

# Welcoming the Water: Adapting to “The Life Aquatic”

Kevan Moffett, Washington State University Vancouver

Erin Seekamp, North Carolina State University

---

*Coasts are defined, in large part, by their interactions with and proximity to water.*

*Yet, we still live on land.*

*What if we welcomed the water as a new human habitat?*

Individual modern buildings and small rural or indigenous communities around the world are already pioneering this vision. The question is how we enable this as not just an occasional option for a highly specific place or people, but: How could we get to scale, safely, equitably, & sustainably, so humans could occupy more of the 70% of the Earth that is water?

**The specific, differentiated recommendation is to:**

**develop the science, technology, and social innovation needed**

**to adapt IN PLACE to flooded or floating lifestyles -- to enable “aquatic communities”.**

To radically change coastal communities to being aquatic, if they choose to stay in place, will **take an interdisciplinary HUB to coordinate research and innovative solutions.** This hub needs a structure that will enable innovation, such as a physical space that can hosting a community innovations incubation center in which community members can bring their ideas and values and co-produce solutions that protect and maintain diverse heritages and values. Additionally, the administration of the hub must represent diverse cultures, races, ethnicities, and genders, to increase the likelihood of community-driven innovations.

## **Rationale**

The present barriers to humans living among prolonged flooding or on the open water of coastlines are mainly scientific, technological and social — innovations we can feasibly research and develop, which are fully appropriate for NSF investment. Once those barriers fall, it becomes a value judgement whether expanding human habitation on land (densification, urban sprawl, agriculture and forest conversion to development, etc.) is or is not preferable to expanding human habitation on water; water becomes just another land cover available for habitation and creative expansion of human endeavor.

Without overcoming the present barriers to humans living sustainably among water land cover, our choices are limited. One option of adjusting to increased flooding is, of course, to move. But migration requires abandoning coastal communities, sometimes with deep cultural heritage and large prior capital investment. Migrating inland is not desirable for all places and people, particularly as people develop deep social and emotional connections to place. For some communities, relocation

regionally as climate refugees is not a viable option as they may face persecution or death if forced to move into a historically exclusionary context. Migration also forces the abandonment of built structures, dissolution of employment agreements, and often of social and family ties, all of which have both immediate and sustained economic and social costs. Relocation requires that other lands must be converting into new habitations. Migration itself is not the enemy, as a flow of human capital and skill from abandoned coastal communities to receiving inland communities may be a boon to the inland society and economy. It seems that our present circumstances provide insufficient consideration and care, however, that migration should not be coerced. The CoPe initiative should work to avoid a perspective of arrogance to think that science, technology, other society, or a strong central control can or should determine for a community whether to remain or move if facing a reality of increased flooding and/or permanent inundation. Better for the advancement of basic research, the self-actualization of communities, and evolution of society to enable multiple productive options, coastal communities to migrate or adapt in-place, as they choose.

A second option for coastal adaptation to flooding is exemplified by the Netherlands, an extraordinary example of humans' ability and ingenuity to keep water out of inhabited and developed lands, built upon a lengthy history and long-term investment. But is permanently keeping water out a sustainable and cost-effective solution today? What would be the present-day cost of creating the protective structures throughout the Netherlands if they had to be started from scratch now? How sustainable is this solution, especially with increasing frequency and magnitude of extreme events? Additionally, this solution is not desirable in all locations, e.g., communities reliant on direct connections to the sea for their cultural identities and ways of living, the provision of raw materials, or support of largely marine-based diets.

As flooding of coastal lands by both freshwater and seawater is increasing in extent and frequency, why should abandonment and inland migration, or ever more costly and risky coastal armoring to keep the water out, be the only options?

