

Memorandum of Understanding



**Leibniz-Institut für Ostseeforschung
Warnemünde, Germany**



**Goa University
Goa, India**

Title

Comparative interdisciplinary research on variability and trends in estuaries and coastal waters – a holistic view on regional shallow water systems

This Memorandum of Understanding is made and executed on this 28th day of February 2025 by and between **Goa University**, Goa, India, herein represented by its Vice Chancellor, and having its official address at Administrative Block, University Campus, Taleigao Plateau, Goa GA 403206, India (hereinafter called GU and which expression shall unless it be repugnant to the meaning or context thereof, be deemed to mean and include its executors, administrators and permitted assigns) and **Leibniz Institute for Baltic Sea Research Warnemünde**, represented by Director, Prof. Dr. Oliver Zielinski and having its official address at Seestraße 15, 18119 Rostock, Germany (hereinafter called "IOW" and which expression shall unless it be repugnant to the meaning or context thereof, be deemed to mean and include its executors, administrators and permitted assigns). Both the parties herein are referred to as the "Parties")

Preamble

The aim of this Memorandum of Understanding is to jointly develop cooperation that furthers the academic and research objectives of both Parties and promotes the exchange between faculty, scientific staff, and students of both Parties, materials and to provide a framework for this cooperation. It identifies common research interests in coastal marine and estuarine systems and outlines joint research activities that align with the respective research programmes of the individual institutions and which (subject to funding) can be carried out within a 5-year time frame.

Objectives

IOW is a non-university research institute under the umbrella of the Leibniz Association specializing in interdisciplinary study of coastal oceans and marginal seas, with a particular focus on the Baltic Sea ecosystem. Its research programme, 2024 to 2033, prioritizes perspectives of coastal seas under three research foci, as follows:

1. Key processes across scales and boundaries,
2. Coastal seas in transition, and
3. Emerging technologies enabling advanced marine science.

GU is a centre for higher education and learning, focused on the exploration of estuarine and coastal waters to provide a citizen-centric, holistic overview of marine habitats. Its research objectives are as follows:

4. Improve the carbon transport pathways using coupled physical-biogeochemical-optical models and remote sensing,
5. Changing estuaries and coastal waters, and
6. Improve existing and develop new technologies, e.g., sensors, and material development relevant to marine habitats.

IOW and GU have the shared objective to improve the understanding of shallow water coastal and estuarine environments within the next decade. Thus, the emphasis of the IOW-GU collaboration is to understand and better quantify the feedback mechanisms of estuarine and coastal waters to varying spatiotemporal scales of climate change impacts.

The coastal waters and estuaries of Germany and the state of Goa face many common challenges as a consequence of both natural and anthropogenic drivers of climate change. The stress of various human activities, e.g., overfishing, tourism, vessel pollution, shipping and transport, dredging, eutrophication, and agricultural/land run-off, has put enormous pressure on natural ecosystems. This is not only detrimental to marine habitats but also impacts human wellbeing in many ways. To monitor and understand these challenges, incorporating the perspective of researchers with different disciplinary approaches, and geographic and demographic backgrounds is useful to understand the true scope of possible solutions. The focus is on ocean research priorities attributed to natural and social sciences, thereby linking ecosystem structure and function to the assessment of ecosystem services.

Scope of the MoU and Collaborative Research Activities

The scope of this agreement covers scientific exchange and cooperation as well as academic activities between the two Parties in the fields identified as collaborative research activities. These are structured into core research objectives, comparative and exploratory studies, and applied technologies, knowledge and application development.

The Non-Exclusive list of Scientific expertise on behalf of both the parties is annexed as Appendix A attached herein after to this MoU.

