



The dike analogy for setback design

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THE DYKE ANALOGY FOR SETBACKS DESIGN - ABSTRACT

Human pressure and climate change are gradually warning that coastal developments have encroached a scarce and treacherous substratum. Consequent threats on human live and properties can be mitigated intervening either on natural hazards or on the coastal vulnerability: while maritime engineers shelter developments from ocean hazards interposing structural protections (breakwaters), coastal managers rather attempt to hold human assets landwards (setbacks).

Even if from a normative point of view, coastal setbacks are internal boundaries within the coastal zone - just like servitude or demarcation lines -, from a functional point of view, coastal setbacks carry out their own function and can be defined as non-structural protective buffers against ocean actions. Coastal setbacks are thus autonomous instruments defined by exogenous and endogenous elements. Exogenous variables are the underlying agents ruling the problem: the hazard, the vulnerability and the substratum. Common parameters used to represent such variables are wave height (hazard), development footprint (vulnerability) and erosion rate (substratum). On the other hand, endogenous elements involves the setback magnitude and a basis.

In practice the problem of setback design is still to be solved since current enforced solutions varies strongly from one coastal nation to another. As an example, two antagonistic illustrative models for coastal setbacks design will be reviewed (North Carolina and Spain). After analyzing these two radically opposite models, a first conclusion shall be drawn: there is a clear analogy between coastal setback and breakwater design.

This analogy can be established in several dimension of the design, ranging from the initial vulnerability and useful time assessment to the structural typology determination. First of all, the vulnerability assessment for breakwater design commonly resort to some integrated index, like the Economic Repercussion Index (ERI), or the Social and Environmental Repercussion Index (SERI). The suitability of such index for the assessment of coastal fundamental assets (human live, real rights, environmental assets and developments) will be reviewed. As coastal dynamics lead inexorably coastal setbacks to be reviewed, return periods, probability of failure and useful life are parameters that shall also be considered extensible from dykes to setbacks. Finally, just as breakwater design varies according to the structural typology (groins, detached breakwaters, rubble mound, caissons...), setback design may similarly vary according to the landform nature (beaches, barrier islands, bluffs, cliffs...).