinguished Adjunct Professor (King Abdulaziz University, Saudi Arabia, 2020-2022). ORCID number: 0000-0003-1601-2025. His main work is making marine ecology

research useful for policy-makers and managers, studying the effects of human activities on marine ecosystems, the recovery of marine systems after impact, protection and conservation of the ocean, effects of climate change on coasts and marine waters, monitoring and assessment of marine status, under European directives (i.e. Water Framework Directive; Marine Strategy Framework Directive), as well as integrative methods under the ecosystem-approach. The assessment methods he has developed, together with his team, are used worldwide, contributing to conserve and protect the ocean (e.g. AMBI, M-AMBI, AFI, NEAT, etc.). Author of >450 papers (Hindex: 84, SCOPUS; 100, Google Scholar), Highly Cited Researcher 2018-2022 (Web of Science) and 2019-2024 (Scopus). He is Chief Editor of Frontiers in Ocean Sustainability and Associate Editor of Continental Shelf Research, and member of the editorial board of Ecological Indicators, Marine Pollution Bulletin, and Current Opinion in Environmental Science & Health. He has chaired/organized >55 international conferences/sessions, being key-note speaker in >100 international conferences. He has participated in more than 120 European and international projects, leading some of them (currently GES4SEAS). He was awarded with the European SETAC Environment Education Award (2017), the Life-Time Achievement Award, by the International Conference on Benthos (Cochin, India, 2019), and the MakeEUBlue Award for the summer school he organizes annually since 2004 (EU Commission, 2024). He has supervised or mentored 22 PhD students, from Spain, Italy, Portugal, Mexico, Iran, Saudi Arabia, and China. He was member of the Scientific Committee of the European Environment Agency (2013-2020), and currently is member of next Advisory Boards: International Center for Environmental Management of Enclosed Coastal Seas (EMECS, Japan); Institute of Oceanography (HCMR, Greece); SustainMare (German Marine Research Alliance); Mission inter-estuaires (French Agency for Biodiversity); and Marine and Environmental Sciences Centre - MARE, Portugal.

https://www.researchgate.net/profile/Angel_Borja/

Lisandro Benedetti

June 3rd 9:15 - 10:15

Boosting the Frequency and Scale of Marine Biodiversity Monitoring Using Digital Imagery and Artificial Intelligence



Lisandro Benedetti-Cecchi (LBC) is Professor in Ecology at the University of Pisa and past Vice-Rector for European and International research (2016-2022). LBC's lab uses marine coastal plants and animals as experimental model systems to address fundamental ecological questions, including the causes and consequences of loss of biodiversity,

the ecological impacts of climate change and the role of Marine Protected Areas for the conservation of marine life. LBC is member of the Biology & Ecosystem Panel of the Global Ocean Observing System (GOOS) and has served the European Research Council (ERC) Review Panel LS8 of the IDEAS program in the years 2012-2019. LBC has coordinated national and international projects and he is the Coordinator of the Biodiversa+ project BioBoost+. LBC has published +180 papers in peer reviewed ecological journals and 10 chapters in books and his work has received +13,000 citations (Google Scholar). LBC is included among the top 2% scientists worldwide in Marine Ecology, based on Scopus standardized citation metrics and in 2019 he received the International Temperate Reef Symposium award for lifelong contribution to marine sciences.

Jose A. Fernandes-Salvador, PhD

June 3rd 10:15 - 11:15

Robust validation and comparison of Artificial Intelligence methods



Jose A. Fernandes-Salvador is PhD in Computer Science (2011, Basque Country University, Spain). Dr. Fernandes is a data scientist from computing and artificial intelligence studies with the skills and experience needed to translate data into valuable information for marine research, policy and industrial applications. These skills

are curiosity, economic knowledge, data and information finding, understanding of statistics and machine learning, and multidisciplinary communicative skills. Over 18 years working in marine research institutes (Spain, Finland, UK). The subject of Fernandes PhD thesis was to apply machine learning to automatically classify biological samples and to forecast fish recruitment. Later, he applied some of those methods to assess the likelihood of achieving the Water Framework Directive in Finnish waters in collaboration with Finish institutions. Afterwards he moved to work to United Kingdom at University of East Anglia and Plymouth Marine laboratory where he worked on developing species distribution model to consider impacts of climate change and socio-economic implications. The last 8 years he re-incorporated to AZTI to enhance its big data and artificial intelligence research combining large and heterogenous datasets with state-of-art machine learning and decision support systems mainly to aid the industry and policy to adapt and mitigate climate change. Currently Dr. Fernandes is chair of the ICES working group on machine learning (WGMLEARN) and editor of the journal Fisheries Research on the topic of artificial intelligence applied to fisheries.

