11th International Conference on Hydroscience & Engineering
"Hydro-Engineering for Environmental Challenges"
September 28th - October 2nd 2014
Hamburg, Germany

Keynote

Building with nature[1)]

Huib de Vriend | Ecoshape | Dordrecht | NL

More than half of humanity lives in urban areas located near rivers, deltas or coastal areas. As the world's population grows and prosperity levels rise, so too will the demand for goods (food, energy, merchandise) and services (transportation, accessibility, safety).

Accommodating this growth will involve the development of hydraulic infrastructure, such as harbours, access channels, land reclamation and flood defences. Sea level rise and climate change are reinforcing the urgent need for adaptable designs. At the same time, people need space for recreation – beaches, parks and waterfronts – which generates its own special demands on spatial and infrastructure planning. These developments need to be realized in often fragile environments that are under constant pressure and in complex societal settings, with a variety of stakeholders involved in decision making.

Sustainable development is crucial if we are to maintain river, delta and coastal environments around the world, and the ecosystem services they provide that are essential for humankind. They include provisioning services, related to the supplies of food and other products; regulatory services, related to natural processes such as water purification, carbon sequestration and flood control; and cultural services, related to recreational, spiritual and other non-material benefits that people derive from nature. Finally, they offer support services that are necessary for the delivery of all other ecosystem services, but may not benefit humans directly, such as nutrient cycling, water storage, regulation and recharging, as well as wildlife habitats, nesting sites and foraging grounds. Balancing the sustainable functioning of ecosystems on the one hand, with the demand for their development and use on the other, is one of the greatest challenges for the future of humankind.

It is crucial that we learn to design infrastructure that can serve more than just one purpose, that is aligned with natural processes rather than working against them, and that is adaptable to cope with changing conditions such as sea level rise and climate change. Traditional approaches focus on minimizing the negative impacts of envisaged infrastructure projects (building *in* nature) and compensating for any residual negative effects (building *of* nature). As a next step beyond these 'reactive' approaches, building *with* nature aims to be proactive, utilizing natural processes and providing opportunities for nature as part of the infrastructure development process.

The challenge to accommodate the needs of nature and other stakeholders into new project designs is an essential element of the building-with-nature approach, in order to arrive at sustainable and socially acceptable solutions. In the past, project developers focused almost exclusively on the primary function, such as protection against flooding. The new approach challenges designers to combine flood defences with nature development and/or creating opportunities for other functions, such as recreation or housing.

The use of adaptable solutions allows society to respond gradually to changing circumstances such as sea level rise and climate change. Typical building blocks of such adaptable solutions are salt marshes, sand nourishments, shallow foreshores and ecosystem engineers. A traditional response to sea level rise, for example, is to strengthen coastal defences and to build higher dikes. These kinds of projects have a given design lifetime and are constructed all at once, based on an agreed scenario of design conditions. The Building with Nature approach promotes the consideration of more gradually developing solutions. Especially when used in combination with traditional, proven technologies, this approach can lead to cheaper and more aesthetically appealing solutions that adjust or can be adjusted to changing circumstances.

[1)] Adapted from: H.J. de Vriend and M. van Koningsveld (2012). *Building with Nature, thinking, acting and interacting differently.* EcoShape, Building with Nature, Dordrecht.