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# Bidirectional Parametrics in Architecture and Urban Design: The Han River in Seoul

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## **WATER AND BUILDING**

This thesis is about setting up an active dialog between water and building by pushing buildings beyond the line of demarcation between water and landform. The waterfront typology that is explored here straddles in between water and land.

## **PARAMETRICS AND BUILDING**

We are surrounded by a dynamic field of various natural forces. And the act of building involves the creation of entities that are reacting against these natural forces, setting up an action and reaction relationship of gravity, wind, and rain, etc. Yet this relationship is passive in a sense that the effect lacks intentionality in its dependency to the cause. A parametric relationship is an active relationship that begins with setting up certain equations between the cause(parameter) and effect(result) so that the result is being directly influenced by the parameter. If one of the parameter changes, the other that is networked is automatically updated by the equation. This thesis is aimed at developing an active parametric relationship between space defining elements, such as walls, columns, or new typologies, and the surrounding environmental data.

## **PARAMETER : RESULTANT = FLUID FLOW**

## **BEHAVIOR : LANDFORM**

## **BIDIRECTIONAL PARAMETRIC FEEDBACK SYSTEM**

As objects on earth naturally embedded with action and reaction relationship, parametric relationship also needs to take the feedback process into consideration. If we say 'action' as unidirectional, 'reaction' will be bidirectional.

Current status of parametric design tends to be unidirectional in its relationship between its initial code and the resultant expression. Bidirectional parametric relationship, on the other hand, is characterized by feedback process, by which the resultant affects the original parameter as well so that it transforms into something entirely new. Parametric relationships between water and architecture that are situated within complex urban context will be explored by researching fluvial geomorphology and testing it with digital media software. Seasonal flood fluctuation of the Hangang River and its inherent flow behavior in metropolitan Seoul will be the main parameters for this thesis.

## **WATER AND PARAMETRIC**

As a process of setting up an active relationship between water and building, this thesis will look at the mechanism of parametric relationships in depth. More specifically, four categories will define the water-building relationship in detail: formal, programmatic, structural and materialistic. River flow behavior will generate a variety of repercussions on the formal design process, which will then harness the seasonal flood fluctuation of the Hangang by its surface height change and flow speed variations, automatically resulting in a complex feedback loop of water and resulted form(Formal). The Hangang is two-stage channel with additional floodplain on both sides of main river channel, which will be the main field for this thesis' experiment. Having said that, the site will be flooded with water seasonally every year. Consequently, program is going to be flexible in order to inhabit

the space(Programmatic). Finally, emergent organizations of structural system and materials will be generated by changes of bordering water, converting the flood hazard into a constructive water resource for metropolitan Seoul(Structural and materialistic).

