

**Proposed thesis topic for the Doctoral degree studies (2021-2025) in
Ecology and Environmental Science at Marine Research Institute (Klaipėda University)**

Title	Marine benthic habitats: identification, classification and the development of indicators for the environmental status assessment based on underwater imagery
Brief description of the topic	<p>Benthic habitats are important components of marine ecosystems. Habitat mapping of World Ocean is getting more intensive due to development of advanced mapping techniques and equipment, however only about five percent of the global ocean has been mapped by modern multibeam sonar systems, while the biological part is mapped even less. Underwater imagery (UI) is commonly used for habitat surveys since it covers larger area than grabs, processing of samples is faster, is applicable in hard bottoms, cameras can access places where divers cannot. UI is the most promising method for the development of habitat extent criteria for reefs (under MSFD D6 descriptor – seafloor integrity), since it requires large spatial sampling effort, while habitat defining features such as the substrate and the coverage of algae or epifauna species (up to 6th level of HELCOM HUB classification system) are identifiable from UI. The main goal in the proposed topic is to apply and develop UI methods to serve both for the identification/classification/mapping of benthic habitats and for the development of indicators on habitat level.</p> <p>The suggested topic is diverse and includes many research aspects such as identification, classification and mapping of benthic habitats in various ecosystems, developing advanced underwater imagery methods, merging of acoustic and biological data, habitat distribution modelling, developing criteria for habitat extent and good environmental status assessment, physical loss due to impacts of natural and anthropogenic factors, functional role, etc., thus leaving enough freedom for the PhD project.</p>
Requirements for a candidate	Basic knowledge on benthic ecology, hydro-physical, hydro-chemical and biological processes in marine and coastal environment, understanding of habitat shaping factors and classification systems, basic taxonomical knowledge on marine megafauna, macrozoobenthos and macrophytobenthos (experience in taxonomy of Baltic species is desirable). Good skills in video and imagery editing and analysis methods, GIS and statistical methods. Experience in underwater filming and diving is desirable. Fluent English.
Existing research experience	The classification and mapping of benthic habitats are the subject of KU MRI benthic habitat ecology research group for over 20 years. Underwater imagery was intensively used for the mapping of soft and hard bottom benthic habitats: Lithuanian coastal and offshore reefs (i. e. Bučas et al., 2007, 2009; Šaškov et al., 2014a), Norwegian Sea (Šaškov et al., 2014b), Arctic (Šiaulys et al., 2021), Adriatic Sea, White Sea, various lakes. Advanced imagery analysis methods (i.e. video mosaicking, 2.5 D and 3 D mosaics, automatic underwater feature identification) are currently developed by joint KU and KTU cooperation. MRI also has experience in developing benthic indicators such as benthic quality index (BQI) for soft bottom macrofauna, maximum depth of macrophytes in Lithuanian coastal area and the Curonian lagoon, threshold values for MSFD D6 (Sea-floor integrity) descriptor, etc. The suggested topic is related to the activities of current projects ADAMANT, DEMERSAL, JSPD4, reef monitoring program, one project is submitted for Lithuanian-Polish program “Daina”.
Existing research infrastructure and support	All necessary equipment and infrastructure are accessible at KU Marine Research Institute: underwater video systems (drop-down video camera, hand-held underwater video camera, ROV), diving equipment, computer classes, GIS and statistics software, benthic laboratory with required infrastructure (stereoscopes with cameras, drying chambers, scales) are also available.
Supervisor	Dr. Andrius Šiaulys andrius.siaulys@jmtc.ku.lt +370 676 61590