BREAK + MAKE: DYNAMIC AGENCIES FOR RESILIENCE

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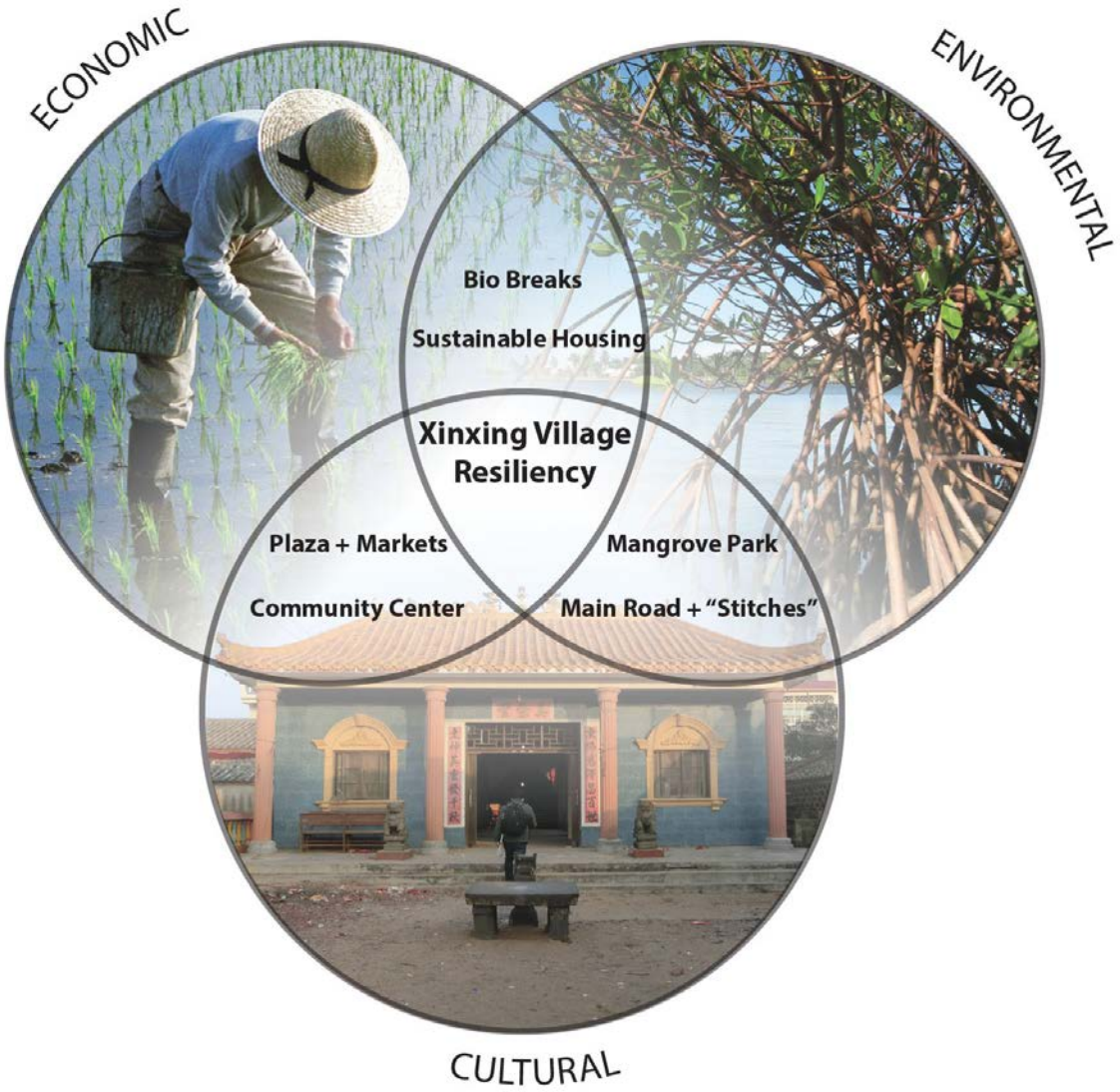
Abstract

"[Resilience is] the capacity to withstand, adapt to, and recover from natural disasters and major economic crises – so that people can continue to lead the kind of life they value."
- United Nations Economic and Social Commission for Asia and the Pacific

Situated on a narrow sliver of land between the ocean and the river, the village of Xinxing in the Hainan Province of China is positioned to become a beacon for resilience by utilizing its occupation of the intersection between fresh and saltwater to its advantage. Through the investment in resilient design, Xinxing will not only survive, but thrive in this unique geological condition, functioning as an example for other coastal communities. The goal of this project is to preserve and augment the elements that make an environment desirable for human occupation, while creating a means to mitigate and adapt to the damage of natural and economic disasters. Resilience by definition requires both active and passive measures to adequately confront present challenges while preparing for future ones, so as its name suggests, this proposal implements strategies that simultaneously **break** down the threats of flooding and isolation while they also **make** new opportunities for agricultural, aquacultural, and societal growth. The design strategies respond to the specific set of contexts at this harbor, including buildings that adjust to user needs, durable houses that consider availability of materials, as well as local technology, and are in tune with the site and climate conditions. The suggested programs within public spaces strengthens community bonds, while it fosters ownership and engagement in coastal issues. Architecture, here, is as much as an object and a symbol as it is a means of survival.



