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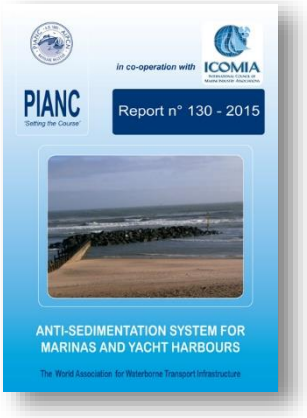

Title: **"Anti-sedimentation systems for Marinas and Yacht Harbours"**

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ICOMIA
International Council of Marine Industry Associations

Introduction:

Marinas and yacht harbours face increasingly rising bills on maintenance dredging of their basins and approaches. A way around it would be to focus our effort in trying to reduce the associated sedimentation rate by carefully designed schemes appropriate for each particular case. In doing so, special attention should be paid to the conditions of each problem, such as tidal or non-tidal environment, coastal or riverine installations, etc. When locating a new marina, the first and most important consideration in the above framework is to avoid placing it in an environment of intense sediment transport. Such places are to be found normally around headlands rather than inside shoreline bends. This is of paramount importance since whatever measures we take it is bound that an amount of sediments transported close to the marina will eventually be trapped and settled in it.

A second batch of large-scale measures pertinent to new designs includes proper orientation and layout of a marina. A bold possibility for a coastal marina would be its placement offshore of the sediment transport zone. This may achieve two targets: to minimise the potential sediment entrainment through the marina entrance and also to maintain unobstructed the main alongshore transport of sediments, eliminating thus the adverse effects the new marina may have on its down-drift coastline. A techno-economic study is obviously needed in the above context of marina siting.

The layout of the protection structures of a marina, should be streamlined, if possible, safeguarding thus the free passage of the alongshore sediment transport with the minimum formation of eddies and uncontrolled sediment settling close to the marina and its entrance. Such an arrangement may offer an extra advantage in that the transported sediment can travel further, with negligible losses, to feed down-drift shores. The marina entrance should be oriented in such a way to avoid sediment trapping; this can be achieved in general by placing its exit direction as close as possible parallel and to the same direction to the dominant alongshore current direction. Sediment entrainment into the marina basin is also minimised when entrances are of small enough width. The above entrance layout arrangements should obviously take into account the relevant requirements for safe navigation.

It is apparent from the above that two main considerations control the planning of any anti-sedimentation scheme. The one pertains to minimising the sediments potentially prone to be trapped in the marina basins, its entrance and approaches; the other deals with safeguarding the free passage of the alongshore sediment transport, in cases where this is required for feeding downstream areas subject to erosion. The same two concepts are applicable also to small-scale structural interventions that are helpful as anti-sedimentation measures in a marina. When there is no need to bother for downstream sand feeding then one can consider applying at the marina spur-type structures, sand pits and main breakwater extension that block the sediment transport downstream but, nevertheless, are advantageous for the marina sedimentation itself. Other arrangements, such as entrance sills, current deflecting walls, etc. can somehow provide both functions mentioned earlier to an extend dependant on local conditions. In any case the conventional sand by-passing and its modern options are at the disposal of the coastal engineer in order to secure the feeding of the downstream section with sediment.

Whatever the anti-sedimentation scheme adopted some maintenance dredging may be required occasionally. In this respect the relevant authority should be aware that the use of small and flexible dredging units may be required and that movable pier pontoons can facilitate considerably the dredging operations. Finally, at the design stage numerical tools can prove indispensable especially for the large-scale anti-sedimentation planning, e.g. general marina layout, downstream sediment feeding. Physical modelling may be normally applied to optimise the shape and relevant location of small-scale structural anti-sedimentation schemes.

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