Lauriane Ribas-Deulofeu

June 3rd 11:45 - 12:45

Species Identification through Artificial Intelligence and expert community - creating iNaturalist Projects



Lauriane Ribas-Deulofeu holds a PhD in life sciences (2020, Academia Sinica - National Taiwan Normal University, Taiwan). She now serves as a postdoctoral researcher position at Nord University in Norway (2024). Her research career has taken place in Taiwan, South Korea, and now Norway. It focuses on marine

biodiversity monitoring, the resilience of ecosystems to climate change and human pressure, and the advancement of ocean sustainability through new technologies.

Lauriane previously held a postdoctoral research position at National Taiwan University, where she conducted the nationwide assessment of Taiwan's coral reefs and MPAs, mandated by the country's Ocean Conservation Administration.

Currently, Lauriane is working on the BioBoost+ project at Nord University. It aims to improve non-invasive, cost-effective and high-frequency sampling and identification of marine biota by applying new technologies such as Artificial Intelligence (AI) with digital imagery. She is also involved in GuardIAS project, which leverages new technologies for the monitoring and prevention of Invasive Alien Species (IAS) in European waters.

Igor Granado

June 3rd 15:30-16:30 & 17:00-18:30

Benthic species workshop; elaboration of shared training-sets, labelling tool and supervised classification methods. Theory and practice



Igor Granado holds a PhD in Computer Science from the University of the Basque Country (EHU-UPV), awarded in 2023. Throughout his career, He has actively contributed to several projects, particularly in the fisheries sector and marine environmental sustainability. His work focuses on designing and implementing of

operation research and AI-driven solutions that address real-world challenges and bring positive change to society and environment, such as vessels routing, machine learning models or computer vision algorithms

In his current role as a postdoctoral researcher at AZTI's Sustainable Fisheries Technologies group, he is part of the Bioboost+ project. This project aims to improve non-invasive, cost-effective, and high-frequency monitoring of biodiversity, including the identification and analysis of marine zooplankton, benthos, fish, and birds through digital imagery. To this end, he is deploying and implementing image analysis of seabed habitats to enhance species recognition and processing, as well as monitoring human pressures using deep learning algorithms and satellite observations.

Linkedin profile:

<https://www.linkedin.com/in/igorgranadodominguez/>

Mihailo Azhar

June 3rd 15:30-16:30 & 17:00-18:30
Benthic species workshop; elaboration of shared training-sets, labelling tool and supervised classification methods. Theory and practice



Mihailo Azhar is a postdoctoral researcher at Aarhus University. His research focuses on applied computer vision (AI) and machine learning in the marine ecology space, developing new methods and tools to monitor and assess marine ecosystems, with a particular focus semi-supervised learning approaches in benthic habitat mapping.

He is currently involved in the Horizon EU OBAMA-NEXT project where he is a part of an interdisciplinary team integrating statistical modelling and AI/ML methodologies with data from marine monitoring frameworks. Additionally, he helps coordinate a Europe-wide initiative to create a comprehensive drone remote sensing imagery dataset of coastal habitats.

Stelios Katsanevakis

June 4th 9:00-11:00
CIMPAL+ theory and practice for alien species assessment



Stelios Katsanevakis is a Professor of marine ecology in the Department of Marine Sciences, University of the Aegean. Before that, he worked in the Hellenic Centre for Marine Research, and the European Commission's Joint Research Centre. His research focuses on marine conservation, ecological monitoring, and the impacts of biological

invasions on biodiversity and ecosystem services. He has participated as coordinator or principal researcher in >50 research projects and was the Chair of the COST Action MarCons 'Advancing marine conservation in the European and contiguous seas'. He is coordinating the Horizon Europe project GuardIAS 'Guarding European Waters from Invasive Alien Species'. He is (co)author of >230 papers in international scientific journals, and his work has received >18,800 citations. He is included among the top 1% scientists worldwide in Marine Biology, based on Scopus standardized citation metrics.

<https://elsevier.digitalcommonsdata.com/datasets/btchxktzyw/7>

Heliana Teixeira

June 4th 9:00-11:00

CIMPAL+ theory and practice for alien species assessment



Heliana Teixeira is a marine benthic ecologist, with a PhD in Biology, specialty Ecology from University of Coimbra (PT), with training at University of Murcia (SP), AZTI Foundation (SP) and Southern California Coastal Water Research Project SCCWRP (USA). As post-doc she worked at IMAR (Coimbra, PT) and as Scientific Officer at the EU

