Review of Climate Change Adaptation papers from Coast and Ports Conference 2015

The theme of the 2015 Coasts and Ports Conference held in Auckland New Zealand in September was 'Environomics. Environment and economics – can we have both?' The intention of the theme was to discuss how we seek win-win solutions delivering projects in the coastal zone.

Climate Change adaptation emerged across all conference streams with papers covering finance and economics, planning, risk assessment and engineering design.

The key papers under each of these areas are discussed below.

Finance and Economics

Coleman and Jackson (2015) reviewed the recent application of economic analysis to coastal management planning in NSW and Qld. The paper suggested that the failure to apportion costs and benefits to stakeholders was influencing the adoption of coastal management strategies that were unable to be implemented due to rejection by key stakeholders.

Ware et al. (2015) presented three case studies of coastal protection projects in Australia which reflected differing approaches to user pays for seawalls and a public private partnership for a sand bypassing project. The paper argued that many options exist for non-traditional funding mechanisms for coastal protection however these must be embedded within the overall project design rather than dealt with as an afterthought.

Planning

Gordon (2015) described the current and historic practice with regards to the use of hazard lines within coastal planning in NSW. The paper argues that the rapid growth in the value of foreshore land has made hazard lines more of a political liability than a useful planning tool. As an alternative the paper argued for the adoption of a probabilistic approach to defining hazard zones particularly as regards the response of shorelines to sea level rise. Auckland Council in adopting a proactive approach to responding to climate change projections for sea level rise described a project to identify and value coastal assets in hazard zones. The paper by **Klinac et al.** (2015) also introduced the regulatory approach for Climate Change adaptation in Auckland which sets out a precautionary approach to controlling coastal development.

Mackenzie et al. (2015) described a case study of adaptation planning by the Gladstone Ports Corporation and highlighted the key issues for consideration by ports globally. The three most significant hazards for the port of Gladstone were; tropical cyclones, fog and storm surge with sea level rise being the least significant hazard. A range of vulnerable assets were identified and adaptation strategies including decommissioning and changing procedures were able to be identified that reduced the vulnerability of operations to the identified hazards.

Other papers on this theme included; Hart et al. 2015; Knook et al. 2015; Mead et al. 2015 and Stephens & Bell 2015

Risk Assessment

Allis et al. (2015) described a recently created risk assessment tool the 'coastal calculator' which allows planners to determine the appropriate storm tide hazard levels and probabilities for locations around the New Zealand coast. The Tool was developed by NIWA and is significantly simpler to use than the complex tables which were required to be used previously.

Blacka et al. (2015) conducted a physical modelling experiment to validate empirical formula for deriving wave and water level conditions for coral atoll's during tropical cyclones. The experiment considered various scenarios including a 40cm sea level rise and found that the current empirical formula over estimates wave setup and under predicts surf beat and water levels recommending a new empirical approach for use in these contexts.

Carpenter et al. (2015) presented Auckland Councils coastal hazard risk assessment which considers inundation, beach erosion, cliff erosion and tsunami hazards at three epochs now, 2045 and 2065. The study found that at present Tsunami is the most severe risk however by 2065 this shifts and the erosion risks become the most severe issues. This has significant implications for resourcing and planning decisions for the Auckland Region and this insight allows for a planned and prioritised approach to hazard reduction activities.

Other papers on this theme included; Quilter et al. 2015 and Berkman et al. 2015

Design

Harrison & Cox (2015) described the implications of sea level rise for breakwaters with particular emphasis on NSW conditions and argued that the sector required a planned upgrade pathway. The paper described the application of benefit cost analysis to the adaptation of breakwaters to sea level rise projections and found that assuming a design life

of 100 years, with real interest rates below 4.5% the best economic decision in 2015 is to design and build the breakwater for the 2115 projected conditions. For interest rates between 4.5 and 8.5% structures should be designed for 2075 conditions and upgraded for the 2115 conditions in 2065.

Colleter et al. (2015) presented a case study of the design of an integrated beach renourishment and seawall replacement project which incorporated sea level rise projections into the sea wall overtopping design levels. Similarly **Bettington et al.** (2015) described the upgrade of an existing carriageway and causeway embankment to prevent flooding during peak tides and accommodate future sea level rise to 2100. The paper argued that the approach required for design and construction of NZ infrastructure 'provides for prudent design and construction, yet allows for severe climate change induced sea level rise'.

Other papers on this theme included; Carley et al. 2015 and Colleter, Flocard, et al. 2015

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