

C-12: Application of mathematical and physical modelling towards optimisation of a fishery harbour layout

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The layout and design parameters for a proposed fishery harbour in the Kudawella Bay, on the southern coast of Sri Lanka were optimised through the combined application of mathematical and physical modelling. Mathematical modelling was used to simulate wave propagation from offshore to nearshore and wave penetration into the proposed harbour basin. A number of wave modules available within MIKE 21, 2 dimensional mathematical modelling system, developed at Danish Hydraulic Institute, Denmark was used for this purpose. A large volume of wave data available from on site wave recordings and from previous wave recordings conducted offshore at Galle was used as the basis for establishing design wave conditions and wave simulation scenarios.

The harbour breakwater parameters were optimised through three dimensional physical modelling conducted at Lanka Hydraulic Institute's laboratory basin at an undistorted scale of 1:30. The waves were generated using 3 paddle type irregular wave generators controlled by a PC based software package. The important aspects addressed were armour stone stability, wave overtopping and wave induced currents.

Two alternative harbour layouts could be optimised through model studies. The wave propagation modelling indicated feasible entrance wave conditions for both layouts. The stable armour stone sizes determined from model testing were substantially higher than those computed using conventional Hudson's formula, providing a clear justification for the use of 3 dimensional physical modelling. The final selection of the layout for implementation was made in consultation with the local fishing community using ease of navigational access as the criterion.