

SA-PoD Systems Approach for Port Development

Port developments around the world, West Africa included, often impact the coastal environment, posing challenges like erosion and degradation of environment with negative socio-economic implications. To develop sustainable ports solutions which are adaptable to climate change and have net positive value a paradigm shift is required from a conventional, economic and engineering oriented approach to a stakeholder inclusive and environmental, social and economic integrated approach.

Port developments are complex and require a holistic approach based on thorough system understanding and active participation by all stakeholders. Our approach consists of a systematic five steps process that integrates the systems: **environment**, **society** and **economy**.

Each step capitalizes on the results from the previous one. They are iterative, achieving a higher degree of detail after every cycle. The focus is different per step:

1. **Problems** and plans (needs and values) are identified for the port project and the larger area surrounding the port.
2. **Processes** in the three systems mentioned above are investigated and the root causes of the problems are determined. Focus on the specific West African context and identify opportunities.
3. **Values** and benefits are investigated, those that are under threat, lost and to be developed.
4. **Solutions** are developed, that are on different scales and are technical as well as non-technical.
5. **Assessment** of the different solutions with existing methods to come to viable, bearable and equitable solutions that are widely supported.

In this process relevant stakeholders are brought together to develop solutions as well as innovative finance instruments to allow for a bankable development which takes into account additional benefits for nature and society.

Figure 1 Systems Approach for Port Development - Sandbar Breakwater (Lekki, Nigeria)



The [Sandbar Breakwater](#)¹ at Lekki, Nigeria is an example of a port development where this approach is applied. The actuation is based on the understanding of the natural system and in particular the coastal processes along the Gulf of Guinea. Given the strong sedimentation at the western updrift side of existing port infrastructure along this coast, sand as construction material seemed very obvious. The large longshore sand transport is used beneficially and formed the basis of the breakwater. This minimised the use of rock and significantly reduced costs and transportation of rock. This resulted in less congestion, traffic accidents and nuisance. The sand nourishment that protrudes from the coast to the east of the port is an integral part of the concept as it prevents erosion and minimises the negative impacts. Through its flexible design it is easy adaptable and can anticipate climate change implications.

Applying this approach results in inclusive integrated port designs from the beginning where negative impacts are minimised and benefits are co-created. It will also lead to a reduction of the cost, hidden social costs included, during the lifetime for everybody.

¹ <https://www.mdpi.com/2073-4441/12/5/1446>