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Architectural design concept and guidelines for floating structures for tackling sea level rise impacts on aquatic abodes GOA

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Abstract - *Previous studies have shown that floating structures have developed in recent decades, concluding that this is the most sustainable solution against sea level rise (SLR), favoring its use over other methods. land reclamation methods in terms of sustainability, longevity and profitability, which research seems to ignore. This article guides architects and urban planners when designing floating structures by introducing a new approach to the floating community model and architectural design guidelines for floating structures. to address the impacts of LRT on Goa. To illustrate such an approach, this article first conducts an analysis of Goa and its implementation of coastal management solutions, as their characteristics provide the necessary knowledge to select solutions to reduce Best lightweight for that area. Second, it conducts exploratory analysis to investigate floating structures as a more sustainable and long-term solution. Third, apply the findings from the previous sections on site analysis, mitigation solutions, and floating structures to define a floating community concept model for Goa. These findings support key arguments that traditional mitigation methods are not sustainable or long-term solutions. The analysis demonstrates that Goa is the most vulnerable region to SLR. Although floating structures have not proven to be the optimal solution in all cases in terms of cost-effectiveness and/or site suitability, after site analysis they present themselves as the ideal solution for A Goa City.*

Key Words: *Land subsidence Adaptation approaches, Architectural design of floating structures, Sustainability, Goa*

1.INTRODUCTION

floating high-end housing refers to the construction of homes on floating Platforms, typically in coastal areas. These homes are designed to address the Issue of rising sea levels and coastal flooding, by elevating the structures above The waterline. They are also built to meet the demands of the high-end housing Market, with features such as large living spaces, high-end finishes, and amenities floating high-end housing can provide a sustainable and resilient solution for Coastal development, while also addressing land scarcity and overpopulation in Coastal areas. The floating platforms can also move with the tide and waves, Reducing damage caused by storms, and can provide new habitats for marine life, Reducing the impact of waves on the shoreline. however, building floating highend Housing can be complex and can require a specific technology, design, and

Engineering that is different from building on land. It also requires specific Regulations and legal framework, and can be expensive.

2. Research methodology

To achieve the previously mentioned objectives, the study conducts studies using state-of-the-art data on SLR, architectural and urban mitigation solutions.

- Identify problem
- Identify the site
- Site study
- Literature study
- Case studies
- Program formulation
- Conclusion

3. Literature review

The Gautrain is a modern rapid rail network currently under construction in Gauteng, South Africa. The project includes a link between Pretoria, Johannesburg and OR Tambo International Airport with a total length of approximately 66 km. The structure described in this article will cross the dolomite area with a 3.1 km viaduct (V5c) south of Pretoria. This location is generally covered by dolomite soils with occasional syenite intrusions. The area is known for its risk of sinkholes and dolines due to the erodibility of local soils, cavernous soil and bedrock conditions, and potentially variable conditions. of groundwater (if not controlled). Sinkholes and sinkhole lines can affect rail services and cause catastrophic consequences if left untreated. The bedrock shape is very undulating, sometimes with deep valleys or grooves between bedrock peaks.

A. Ambika and K. Venkatraman in their paper it has a floating home with a dimension of 6.15m x 4.33m x 3m. The

software Staad.pro v8i is used to evaluate structural members in the floating bay. For the complete floating home, the manual design was developed. For the safety of the structure, a stability study is also carried out. Design with lightweight building materials and a stable fit of the overall structure. In most regions of the world, this next technology will be adopted if the current surface is distant from sea levels.

Emilin Sara Varkey, Fayiz Ameen M M, Sonam G Bose, Syamlal V, Linda Lawrance in this magazine, they are designing a temporary residential building using the Pontoon principle. And they analyze the structure using ANSYS software. They concluded that temporary housing could be considered an effective alternative to traditional housing.

F. Ishaque, M. S. Ahamed, M. N. Haque, the researchers have tried in this publication to construct a cheap dwelling for individuals in inland locations such as Bangladesh. The proposed floating house was constructed using local resources that were proven to be sustainable and economically viable. The floating house is developed for areas devastated by the flood and gives a permanent address for homeless and gypsy. Airtight plastic cylinder can be used instead of drums to enhance life expectancy. Other floating homes will be constructed as well as the main building for poultry and animals.

4. Case Study:

OCEANIX CITY , SOUTH KOREA

LOCATION : BUSAN ,SOUTH KOREA

CLIENT : OCEANIX

BUILT : 5,00,00 SQM

ARCHITECT : BIG ARCHITECTS

STATUS : IN DESIGN

As part of un-habitat' new urban Agenda blue tech company Oceanix and big proposed a Blueprin vision for the World's first resilient and Sustainabl floating Community fo 10,000 residents. Figure 10. View of oceanix city master plan The city is designed to house Up to 10,000 residents and is Made up of hexagonal floating Platforms that can be Arranged in different configurations To accommodate Different needs. Each Platform is equipped with Renewable energy sources, Such as solar and wind Power, and is connected to A central hub that manages The distribution of resources. The big ecosystem works By using a closed-loop system, Where waste from one Aspect of the city is repurposed And reused in another Aspect. For example, food Waste can be used to create compost for urban farming, Which in turn provides Fresh produce for the city's Residents. The city also has An advanced water management System that collects And purifies rainwater, as Well as treats Wastewater for reuse. Overall, the oceanix city big ecosystem aims to create a sustainable and resilient community that can adapt to the challenges of climate change and rising sea levels.

