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Course Name: **River-sea interactions**

Number of credits: 4.5 ECTs

Coordinator	Institute of Oceanography
Credits	4.5 ECTs
Lecturers	Bui Hong Long, Phan Minh Thu
Level	BSc.
Host institution	Ho Chi Minh City University of Natural Resources and Environment
Course duration	1 semester (the classes will be scheduled in accordance with the university timetable)
New/revised	New course

Summary

Estuary and continental shelf areas cover 5.2% of the earth's surface area and only 2% of the ocean volume. However, they are the bridge between the land through continents and the oceans, and every year, the world's major rivers pour about 20,199 m³ of sediment along the shores of the oceans (Miilliman & Syvitski, 1992; Lugwig & Probst, 1998), forming large deltas such as: Yellow River, Yangtze, Mekong, Red, Nile, Mississippi and etc. In the world, there are more than 50 large deltas distributed on almost all continents with a total population of about 325 million people (ORNL, 2002). There are often major political-economic centers such as: Shanghai (Changjiang), Guangzhou (Zhoujiang), Bangkok (Chao Phraya), Yangon (Irrawaddy), Calcutta and Dhaka (Ganges-Brahmaputra), Karachi-Hyderabad (Indus), Buenos Aires (Parana), Vancouver (Fraser), New Orleans (Mississippi), Lagos (Niger), Ho Chi Minh City (Mekong), Hanoi/Hai Phong (Red River), and Marseilles (Rhône) (Syvitski & Saito., 2007)

According to studies, most of the world's deltas have been facing 3 major problems in the world:

- Shrinking deltas;
- The lands of the delta are being subsided (Ground subsidence);
- Sinking deltas.

The cause is believed to be the complicated effect of climate change and the impact of climate change and Human activities.

Vietnam is one of the most vulnerable countries in the world to the effects of climate change. Increasing temperature, drought, saltwater intrusion... are getting

worse, sea level rise and increased frequency of storms threaten food security, livelihoods and lives of millions of Vietnamese people.

Within the framework of the lecture on river and sea interactions, we can only mention some of the following issues:

- Provide the knowledge of the influence of the river into the sea; identify scientific issue of upper boundary of sea impacts into the river, supporting to determinate the scope of coastal management.

- Provide the approaches to identify marine fronts (hydrology, tide...) that help to detect potential areas for high primary productivity and fishing grounds;

- Understand the approaches to determinate the Regions Of Fresh water Influence (ROFI) in the coastal areas as well as the areas affected by physical processes (such as stratification, disturbance caused by wind, waves, tides and currents).

- Provide the knowledge of river - sea interaction processes and their influence by the of socio-economic development and climate change.

Objectives:

The main course objective is to equip students with knowledge of:

- In terms of knowledge:
 - Understand features of morphology and type of estuarine, as well as the hydrological, dynamic, environmental, ecological and resource characteristics of estuaries.
 - Understand processes of river-sea interaction, estuarine changes under the nature impacts, socio-economic activities and climate change.
 - determinate scientific problems on estuaries, river-sea interaction.
- In practical terms:
 - The role of estuaries in local and regional socio-economic development.
 - Provide the methods that how to organize surveys/field trips, to collect scientific data and documents for researches.
 - Provide professional skills to lead any scientific topics.

The content of this lecture consists of 5 chapters:

Chapter I: Estuaries and tidal creeks (inlets). This chapter provides the concepts of estuaries; the classification systems of estuaries; processes of current, circulation and sedimentation; and features of wave, tidal regime and flooding effluence.

Chapter II: Deltas. The same as chapter 1, in this chapter provides the basic knowledge of deltas, including definition of deltas, the formed processes, classification and sedimentation.

Chapter III: Dynamics of sediment in estuaries. This chapter provides the basic knowledge on hydrodynamic systems in rivers, at estuaries and the water bodies of river-sea interaction.

Chapter V. Estuaries of Viet Nam. This chapter provides the characteristics of Vietnam river systems, including estuaries and delta systems of Mekong and Red rivers, and coastal bays/lagoons in the central regions of Vietnam. In every river system

Chapter VI. Natural disasters and hazards on estuaries of Vietnam. This chapter provides the knowledge of the issues of natural disaster and hazards, including flooding, typhoon, erosion, tidal and climate changes. In each section, student will gap the basic concept, occupation and impacts, as well as how to prevention of Natural disasters and hazards on estuaries, in the case of Vietnam.