COASTAL ADAPTATION & RESILIENCE: INNOVATION AT THE WATER’S EDGE

On March 13, 2024, Waterfront Alliance hosted a private roundtable discussion with leaders in resilient and nature-based design, financing, and communities as part of the Aspen Ideas: Climate summit in Miami Beach. This white paper captures the energy, spirit, and solutions presented in that discussion.

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Roundtable Topic

Sea-level rise, heat stress, extreme weather, and flooding pose growing threats and disruptions to all places where water meets land, where built and natural environments intersect.

Coastal communities face rapidly escalating challenges as the climate crisis worsens, necessitating a more urgent focus on community-wide adaptation and demonstrations of resilience.

Barriers to coastal adaptation and resilience are numerous and well-understood:

- funding is insufficient
- flood resilience is not always designed with communities in mind
- permitting is burdensome and project-defeating
- communities are insufficiently engaged or not engaged at all
- misinformation endangers multi-stakeholder benefits

Participants

Perspectives from around the country in coastal resilience strategies and barrier solutions were presented at the roundtable by delegates from various organizations.

Participants in the roundtable ranged from chief resilience officers of U.S. states and counties to pioneers in financial innovation for insurance and de-risking solutions to leaders in the design and implementation of nature-based solutions for the built environment.
## Discussion

The group discussed a broad set of concepts, approaches, lessons learned, and go-forward strategies. Three segments framed the conversation:

| **Design** | Utilize best practices in design that integrates community, climate, and natural features. |
| **Community Engagement** | Interactions with the community should be two-way developments—advancing resilient design, education of climate-related issues and solutions while seeking hyperlocal expertise inputs. |
| **Funding and Finance** | Incentivize solutions by directing funding and finance where they are best suited to de-risk, capitalize, and build continuous resilience against current and future climate system decay. |
Climate resilience is an imperative for the nation and is now beginning to get the attention it deserves given the acceleration of climate impacts.

One of the major opportunities for climate projects that protect people and property from the impact of climate change is that they can often generate multiple co-benefits: benefits to communities, economies, nature, and livelihoods that go beyond climate protections. There are win-win-wins of many kinds yet to be realized.

**Benefits from climate resilient infrastructure are multiple and diverse.**

- **Infrastructure to protect communities from coastal storm surge** can provide benefits against tidal or nuisance flooding, precipitation-based flooding, erosion prevention, or structural protection, as well as extreme heat mitigation.

- **Green or nature-based solutions** provide a broader range of benefits beyond habitat and ecosystem services. This includes stormwater quality improvements, reduced burdens on municipal stormwater systems, increased opportunities for enhancements for pollinators, public access and recreational opportunities, increased property values, and carbon capture.
Yet challenges abound bringing climate resilient infrastructure to local communities, neighborhoods, cities, and regions.

- When climate resilient infrastructure is effective, the results often go unnoticed; people rarely recognize the instances when their home does not flood.

- Waterfront project development timelines can be extremely lengthy, sometimes reaching into decades.

- Hurricanes and extreme weather can become distant memories as life goes back to usual, the urgency for resilience projects can dwindle, and support for expensive solutions may lose political support over time.

Solutions can include the following:

**Building Support and Defending Projects**

- Project teams must be up front about the multiple benefits and public good that projects offer.

- The goals and multiple benefits must be built into funding streams, rating system commitments, and other efforts that prioritize them.

- Establishing and documenting, even codifying, co-benefits is crucial for maximizing project effectiveness and garnering political support and support from diverse stakeholders. By highlighting tangible benefits like recreational opportunities, improved aesthetics, and enhanced social cohesion, project proponents can attract broader public support and secure buy-in from decision-makers and funders.

- Beyond simply mitigating climate risks, integrating features like public access not only improves community well-being but also fosters a sense of ownership and stewardship among local residents.
In Miami, Florida, a small group of residents challenged the use of mangroves on the site, a shoreline tree with demonstrated wave attenuation benefits. The project team was able to defend the project by demonstrating that it would jeopardize the site’s WEDG® (Waterfront Edge Design Guidelines) Verification and potentially impact state funding because the mangroves were built into the design for both WEDG and grant funds.

**Messaging and Communications**

- Messaging the inclusion of public access on a shoreline stabilization project can broaden the project’s impact and enhance its overall value proposition.

