Broader Impact Statement for the project *"Interaction of ocean waves and currents with muddy coasts"*

An undergraduate level seminar on how muddy and sandy coasts differ, and a follow-up discussion period will be developed for junior-year students who are taking an undergraduate level "Coastal Structures" class at the Civil Engineering Department of the University of X. "Coastal Structures" is an introductory engineering design class with no focus on the crucial effect of the coastal sedimentary environment on the physical processes (e.g., hydrodynamics and sediment transport) or on general design considerations. In addition, these students are not fully aware that not all the coasts are sandy. This activity will demonstrate them the importance of taking the type of sediment in a coastal environment into account at the level of design of a coastal structure.

The class has 40 students. The seminar presenter (PI), the project partner from COSEE and the professor of the class will be working in collaboration in this project; hereinafter they are altogether referred as "the project team." The COSEE project partner and the professor of the class will assist the PI mainly in terms of bringing the seminar to the level of knowledge of the students, making it in a way that the student interest in the seminar could be enhanced, and finally evaluating the student strengths and weaknesses for the demonstrated material. The project team will altogether attend the seminar, do the evaluations of the summary papers of the students, and develop&hold the discussion period two weeks after the seminar.

The seminar will be entitled *"Not all the beaches are sandy: different conditions and processes in muddy and sandy coasts."* The seminar will cover one class hour, i.e., 45-min. The three equally divided parts of the seminar will present:

- Introduction to muddy and sandy coasts worldwide
- Major differences of physical processes in muddy and sandy coasts
- Examples from field observations

followed by a 5-10 min long period for questions from the students. In a one-week deadline after the seminar, the students will be required by their professor to provide a one-page long summary of the seminar and three major highlights they have gathered. These summaries will be graded (and eventually returned to the students) by the project team; the essential points the students understand and do not fully understand are determined. Based on this evaluation of the feedback they get from the summary papers, the project team will hold a 45-min discussion, led by the PI, in the class two-weeks after the seminar. In two equally divided parts, this follow-up discussion will focus on:

- Essential points of the material demonstrated in the seminar, by keeping an eye on the students' major misinterpretations in their summary papers. The goal of this part is to provide the students feedback and a better understanding of the physical processes in muddy and sandy coasts.
- Possible implications of the coastal sedimentary environment on the coastal structure design. For this second part, the project team will have ready a series of questions that would ignite related discussions among the students.

As a result of this project, the students will be able to name the major muddy coasts around the world, distinguish between the major differences in muddy and sandy coasts, explain the reasons of differing physical processes in muddy and sandy coasts, and learn and discuss the possible implications of the coastal sedimentary environment on the design of coastal structures. The project team will diagnose possible flaws of the seminar and the follow-up discussion based on the evaluations and do necessary corrections for future applications.

The budget for this broader impact activity is $800, i.e., 8% of the proposed overall budget ($10000).