- Core Research Objectives
 1. Vulnerability and resilience of coastal seas and estuaries.
 2. Process studies as a multiscale problem involving intra-tidal, diurnal, spring-neap, seasonal, inter-annual, and decadal timescales.
- Comparative Studies
 1. Response of shallow water systems to climate change, extreme events (e.g., flooding, droughts and marine heat waves) and anthropogenic stressors.
 2. Different modes of climate variability, e.g. biogeochemical response of eastern Arabian Sea to wet and dry spells of the Indian Summer Monsoon versus biogeochemical teleconnections between the Baltic Sea and the North Atlantic. How well are climate scales being represented in regional data.
 3. Human activities and ecosystem services.
- Exploratory Studies
 1. Physical processes, i.e., mixing, diurnal heating, tidal straining, sediment transport, and changing morphology.
 2. Biogeochemical transformations: pathways of biogeochemical tracers, ecosystem health, regime shifts, and estuaries' coastal filter function.
 3. Shifting optical states in coastal waters.
 4. Marine Pollution and Hazards (e.g. meso and macro litter, microplastics, metals, other contaminants).
 5. Ecosystem services and societal needs (e.g., food, clean water).
- Applied Technologies, Knowledge, and Application Development

1. Shallow water process models resolving physics including sediment transport and grid refinement.
 2. Biogeochemical, bio-optical and statistical modelling and data science.
 3. Novel monitoring technologies, e.g. in-situ optics, remote sensing, autonomous vehicles.
- If the research carried out leads to the development of a technology through incubation, the facilities of the Goa University Research Park Unit (GURU) could be utilised according to the rules and regulations of the Research Park.

To implement this agreement, the Parties shall:

- support mutual research stays, especially among their young researchers, according to their respective financial possibilities.
- encourage the development of joint research projects.
- strive to raise national and international third-party funds.
- enable mutual access to facilities of the participating institutions as well as the efficient sharing of the relevant infrastructure.
- support joint academic teaching and educational activities.

Anticipated Outcomes and Products

- Joint proposals and scientific publications
- Research visits, collaborative workshops and seminars in association with international and national scientific organisations, e.g., IOCCG focusing on the remote sensing of estuarine and coastal waters.
- Stakeholder engagement, outreach, knowledge transfer and exchange, e.g. fact sheets, educational material, and training resources.
- Annual reports.

Intellectual Property Rights (IPR)

No right of any kind whatsoever in any Invention, Copyright, Trade Secret, or any other form of Intellectual Property (Collectively defined as IP) are granted or transferred under this MoU. Any IP exchanged pursuant to this MoU shall be governed by the terms of a separate written agreement mutually agreed upon by both the parties.

Operational Constraints/Fundings

It is recognized that the implementation of program activities under this MoU will in every case be dependent upon the availability of necessary resources, either from within the institutions concerned or from external sources. In the case of externally funded projects, cooperative activities will be subject to the terms of the project of which they are a part. The implementation of such a Project shall be mutually discussed and agreed upon in writing by both parties prior to the initiation of the particular programme or activity and the terms of such programme shall be negotiated on an annual basis.

Duration of the MoU

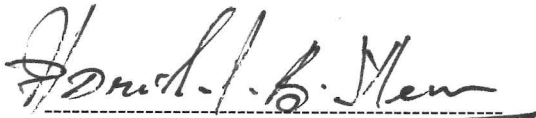
The MoU will come into force on the date of signature by the Parties and will be valid for five years. The MoU may be amended or extended with the written consent of both the Parties. Either Party may terminate this agreement at any time providing that the terminating Party gives written notice of its intention at least three months prior.

Coordinators

Dr. Bronwyn E. Cahill at IOW and Dr. Arjun Adhikari at GU are designated as Coordinators of the MoU.

Settlement of Dispute

Normally it is expected that no dispute will arise in the assignment. Should any dispute arise, the same shall be amicably settled by the Dispute Resolution Committee constituted by both the parties to this MoU. The Dispute Resolution Committee shall consist of senior representatives of the GU and IOW who shall be nominated by the Vice-Chancellor of the GU and the Director of IOW, respectively. The decision of the Dispute Resolution Committee shall be final and binding on both the parties.



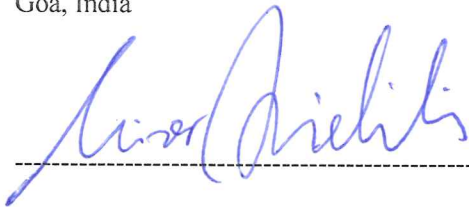
Vice Chancellor
Prof. (HAG) Harilal B. Menon
Goa University, Taleigao Plateau
Goa, India

28/02/2025



28 February 2025

Date



Director
Prof. Dr. Oliver Zielinski
Leibniz Institute for Baltic Sea
Research Warnemünde, Germany



28 February 2025

Date