- Philanthropic funders may be more inclined to invest in projects with multiple and tangible community benefits.

- Messaging around benefits should be clear and catered to specific audiences, such as environmental benefits to environmental groups, economic and property value benefits to economic development groups, climate hazard reductions to homeowners, etc.

- Integrating stakeholder feedback and incorporating their priorities into project design and implementation can enhance stakeholder engagement and ensure the project’s long-term success.

**Blue Technologies and Funding**

- Blue tech such as ecological concrete or 3D printed concrete are attractive to aquatic animals and will enhance ecosystems and overall resilience.

- Blue tech offers an opportunity to engage diverse and underserved populations through connections with schools and workforce development programs.
Companies that offer new technologies are greatly challenged by long project timelines and extended funding horizons which make it difficult for the private sector to maintain its capacity and viability.

The University of Miami has a program that is addressing design and solutions—the SEAHIVE project for sustainable estuarine and marine revetment.

The current federal and state public funding streams are unprecedented and provide a major opportunity for new projects to be planned, funded, designed, and constructed. The better tools we have for taking advantage of this moment the more opportunities we will have to meet the climate future.

Systemic Solutions

- Design projects with full analyses of upstream hydrology, community threats, extreme weather projections, storm sewer system inadequacy, etc., to ensure downstream projects are accurately designed and constructed. The entire system within a watershed must be a part of any planning and design.

- Watershed coordinators can play a key role in connecting upstream and downstream needs and projects.

- Develop waterfront resilient design guide that includes code and schematics, and leverage standards such as WEDG to promote or require best practices.

- Many are optimistic that Risk Rating 2.0 and other reforms to the National Flood Insurance Program will provide opportunities for funding climate resilience in local communities.

- The insurance industry plays and will play more of a role in unlocking solutions from innovative insurance projects and delivery.

- Advocacy and coordination with federal agencies delivering major funding opportunities is critical.
Interactions with the community should be two-way developments—advancing resilient design, education of climate-related issues and solutions while seeking hyperlocal expertise inputs.

By valuing community knowledge and input, professionals can advance climate resilience efforts in a manner that is inclusive, equitable, and effective, driving positive change for coastal communities worldwide.

The Importance of Community Engagement

Local and Hyperlocal Knowledge

- Community members understand the causes and impacts of flooding and other climate hazards in their neighborhoods and are experts on the flood resilience needs of their community. Yet too often, under-resourced project teams treat community engagement as a box to be checked in the process without true participation by community members.

- Local expertise is essential and necessary to identify unique challenges, opportunities, and priorities specific to each community, ultimately leading to more inclusive, sustainable, and effective resilience projects.
Community members have a better understanding than many local officials of what is going wrong. They know when stormwater backs up into homes, what drains work properly, where it floods most often in their town, and what efforts would receive the community’s blessing or ire.

Waterfront Alliance’s WEDG standard provides guidance on creating an integrated and inclusive community engagement process, including performance measures to assess whether projects enact design changes as a result of community feedback.

Green gentrification in environmental justice communities is a risk that must be managed and planned against. An increase in property values from climate resilient projects that provide multiple community benefits could eliminate home affordability for the community members who originally supported and needed the project.

**Community Education**

- Project leaders must talk about “why” not “what”. Project teams must prioritize sharing climate change and resilience education with communities to facilitate informed decision-making and build a long-term base of support for interventions. This education involves disseminating comprehensive information on climate science, coastal risks, and the benefits (and co-benefits) of resilience strategies.

- Providing members of the public with knowledge can help project teams cultivate a sense of urgency and collective responsibility. Project teams can share success stories that create more momentum for green infrastructure and climate resilience solutions.

- Visualizations and renderings are particularly important given the complexity of hydrological models and solutions. Visualizing a new future is a key part of building overall support.

- Accurate and approachable climate data is a critical part of any community engagement process for climate resilience projects. Coupled with local knowledge this can be a powerful part of any process.
Schools, Universities, and Workforce Development

- High schools and universities are an often-overlooked part of any community engagement strategy. Engaging schools can bring together teachers and communities to support projects.

- Students can be brought into career pathways related to climate infrastructure, and ongoing maintenance and operations.

- It is important for philanthropy and others to commit to building the skills and capacity of future generations. The time it takes, for example, for a group of students to plant and maintain oyster beds is longer and more expensive than hiring professionals. Yet training students to do the job builds capacity in local communities, community support, and builds future workforces.