COM JRC Joint Research Centre (IT). Since 2016, she is a researcher at the Center for Environmental and Marine Studies (CESAM) and the Dept. Biology at the University of Aveiro (PT), leading the Ecosystem Management and Conservation Research Group. Her research focuses on environmental quality assessment, investigating pressure-response relationships to reverse the negative impacts of anthropogenic disturbances and climate change in natural ecosystems. She is an expert on the use and development of ecological indicators for trends in estuarine, coastal, and marine ecosystems, and on the study of local processes and impacts of biological invasions. She has been exploring AI for developing computer vision and information retrieval tools to support management of IAS. Her interests also include socio-ecological research for understanding biodiversity links to ecosystem services, using participatory processes to engage stakeholders and integrate local indigenous knowledge. Long experience in international expert groups on the domains of Water and Marine Strategy, with several studies highlighted as relevant Science for Policy denoted in her Sage Policy profile. Currently, part of the EU Water Directive ECOSTAT WG on nutrients and other physical-chemical elements in support of good ecological status, and of COST Action InsectAI Using Image-based AI for Insect Monitoring & Conservation. She collaborates with LifeWatch ERIC, through PORBIOTA - Portuguese e-Infrastructure for Information and Research on Biodiversity, and the JRC for developing research tools for non-indigenous and invasive species. She participated in more than 20 R&D projects in national and international contexts, co-authoring over 50 scientific publications in ISI Journals, among other publications such as books, guidances and technical reports. Currently participates in HEU projects GES4SEAS (2022-26) and B-CUBED (2023-26) and collaborates in the HEU projects A-AAGORA, RESTORE4C's, REDRESS and LIFE SeaGrassRIAwild. Active member of InvECO the Portuguese network for the study and management of invasive alien species of the Portuguese Ecological Society, and since 2023, Specialty Chief Editor of Frontiers in Marine Science in Marine Ecosystems Ecology. ORCID iD 0000-0001-8525-9967

Agnese Marchini

June 4th 11:30-12:30

Capacity building through citizen science initiatives: BioArtBlitz events, Zooniverse projects



A graduate in Biological Sciences in 2000, Agnese Marchini received her PhD in Experimental Ecology in 2004 from the University of Pavia, continuing with post-docs at the Universities of Ferrara and Pavia. Since 2023, she has been full professor of Ecology at the University of Pavia where she currently holds

responsibilities in teaching coordination, communication and internationalization. Her research mainly concerns aquatic biological invasions, considering different aspects of the issue including management aspects, and participating in international working groups on the topic, including the Working Group on Introductions and Transfer of Marine Organisms (WGITMO) of ICES, and the Working Group on Invasive Alien Species (WGIAS) of DG Environment of the European Commission. Author or coauthor of ninety papers published in international scientific journals, her research has been displayed in >100 outreach articles (magazines, newspapers, radio), and she actively engages in various public outreach initiatives (documentaries, exhibitions, seminars, open labs, science festivals, science-art shows, educational MOOCs and participatory workshops).

Elena Tricarico

June 4th 15:15-16:15 & 16:45-18:00

Data-validation solutions for citizen science data on invasive alien species using smartphones



Elena Tricarico, research fellow in Zoology at the University of Florence (Italy), works on conservation and invasion biology in aquatic environments, spanning from research on impacts and behavior to management and citizen science. Elena participated in more than 43 national and European projects (as

as LIFE ASAP, COST Actions Alien Challenge and Alien-CSI, Marie Curie ITN Aquainvad-ED) mostly on alien species. She was also involved in the IPBES Invasives Alien Species Assessment. Elena is a member of the EASIN editorial board, of the Executive Committee and International Council International Association for Open Knowledge on Invasive Alien Species (INVASIVESNET), and of the EICAT Authority. She provides technical and scientific support for the implementation of EU Regulation 1143/2014 on IAS through IUCN, and is currently participating in the Horizon project GuardIAS as well as in other projects dealing with horizon scanning and risk assessment at EU level.

Berta Companys

June 5th 9:00-11:00

Citizen science as a tool to reduce the marine biodiversity gap of knowledge and the usage of Artificial Intelligence



Berta Companys, graduated in Marine Science in 2010 (University of Vigo, Spain) and PhD student at ICM-CSIC. She has worked on several research projects both national and internationally funded, focusing on marine biodiversity monitoring, invasive alien species and ecosystem restoration. Berta is currently working with participatory technologies, in

particular with the citizen science observatory MINKA (<https://minka-sdg.org/>), oriented towards the establishment of living labs and communities of practice. She is part of the coordination team at HE ANERIS project, as well as work package leader on participatory technologies; in addition to the participation of other HE projects as GUARDEN (<https://guarden.org/>) and PHAROS (<https://pharosproject.eu/>). She has conducted training, presented conferences and workshops across Europe. Experienced diver promoting the environmental education of the underwater ecosystems.

Alice Estrela

June 5th 11:30-12:30

Artificial Intelligence for communication in ocean sciences



Alice is an experienced creative and copywriter, specialized in digital content and digital strategy. She graduated in Biology in 2006 (Faculty of Sciences, University of Lisbon, Portugal) and finished her MSc degree in Conservation Biology in 2008 in the same institution. Her passion for communication and education has guided her professional

journey. For the past +12 years she has been planning and creating effective, SEO & SEM content as well as the best strategies for that content to reach its target. Currently, she works at Science Crunchers as a digital content and digital strategy specialist. Her scientific background combined with her strong communication skills allow her to navigate the exciting, but many times challenging waters of science communication.



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