Break

There are multiple layers in the design that serve the passive function of resilience. The first line of defense is a series of biologically enhanced breakwaters in the harbor that attenuate impact from waves associated with typhoons. The second is a mangrove forest that lines the shore, replacing the existing sea wall in favor of a soft buffer between the village and the sea. Mangroves will help to filter sewage and other wastes re flowing into the harbor. Along the eastern edge of the village, a canal collects floodwaters from the river and channels it into bioswales, filtering the water as well as keeping pedestrian and vehicular thoroughfares dry and navigable.

Make

This design also proposes new architectures, infrastructures, and industries to enhance the socioeconomic potential of Xinxing. A new plaza stretching from east to west is lined with various structures that serve commercial, political, medical, and educational functions, including a community center, a fish market, and a farmers market. Supplementary gathering spaces can be found on the new concrete decks that

line the coast, enabling fishermen direct access from their boats to their homes and providing ample space for the preparation, storage, and sale of fish. Additional connections are made by the paved roadways, or “stitches” that run from these decks to the second roadway on the eastern edge of the village. This new network of roadways will increase mobility and efficiency, as well as aid in evacuation during a storm event if needed. The new housing will increase efficiency as well, employing rainwater harvesting techniques to augment existing utilities.

Houses

This proposal creates 90 houses a based on three new typologies along the eastern edge of the village. The new houses are designed so that water from floods will be able to flow unimpeded to the sea, keeping the houses dry and at the same time fostering the growth of the coast. To protect the existing non-elevated houses, bioswales drain water from rain and floods, guiding it to the mangroves. The new housing types incorporate large overhangs, porches, and storage. The roofs collect rain and store in a cistern to be used as greywater, while excess stormwater is drained into the bio swales. To cool the houses, window openings encourage cross breezes and stack ventilation. Bamboo is introduced as a local and sustainable alternative to wood, for panels, shutters, screens, and interior details. Overall, the new types establish a dialogue with the existing ones, turning household shelters into a system that renders resiliency.

Community Center

As the main road into the village approaches from the east,it splits into two, forming a central plaza that continues into the harbor with a large dock. Providing a clear view to the sea, the plaza creates a space that everyone in the community will love to gather. New public buildings around the plaza will provide additional services to the village as well as new opportunities for their economy.

The community center serves multiple purposes, bringing the village together culturally as well as transforming into a place of refuge during natural disasters. The building is raised to protect from flooding. Bamboo in the form of exterior cladding and a weather screen shields the building from the elements, yet still allows natural light to penetrate deep into the interior spaces. The open main floor interior allows for flexible programing and a variety of activities to happen during different parts of the year, while the second floor contains enclosed space that can be used for more private functions, yet also serve as storage for important town documents and emergency supplies. Lastly, an accessible, green roof provides a panoramic view of the harbor and village.

Bio Breaks

On coastlines like that of the Xinxing Village, the shallow water does not allow the storm surge to be dispersed downward, and therefore makes for a larger surge upon land. Barriers like oyster reefs and aquaponic floats hinder the forces of fast moving storms that would normally create a high surge along this type of open, shallow coastline. The structures can also act as wave breaks, lessening the height and force of waves on top of the surge by the time they get to the shore.

In addition to breaking the waves' energy, the proposed oyster reefs and aquaponic floats create a valuable aquacultural asset for the village. As the oysters grow, they can become an additional food source as well as an export for Xinxing. The reefs in conjunction with the towers will also create a new, healthier habitat for the fish in the harbor, which again, increases aquacultural output. The combination of these two strategies forms a line of defense against storms and economic recession.

Decks

For the Xinxing Village, the connection between the people and their harbor is strong, but the current infrastructure is not conducive to that relationship. The sea wall that lines the shore does not adequately protect the village in the face of storm surge, nor does it support the vital fishing industry. This proposal redesigns the sea wall into a more habitable and performative space that mitigates threats while enhancing the livelihood of the village.

Instead of the hard, fortified edge of the sea wall that clearly demarcates village from harbor, the new edge blurs that line, extending the coast with a new mangrove forest and a series of decks and docks in between. Mangroves were chosen for their promising coastal protection and restoration properties, which include salt-tolerance and their thick root system. Mangrove flats already exist at the mouth of the river flowing north of the village, so that same ecosystem will be extended southward, growing into a flourishing mangrove forest. In addition to the new habitat created and the aesthetic appeal, the mangroves also aid in water filtration, taking drainage from the village and filtering it further as the water flows to the sea. Concrete decks emerge from the trees to visually and functionally connect the land to the water. All in all, this systems approach to design takes advantage of the natural environment using active and passive strategies to enhance the ability of the village to thrive.