FIGURE 1. KEY PRINCIPLES OF OCEANIX CITY

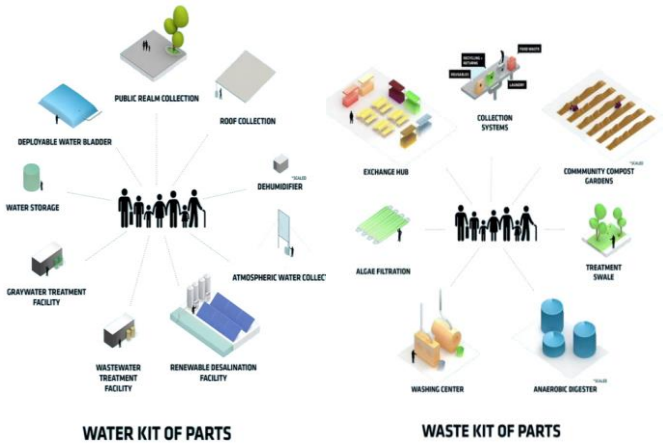


Fig 2. WATER ECO SYSTEM

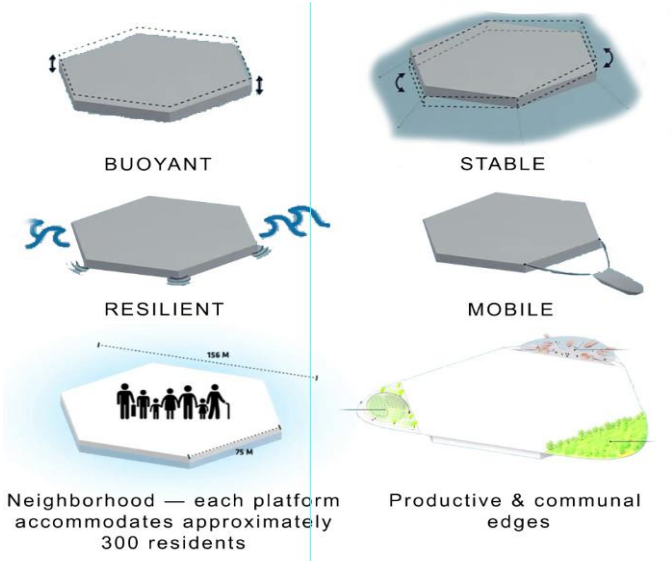
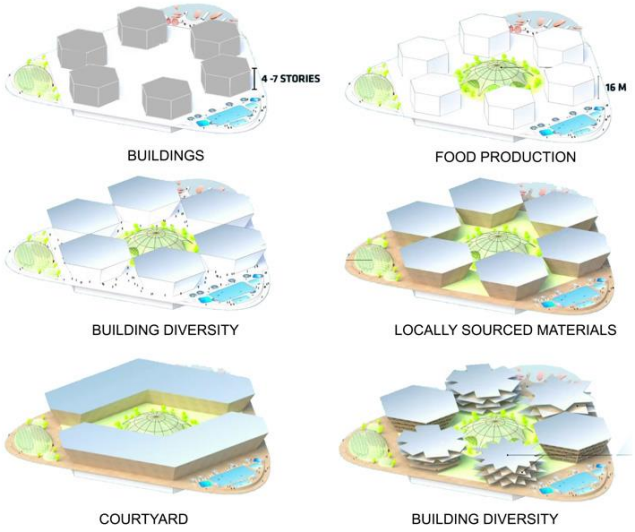


Fig 3. Conceptual ideas for base structure



5. Comparative analysis of material

Sr. No	Process	Oceanix City Busan , South Korea	Floating farming, Netherlands	Makoko floating school,Lagos, Nigeria	Floating Pavilion, Rotterdam	Waterwoningen waterburt west, Netherlands
1.	Base (foundation)	Concrete (hollow)	Concrete (hollow)	Plastic Barrels (200 li)	Concrete shells, Polystyrene	Steel Pole
2.	Structure	Bamboo, timber	Aluminium and steel framing	Bamboo	Dome construction (ETEF foil)	Aluminium, timber or steel framing
3.	Decking	Composite	Cement sheet And Wooden flooring	-	Polystyrene and cement sheet	Composite
4.	Roofing	-	Polycarbonate roofing	Galvanized sheet	ETFE foil	Corrugated sheet
5.	Flooring	wood	Cement sheet	Wooden planks	-	Timber floor
6.	Walls	-	Fibre glass with aluminium framing	Bamboo strip Criss-cross framing	ETFE foil	Corrugated sheet With Foam

