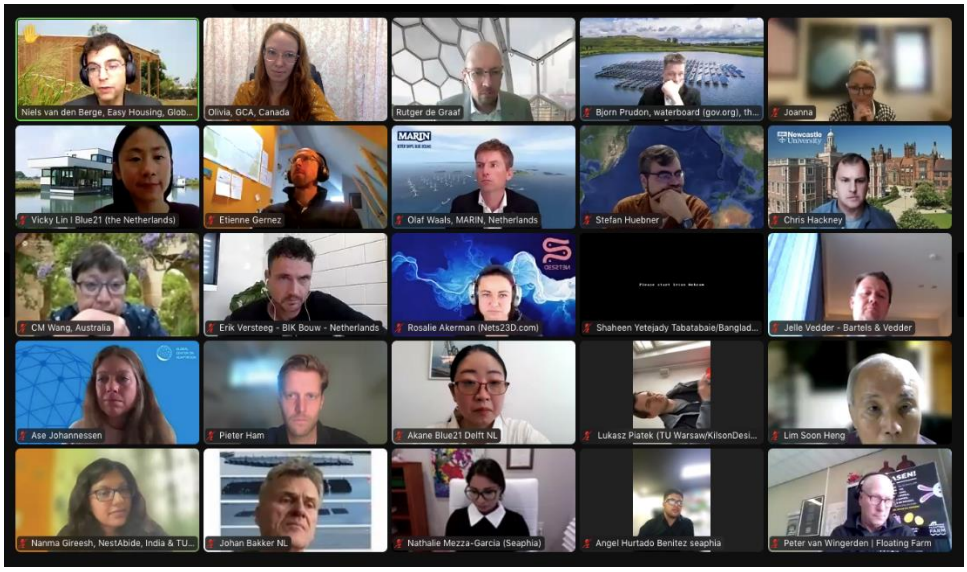
Global Knowledge Exchange on Floating and Resilient Development

Summary Report

October 2022



Hosted on 29 September 2022

Hosted by the Floating Development Community of Practice, part of the Water Adaptation Community, of the Global Center on Adaptation

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Introduction

Floating development and related amphibious and stilted options are providing innovative adaptation solutions with many development benefits. They provide for example resilience in the face of extreme water levels, such as flooding and sea level rise. However, despite demonstrated benefits and existing good practice, there is a critical gap in scaling up floating development solutions.

The Water Adaptation Community (WAC) of the Global Center on Adaptation is a global platform for sharing, developing, and exchanging insights, knowledge, and resources on the crucial role water plays in adaptation. It is a knowledge broker, supporting the connection of solution seekers and solution providers. It is home to many active communities of practice including a Floating and Resilient Development Community with many entrepreneurs and researchers.

In early 2021 core members of the community of practice identified the need for a public knowledge exchange focused on floating and resilient development. This was an opportunity to grow the community of entrepreneurs and researchers and share their dynamic floating expertise with others - such as city planners, developers, investors and policymakers. The WAC supported this idea and coordinated and facilitated the event development and delivery. The floating development community of practice members provided input on breakout room discussion topics and chaired the breakout rooms' roundtable discussions.

Summary of the Event

There were 95 participants engaged in the knowledge exchange, including participants from South Africa, Poland, Netherlands, Columbia, Bangladesh, Australia, Singapore and additional countries. The program began and concluded with a plenary session chaired by Rutger de Graaf-van Dinther from the Blue Revolution Foundation, a core member of the community of practice. There were two rounds of thematic breakout room discussions. All participants could attend one breakout room each round, two in total. The topics, chairs and presenters in each room are listed in the table below.

