

Coastal Structure Design Approaches

Design of any engineering structure requires understanding of its purpose, the mechanics of the structure throughout its life cycle, and the environment within which the structure will be used, including its patterns of use. However, the degree of information used for coastal structure design can vary substantially, generally related to the marginal cost savings introduced by refined design, and the consequences of structural failure.



West Australian coastal engineering practice, includes a number of approaches used for design and construction:

- **Optimistic** – where trial and error is used to develop a design. This is rarely used, except with low treatment cost and low consequences of failure, or for repeat actions (e.g. beach nourishment).



- **Translative** – where an equivalent facility is identified and recreated. This includes standardised or modular designs, (e.g. boat ramps or pontoons) where previous application has resolved fine technical details that complicate a bespoke design.
- **Deductive** – where external observations are used to derive design conditions, say by hindcasting or modelling. This approach is dependent on the level of confidence associated with the deductive method.
- **Scientific** – where coastal measurements are undertaken and used to provide design parameters. This requires careful



translation from observations to a likelihood state-space.

- **Conservative** – where worst-case or statistically unlikely situations are determined and used to develop design (e.g. probable maximum flood).



The modern approach to coastal engineering practice commonly uses a strategic combination of approaches, according to the information and alternatives available, although deductive and scientific methodologies are most common. The choice generally follows risk-management principles, incorporating the cost, consequences of failure and the uncertainty associated with the design approach.