Amphibious aggregations
Responsive environments for the metacity of Cyclades

■ a System to generate

temporary
responsive
self-sustained
multi-peformative
and fully adaptive
Space

expanding the existing boundaries
of dynamically evolving human agglomerations/ settlements.

Aspect 1

the relationship between research and design

For the elaboration of my project, research has been made into the fields of:

- theory of human agglomeration evolution
- emerging needs of isolated communities
- the notion ‘‘island’’
- weather data simulations
- coast line geomorphologies
- user analysis
- activity connections
- natural coastal formations & parametric 3D modelling of organic shapes
- ship design requirements/ docking/ mooring systems & floating structures
- adjustable structural systems/joints

different coast line qualities within the island.
Apart from the existing infrastructure, the activity patterns, the seabed and the geomorphology of the coastline, the wind directions with the highest speed was a basic parameter implemented to the design system in order to conclude to the four final case studies chosen [the locations where the aggregations would assemble each time to perform as a complex floating building hosting the facilities for the corresponding usage of the building].

Solar radiation analysis and simulations were run in order to be taken into consideration for the assembling system of the aggregations, the shape of the aggregations themselves and the elaboration of the final skin of the structures [interactive-kinetic skin].

The proposed aggregation system intends to behave as three different types of building, since in Syros it hosts student housing facilities, in Mykonos hotel facilities and in Delos conference centre facilities. Such multi-performance of the complex building, implies the existence of different users and therefore a system which would generate different aggregation assemblages with various connections and routes designed in order to experience each usage of the building.

Water is a prevailing element when it comes to not only my research, but also my design. Therefore, I could not disregard the variety of different architectural qualities, water could offer my design. What could mean for a human being to navigate on the surface of water, above it, or even under it? Water is not only about vision, it is also about the sense of touch, smell and hearing. It is about memories. Therefore, in the parametric design strategy of the aggregations, coastal and sea landscape qualities, resembling natural organic formations, were incorporated in order to create a multi-sensory built albeit natural environment for the users to experience.

Each component of the aggregations is structurally designed in a way that would interlock fully flexibly in specific parts with other components in order to assemble according the specific scenario each time in the corresponding case study location.

Platforms designed within the components are designed in a way that both in terms of geometry and structural adjustable system would approach the coastline [reformed in parts in order to be able to connect], adjust and behave as docking-exit spots of the building towards the main land of the island.
Aspect 2

the relationship between the theme of the studio and the subject/case study chosen by the student within this framework (location/object).

The studio brief refers to self-sustaining climatic ecologies, local and global climatic associations, user-centric adaptations, adaptive spatial systems, multi-performative architectural formations, the architectural praxis which is in a continuous state of change, optimising multitude of parameters, highly adaptive, self-organising formations, polymorphic topologies, multi-scalar spatial formations and the analysis of social behavior patterns, critical urban context and geographical location.

Within this framework, the goal of the project is to generate responsive, self-sustained, multi-performative and fully adaptive architectural space, which could collect everyday data and detect emergencies, in order to serve the constantly arising needs of isolated communities in water. The structure is comprised of various aggregational components, assembled according to various scenariums in order to fit functional connectivity challenges, user analysis output, environmental parameters and ship design requirements. The designed volumes should be constantly re-evaluated in order to sustain their aerodynamic shape. Priority in the design process, is the production of flexibly re-arranged aggregations which enhance the multi-performative character of the proposed structure.

After research, and within the limitations of the graduation project assignment, there was a narrowdown in scale. Globally, there are over 2 million islands [180.497 islands inhabited in 361.000.000 km² sea surface area]. While, in Greece, there are 1.400 islands [227 island inhabited in 300.000 km² sea surface area]. Which means that islands in Greece comprise the 20% of total Greek surface, which implies 1,5 times bigger density than on a global scale. Therefore, the project focuses on the design of responsive architectural environments which correspond to the needs of the islands of Mykonos, Delos and Syros in the aegean archipelagos. Mykonos: multiplication of population during summer time, lack of accommodation. Delos: archaeological complexes of great global interest, many scientific conferences take place there, it is forbidden to stay over night in the island. Delos: archaeological complexes of great global interest, many scientific conferences take place there, it is forbidden to stay over night in the island. Syros: University functioning during winter, no student accommodation.
Aspect 3

· the relationship between the methodical line of approach of the studio and the method chosen by the student in this framework.