- Workforce development and career pathways for the climate future are a key part of all solutions.

- Entrepreneurship is often left out of green career pathways and must be included because of the many opportunities for technology, new project delivery, and innovations through AI to provide a role in climate resilience solutions.

- An open framework for youth education should be developed with easily accessible, peer reviewed best practices, such as a Wikipedia for coastal adaptation and resilience.

Poor Public Engagement Processes

- Community members come away feeling unheard and frustrated by a public engagement process because their time has been wasted.

- It is not uncommon for projects to reach final stages only to have community members feel their concerns and ideas they spent time communicating were dismissed.
Discussion Summary

Community Engagement

• Examples of how community engagement can go wrong and not far enough include a living shorelines project that featured plantings to stabilize the shoreline. The plantings were routinely trampled by recreational users of the shoreline, not because the community members did not support resilience measures, but because community engagement was not holistic and integrated enough to prevent people from assuming the plantings were weeds.

• Community members should be compensated for their time and involvement in any process as a best practice.

In summary, without rigorous, thoughtful, meaningful, and expertly integrated two-way community engagement, projects will face challenges. Poor community engagement practices could lead to a distrust of major climate infrastructure improvements, beyond what would be expected from typically common local opposition to major projects.

Ultimately, by valuing community knowledge and input, projects will be more successful and supported at a political level. Professionals will be able to advance climate resilience efforts in a manner that is inclusive, equitable, and effective, driving positive change for coastal communities worldwide.
FUNDING AND FINANCING

Incentivize solutions by directing funding and finance where they are best suited to de-risk, capitalize, and build continuous resilience against current and future climate system decay.

What little capital flows currently to adaptation and resilience projects mostly comes in the form of funding such as corporate and foundation grants, non-equity grants, public finance, and blended finance. Private sector participation in climate resilience and adaptation financing is limited, composing only 5 percent of private climate investments globally. [1]

Differentiating Funding from Financing

It is important to define and differentiate funding and financing as terms that help frame how to pay for climate adaptation, how to manage the associated investment risks, and how to capitalize the financial and environmental opportunities.

**Definition of Funding**

- Funding refers to direct capital flows into more certain budgeting values such as those used to cover costs for materials, labor, and ancillary services in a coastal adaptation and resilience project or site.

- This capital flow can also be called patient capital when it is commonly used by long-term investors such as governments, philanthropies, and other grant-giving institutions to enable climate action implementation and does not usually expect or necessitate a financial return which differentiates it from financing.

- Investments by patient capital players are also referred to as de-risking or catalytic capital in the case it allows for economic viability where it would not exist otherwise. Focusing on the breakeven is something only certain investors can help achieve and makes way for more risk-averse participants to co-invest.

- Patient capital comes early in the investment horizon and is sometimes the only funding source for a project. It can make or break an adaptation and resilience project’s ability to meet its intended purpose and timeline.

- Private investors may be disincentivized from looking at adaptation and resilience projects when patient capital is available or where projects risks are unknown or cannot be easily mitigated to protect capital.

**Definition of Financing**

- Financing coastal adaptation and resilience differs from funding because a return is expected.

- Currently, the lack of projects that provide a financial return continues to cut off private capital from investing in climate resilience.
Adaptation and resilience investments require a return of principal, capital preservation, and a chance for excess returns. Fortunately, adaptation and resilience preserve asset values, which becomes an incentive in its own right.

The base of adaptation and resilience project funders should be expanded to broader segments of investor types—those who are seeking financial returns alongside non-financial returns (e.g., carbon mitigation, water depletion mitigation, marine and freshwater ecosystem restoration, conservation, protection, and sustainability).

Private sector investors are sought after for investing in startup projects that are more suitable for patient and other longer-term investors with higher risk tolerance. Startups are inherently unable to take on or manage make-or-break operational risks without significant confidence (i.e., patience) from their investors.

Research and development on how to catalyze private sector assets is limited and what does happen is not being paid for by the private sector. Research, development, and proofs of concepts instead mostly fall on patient capital and startups.