Figure 1: FRD Global Knowledge Exchange Agenda

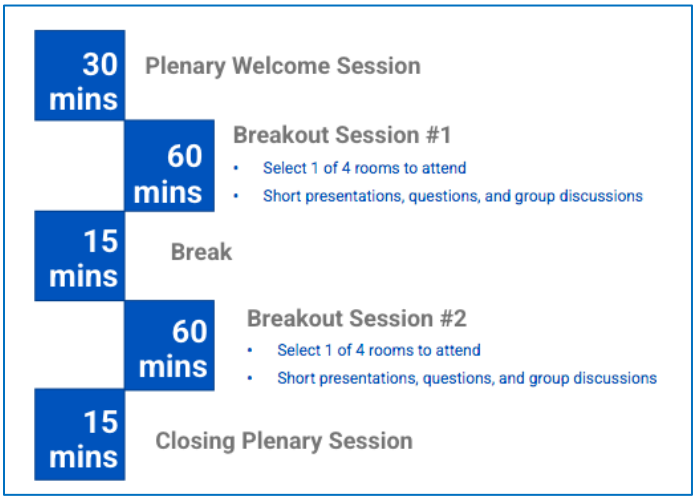

Table 1: Breakout room discussion themes, chairs and presenters

Round 1 Options:			
Room 1: Floating Future, a large national research project for a resident future	**Room 2: Floating agriculture for livelihoods and cultural heritage, contemporary solutions, with examples from Bangladesh & Netherlands**	**Room 3: Architectural design on the water - an attractive, sustainable, resilient and affordable style of living**	**Room 4: Environmental benefits of floating development**
Chair: Olaf Waals, Maritime Research Institute Netherlands	Chair: Peter Van Wingerden, Floating Farm Rotterdam	Chair: Rosalie Akerman, Nets23D	Co-chairs: Rui Lima, Indymo, Ase Johannessen, Global Center on Adaptation
Invitees: Rutger de Graaf-van Dinther - Blue Revolution Foundation	Invitees: Haseeb Md. Irfanullah Bangladesh Gardens	Invitees: Jelle Vedder, Bartels & Vedder engineering, Dr inż. arch. Łukasz Piątek Warsaw UT, Shahryar Habibi, Penn State U	Invitees: Robbert Jak, Wageningen Marine Research, Chris Hackney Newcastle U
Round 2 Options:			
Room 1: Upscaling and large floating developments, sharing initiatives and plans	**Room 2: Making flood resilient housing affordable**	**Room 3: Floating solar example from the Netherlands**	**Room 4: Navigating regulations for floating development**
Chair: Vicky Lin, Blue 21	Chair: Niels van den Berge, Easy Housing	Chair: Johan Bakker, Waterschap Rivierenland	Chair: Nathalie Mezza-Garcia, Seaphia
Invitees: Akane Takahashi, Shimizu Corporation/ Blue21, Lim Soon Heng, Society of Floating Solutions Singapore, Joanna Pontin, DST Innovations	Invitees: Nanma Gireesh and Ben K George, NestAbide, Pieter Ham, Finch Floating Homes	Invitees: Bjorn Purdon, Waterschap Rivierenland	Invitees: Ángel Hurtado Benitez, Andrés Felipe Perez, Daniel Eduardo Ortega, Edgar Alfonso Rodriguez, Seaphia

Key Insights from the discussions

Presentations and recordings are available online, accessible here.

Floating Future, a large national research project for a resident future integrating the science fields of Governance, Technology and Ecology

- **Emerging insights:** Quality of life is a central key to success for a floating future and working with NGOs in this large-scale research is critical to show how this project impacts the long-term future of the Netherlands. An emerging community engagement mechanism being used is presenting research/vision through art to help the community see the future potential.
- **Knowledge for policymakers:** Policymakers need to understand that the economic feasibility of floating housing is a political matter.
- **Knowledge gaps discussed, for potential pilot projects/ or research opportunities:** 1. Floating and amphibious housing could interlink with (or enable) allowing water to flow in the city and urban water storage. This could be a tactic for not only flood adaptation but also would serve drought and urban heat management. 2. More research about floating development and quality-of-life could be conducted.

Floating agriculture for livelihoods and cultural heritage, contemporary solutions, with examples from Bangladesh & Netherlands

- **Emerging insights:** Crop selection for floating cultivation should be determined by market demand. There is an information gap for both policymakers and investors on this topic. These two examples are quite different, and they are not alone, Singapore, China are using these artificial floating beds to cultivate crops, Mexico also has traditional floating gardens.
- **Knowledge for policymakers:** Floating agriculture using natural resources should not be an imposed intervention among the poor communities; it should be in an intergenerational knowledge-sharing approach, meaning local knowledge holders at the community level should be teaching the practice to the younger generation. For higher-tech interventions, we need find funding mechanisms to make high-tech farming affordable.
- **Knowledge gaps discussed, for potential pilot projects/ or research opportunities:** 1. More knowledge is needed on possible failure factors. Practitioners are monitoring factors like water hyacinth availability, currents, floods, heavy rainfall etc. 2. Ongoing work to understand possible marine pollution from the floating agricultural adaptations.

Architectural design on the water - an attractive, sustainable, resilient and affordable style of living

- **Emerging insights:** Innovations in floating houses can be a solution to adapting to sea level rise as it combines aesthetics with functionality.
- **Knowledge for policymakers:** The policy must address ownership specifications, since it's on water not on land, long-term low-cost leases or giving ownership to the land below the water are some options. Floating policy implications will factor into the accessibility and affordability of floating homes for the users, this should be considered.
- **Knowledge gaps discussed, for potential pilot projects/ or research opportunities:** Interlinking resilient, adaptive and floating housing to circularity/circular economy, and/or water and wastewater treatment innovations. Floating home water treatment systems could also treat the water in the natural environment below during times of poor quality.