First and foremost, I formulated the problem statement. Afterwards, I concluded to my proposal. Then I had to define the rule-set for my computational, generative design strategy, in terms of location, design, evaluation, performance and re-evaluation (parametric process), taking into consideration my research on the existing urban fabric. After a research on the functional program of the building as a hotel, a conference center and as a student housing I observed patterns of function, finding common functions and estimating additional space needed for the building to function as a multi-performative space, clustering functional unities and experimenting on the creation of separate though connected volumes, taking into consideration the research on creating a multi-sensory, synaesthetic space. After research on ship design and floating principles and theoretical simulations of the aerodynamic and water dynamic behavior of complex systems, I re-evaluated my designed volumes. Such strategy would conclude to skin elaboration, structural test experimentation and final design and structural detailing [along with solar radiation and wind simulations].
Aspect 4
· the relationship between the project and the wider social context

The architectural praxis is in a constant state of change. The urban context radically transforms constantly over time, each urban context, to a different scale and with different speed. Cities are formed but do not remain static. A city is a living organism. The creation of urban centres and their development is a constant procedure over the centuries. Human agglomerations are living organisms, which depending on socio-cultural and economic conditions evolve. The notion of human agglomeration is fully integrated with the formation of dynamics. Therefore, human settlements have the tendency of evolving and even expanding, since they are intrinsically connected with the formation and the evolution of corresponding human communities. Even new centres are created during such procedures over the decades.

But, what happens when geomorphological boundaries are set to a settlement? What happens when communities evolve although the built environment cannot actually follow this state of change? The paradigm of an island is the most characteristic case study of such an inconsistency between human agglomerations and their surroundings.

In the general framework of an isolated community, in terms of geomorphology, economy and infrastructure, such as the community of an island, there are numerous needs constantly emerging and many limitations set. And when an isolated community refers to a network of islands, within the borderland of a country, the needs emerging could be common, diverse or even supplementary to each other. The notion of a network implies the theoretical existence of a multitude of particles and a set of dynamic bonds and ties between the particles. When the aforementioned communities play the role of the particles, what kind of ties could be formed? Should these bonds be literal or theoretical? Could an architectural formation, perform in a way of an external ‘source’ which could continually provide the particles of such a network with solutions for the needs emerging? Could this constant shift of performance correspond to a fully multi-adaptive designed and built environment? And if so, could this environment collect realtime everyday data and navigate, approaching potential anchor points with the land to serve each need and architectural parameter? Or should it be designed in a way that, as a dismountable contemporary structure, could be reassembled and behave in accordance to the needs?

Existing ways of handling the issue of border conditions in the islands and seaside settlements are either permanent extension of the land towards the sea, or responding to needs arising via ship transportation. Therefore, the proposal investigates the intermediate scenarium of temporary extensions that should adjust to different types of coastal line geomorphologies and perform as whatever, whenever and wherever needed.
The project intends to respond to the issue of constantly arising needs of isolated communities in water. How and up to which extent could supplementary floating structures respond to such needs? Therefore, it addresses the issue of how could this be integrated into an architectural design of a self-sustained, fully adaptive to real-time data, weather conditions and existing geomorphology, structure. The upper goal of such project, is to study and make a thorough research on new systems which could play the role of an architectural and technical glossary for self-sustained structures which could respond to emergencies of isolated communities with strict border conditions. This discussion arises sociocultural issues concerning the communities of the islands, their common, diverse or even supplementary needs, and the practical or theoretical existence of dynamic bonds connecting them. Is an island a self-sustained environment? If not, could it or should it behave in such way?
The islands are separated through water, while in the same time, they are unified and connected through it.

The organic fabric, narrow streets interrupted by small scale squares, the skyline and the endless blue horizon, indicate the trace of an inextricable bond between the particles. A technological expertise and an urban syntax transferred from an island to another. Or technologies invented and developed concurrently. Or even, it implies alternative versions of a common genetic mechanism which reproduces itself continuously, "through an inexhaustible number of variations generated by transformations of the underlying structure. A structure, according to F. Braudel, whose history narrates the complex transformations of its persistent materiality"\(^1\).

As described by George Thomson, "Archipelagos has been inhabited uninterruptedly since prehistoric times, its unique and non-reproducible features make it an alternative, although nor easily emulated, model"\(^2\).

Describing the prototype of a complex rule-set of inhabiting, Aegean, as an idiosyncratic aqua-city, documents its position under the general discussion over the idea of the metacity.

Studying literature for the existence, the origination and the development of an island (as a fraction and a unity of fractions) is of utmost importance for the elaboration of my research concerning my graduation project. Furthermore, the argument of Aegean presented as a metacity, played the most important role in understanding the structure of an Aegean island, the connections between them, the arising needs, the role of water and the co-existence of these communities, throughout history and under the scope of a discussion claiming that Aegean is one city comprised of many particles surrounded by water, and not a group of islands. My project refers to the formation of an architectural and technical glossary for self-sustained structures which could respond to emergencies of Aegean islands. Such glossary, implies a thorough research on the existing urban syntax, the existing infrastructure patterns and how a proposed structure could supplement to this network, without disrupting the social cohesion of the native population.

\(^1\) Department of Architecture - University of Thessaly/ © 2010, Elias Constantopoulos, Korina Filoxenidou, Katerina Kotzia, Lois Papadopoulos, Curators of the Greek participation, Translated by Judy Giannakopoulou

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