Research and efforts focused on how to develop system-level adaptation, resilient performance metrics, and data generation/monitoring, is also mostly limited to the public sector (states, counties, municipalities), patient capital (foundations, non-profits), academia, and some startups (angel and venture backing with low technology and market readiness levels).
Solutions to Unlock Financing

Solutions centered on funding and financing coalesce around various shared themes with respect to the challenges and benefits of coastal adaptation and resilience projects.

Climate Mitigation Financing

- Pure private capital for climate mitigation is starting to come in through blended finance arrangements, corporate venture capital, and aspirational expansion of corporate budgets for project finance and fundable research and development. This is financing that brings supply chains, operational value chains, and asset fleets closer to reaching greenhouse gas emission reductions targets and can make assets more resilient.

- Because the measures, activities, and assets of coastal adaptation and resilience bear a financial value, it is logical that blended finance arrangements, corporate venture capital, and aspirational corporate funding can be better allocated than business as usual.

Public Sector Funding for Climate Resilience and Adaptation

- The U.S. Army Corps of Engineers remains the largest funder and implementer of community-wide coastal adaptation and resilience projects.

- The federal nature of the funding and financing forces states, counties, and municipalities to advocate and to align political interests continuously to keep funding flowing in the right direction.

- Economically viable projects will benefit from hyperlocal knowledge while they receive unprecedented expenditures and policy supports due to federal and state-level legislation.
Discussion Summary

Funding and Financing

Private Financing for Climate Resilience and Adaptation

- Private capital investors can be funds, financial institutions, investors, and non-financial corporates. They will demand a high-level of precision for project ideas, growth margins, and timelines for getting paid back.

- Public funding takes too long for private investors which makes blended finance less market-aligned and requires more financial engineering.

- The lack of precision and return margin continues to keep away risk-averse investors and challenges the growth in mandates for these types of investments.

Philanthropy

- Early-stage funding and financing is the most critical. Philanthropy should be playing a key role in de-risking and catalyzing systemic change.

- In practice, philanthropy can be risk-averse, which is contrarian to the role for patient capital in absorbing risks that the private sector and investors are unsuited or unwilling to carry.
Financial Engineering

- Financial institutions have extensive experience financing projects that have a lot of uncertainty and risk, such as using derivatives and other complex contracts.

- Blue finance requires many financial engineering practices not dissimilar to structured products and derivatives in the fixed income space to make projects bankable. Green or blue performance is not being translated well into risk mitigation and upside for existing and pipeline projects. If we focus too much on risk with these projects, finance will continue to not come in.

- Financial design can be used to make sure investments work. For example, a creative financing mechanism can be developed to add a layer of security for the investor through features such as insurance or guarantees. More complex contracts and features can be developed to help nascent sub-sectors of the real economy response to climate change.

- There is a multi-stakeholder dimension to making projects bankable and standalone without too much need for government support or patient capital charitable giving.

- Because of community and ecology integration in resilience, a door can be opened to stack co-benefits across environmental and social dimensions. These must rely on project performance data and solid accounting methodologies for determining the financial and non-financial value of the costs and benefits.
**Develop, Consolidate and Innovate**

- Implementers must continue to develop, consolidate, and innovate on ways that the multiple benefits generated by ecological and nature-based solutions are accurately represented in public and private funding and financing, including:
  - Commitments to monitor and collect data on project performance
  - A framework for private participants to accurately price environmental data
  - Ways to render environmental data usable by business/finance sectors

**Lack of Common Return Language**

- Adaptation and resilience finance for coastal sites does not have a common return language such as what can be observed, measured, and assessed. What’s needed now is a common return language similar to net-zero commitments and greenhouse gas mitigation strategies. Natural capital accounting fills that gap.
Payment for Performance

- Pay for performance models could and should work on coastal adaptation and resilience projects. If there is financial value on natural assets such as mangroves, coral, salt marshes, and seagrass in places like Florida, it would allow the nature to develop its own operations and maintenance budgets that are much needed to sustain operations and decouple sites from public sector budgets and private sector investment gaps.

- For example, when conducting vulnerability assessments and acquiring wetland properties, exploring creative financing and taxation mechanisms to protect nature should be developed.

Insurance

- Insurability and stabilizing insurance costs will continue to be a goal for the insurance and reinsurance industries.

- Waterfront and upland community budgets are straining against higher frequency loss and damage claims.

Waterfront Alliance is eager to work with roundtable partners and others to further these three goals.

Please reach out or follow us on www.waterfrontalliance.org.