## **Examples of Convergent Research Opportunities**

There are profound opportunities for the vision to inspire innovations at the convergent intersections among the natural sciences, engineering, technology, material science, design, communication, education, and the social sciences, including:

- Understanding factors that motivate or de-motivate people to stay in place despite flooding of different depths, frequencies, and sources (rainfall runoff, river flooding, reservoir filling, storm surge, sea level rise).
- Ensuring adapting in place is a choice, not coerced.
- Creating economic and governance structures that support underrepresented/underserved communities to implement adaptation in-place.
- Securing freshwater, food, energy, transportation, healthcare by provisioning in-place with new technology (e.g. low-energy desalination) and/or new and improved supply lines.
- Innovative waste management.

- Improving prediction of hazards, communication of upcoming hazard/extreme events, preparation or contingency (e.g. for storms).
- Advancing building materials, new construction designs, new technologies for floatation, waterproofing, water to move easily around/through structures, etc.
- Potential for bio-mimicry or geo-mimicry designs (e.g., how do mangroves do it?)
- Develop abilities to move entire communities to sea, whether by preference, for economic gain (e.g., sustained aquaculture or energy harvesting), or for safety (e.g., moving moored community to sea to avoid waves and surges from storms or other hazards).
- Develop mechanism for valuation/decision of whether adapting in place or expanding inland has preferable impacts/benefits.
- Preemptively mitigate inadvertent or increased aquatic system contamination, invasive species introduction, impacts on coastline and near-shore flora and fauna, etc.
- Imagine and understand as-yet unforeseen consequences of colonizing aquatic systems.

### **What is the reasoning or supporting evidence behind it?**

The proposed vision is achievable, supported by learning from past or poorly studied examples, continuing nascent movements of innovation in relevant areas, and inventing new knowledge, materials, and practices. Inspirations to consider include:

- Keeping water out or abandoning coastal communities and migrating inland is not sustainable, cost-effective, or desirable for all places and peoples.
- There are multiple examples of aquatic communities around the world. Bangladesh village islands survive annual monsoonal floods. The indigenous Uru people near Puno, Peru, live as floating reed-raft island communities on Lake Titicaca. When re-introducing tides to Seattle's big lakes, properties on Lake Union were flooded; the solution was to float the houses and reconnect the utilities, making water just another habitable land cover. Ocean- and wind-adapted, innovative buildings are already being designed and built, such as the Burj Al Arab hotel in Dubai, built to look like an enormous white sail seaward of the shoreline, and existing proposals to entirely float a new San Diego, CA, airport. And, the advances in amphibious architecture hold much promise for communities to maintain some of their heritage identity provided by distinctions within the built environment.
- There is also a trend in landscape architecture for "Room for the River" designs – e.g., in the Netherlands. In these designs, lowlands (inland or near the coast) can be re-zone or re-developed to place land uses resilient to flooding -- e.g., public parks, parking, or natural lands -- in strategic areas of river floodplains and to use existing river restoration and engineering strategies to help steer/allow the river to expand into those resilient, submersible areas instead of into less water-adapted adjacent lands.

### **What impact or value does it seek to deliver?**

With the greatest proportion of the United States living in coastal counties, adapting in place seems to be a necessary reality. Yet, our current flood policy structure is insufficient to enable the perpetuation, evolution, and safety of coastal communities. The Welcoming the Water HUB seeks to deliver an array of benefits that maintains cultural, social, and economic continuity and growth by adapting instead of migrating and fragmenting communities and economies and placing further development pressures on inland habitats. Some more nuanced examples of the benefits include:

- Cultural heritage and place-meanings could continue existing and evolving.
- Socio-cultural and governance support structures could continue.
- Growth, employment, innovation need not be interrupted.
- Coastal population growth could move, in part, off-shore while (a) remaining part of the city/community and (b) relieving pressure on nearby terrestrial ecosystems and land uses that sustain life.
- Natural resources can be conserved by extending usability of existing built environment despite flooding.
- Blue economy can be sustained by enabling a more permanent populace for off-shore industrial activities.
- Humans' relationship to the 70% of the planet that is water will evolve.
- The radical technologies and materials needed for such adaptation could have other unforeseeable uses and applications.