Environmental benefits of floating development

- **Emerging community insights:** The **environmental benefits** of floating developments include: 1. Reduced pressure on sand mining, which is causing a more negative impact on salinization in coastal areas than sea level rise. Floating development contributes to sustainable solutions that are needed to avoid a major ecological and environmental crisis. 2. New habitats for biodiversity (mussels, plants mussels, insect larvae, small crustaceans, algae). 3. Wave protection. 4. Green landscaping, 4. Water treatment is aided by plants and floating wetlands. **The potential environmental impacts of floating include:** 1. Change of flow currents and wind, 2. Changes in water quality, 3. Disturbance of nature by human presence, 4. Hazardous waste (pollution), 5. Shading, 6. Transport vessels. 7. Introduction of non-indigenous species and reduction of native flora & fauna, 8. Impacts on sedimentation and ecosystems.

  Aquatic drones are used to collect underwater images, water samples and water quality and ecology data for public and private entities who want to inspect and monitor water systems and

can help with data and research gaps around floating development's environmental benefits and impacts. The mobility of sensors and cameras provide a unique 3D understanding of water bodies.

- **Knowledge for policymakers:** There are many opportunities to implement ecological measures to ensure/maximize positive impacts including floating water treatment/wetlands and habitat enhancement (biodiversity), wave protection, green landscaping. Floating development should be considered instead of sand infill development to reduce pressure on sand mining, which is a very destructive practice.
- **Knowledge gaps discussed, for potential pilot projects/ or research opportunities:** 1. Further research is necessary to infer about larger scale floating projects (water quality modelling). 2. As floating grows it will be good to continue monitoring impacts on aquatic ecosystems on large scale floating structures. 3. The breakout room initiated a scientific collaboration: to calculate how much sand is saved by developing floating. Christopher Hackney and Rutger de Graaf van Dinther will communicate on this.

Upscaling and large floating developments, sharing initiatives and plans

- **Emerging insights:** The social acceptance and concerns from users' perspectives should be considered. There is curiosity about floating ecologically friendly building techniques, and how utility systems are designed/integrated into the floating platforms.
- **Knowledge for policymakers:** Floating development has been recognized by IPCC and UN-Habitat as both transformative and sustainable, adaptive urban habitat (respectively).
- **Knowledge gaps discussed, for potential pilot projects/ or research opportunities:** Innovators need to start thinking about what the need will be next. This means, after the first large floating cities are implemented successfully, what will the floating innovator's role and work be to continue the movement?

Making flood resilient housing affordable

- **Emerging insights:** Raw building materials should be collected in a sustainable way.
- **Knowledge for policymakers:** Typically, existing policies do not fit, and slow the implementation process, active government engagement is needed in the initial project. Public financing is often missing. Addressing these two challenges will make implementation more efficient in future projects. Local authorities can inspire the public to consider floating houses by highlighting the key benefits of the newly adaptive approaches.
- **Knowledge gaps discussed, for potential pilot projects/ or research opportunities:** 1. Tracking the long-term quality and impact of sustainably sourced material used. 2. Household behavior change study. 3. Research on finance mechanisms for making resilient housing projects more affordable.

Floating submersible solar example from the Netherlands

- **Emerging insights:** New innovations include floating solar that can be submerged under water when there is a storm coming. This is cost effective as there is less damage to the structures.
- **Knowledge for policymakers:** A lot of commercial floating solar parks are being developed, and this is happening ahead of associated regulation development.
- **Knowledge gaps discussed, for potential pilot projects/ or research opportunities:** 1. The impact on the environment from floating solar, specifically the changes light availability to aquatic

ecosystems, needs to be further monitored and researched. This was also presented in another round table on floating energy by a Dutch water authority.

Navigating regulations for floating development

- **Emerging insights:** As a floating implementer understanding regulations is essential for success. Customers needed to be convinced on floating development safety, longevity, affordability and access. Floating developments could serve multiple uses, example a school built in Myanmar that doubled as a flood shelter.
- **Knowledge for policymakers:** If there are no specific regulations for floating projects, local authorities can mandate floating projects to follow existing rules such as pollution and zoning norms ahead of developing floating development policy.

Participant insights

The event received excellent feedback through direct communication with the WAC organizers and in a formal post-event

When asked **what they liked most about the event**, the most popular response was:

"knowledge sharing from diverse perspectives on the shared-interest topic"

Some other notable responses included:

*"It provided the **opportunity for participants to take part and it was interactive**. The topics in the break rooms were just good ones to be discussed"*

*"The **diverse backgrounds and countries** of the participants"*

*"Very **detailed explanation on the procedure** for the breakout sessions"*

*"The laid-back atmosphere, the engagement of the facilitators and participants, the diversity of the participants and topics, **the accessibility of all**"*

Conclusions

The event and its format were successful in brokering global knowledge sharing about floating development challenge, opportunities, and needs.

The policy and insights identified during this event and highlighted in this report will be amalgamated and analyzed and synergized with other Water Adaptation Community events. The policy findings to be shared as core streamlined WAC message to policymakers at forthcoming high-level decision-making events, including UN Water 2030.