Table-1: used materials on case study in different process

7. Location:

Site will be located in the south western ocean Area and it will be 10-15 min away from the shore So that it will be easy for transportation and also for medical emergencies. Site is located near Benaulim beach. Panji is the capital of goa and benaulim beach is 35 km around 1 hour drive away from panji. The main city is margao has around 1,46,000 population compared to panji which hasaround 55,000 population and margao is 10 km around 22 min away from the benaulim beach from the benaulim beach airport is 60 min away, railway station is around 25 min away and the . The benaulim beach is 6 km away from the national highway so it is easily accessible. According to statistics and study, the south side of goa will be a safer site than other areas in the state and, according to certain data from past

Years, cyclone activities there were extremely few compared to those in other cities, and the ocean is also relatively calm in comparison to other areas of goa.

Fig -4: Location

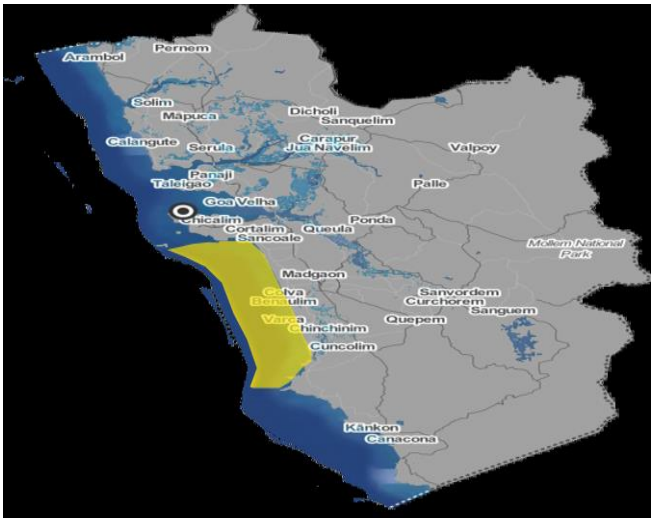
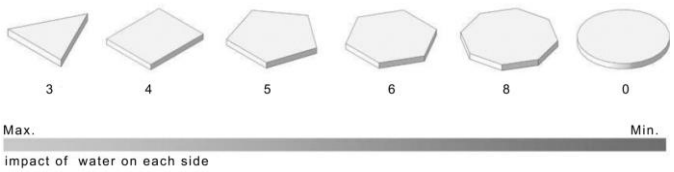


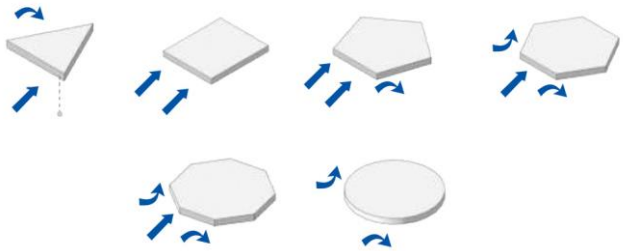
Fig -5: map showing rising sea level effects in goa

7. Concept & design developent

7.1 base plate development

For the base plate the shape will be more important so that will be repeated for create large modular base community for different function.





Most preferred shape for aquatics abodes Hexagons are the closet shape to a circle than can still from a grid.

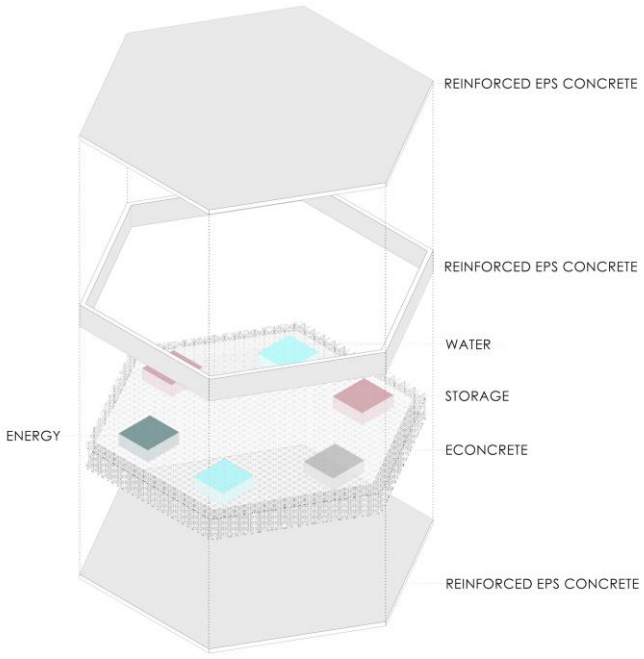
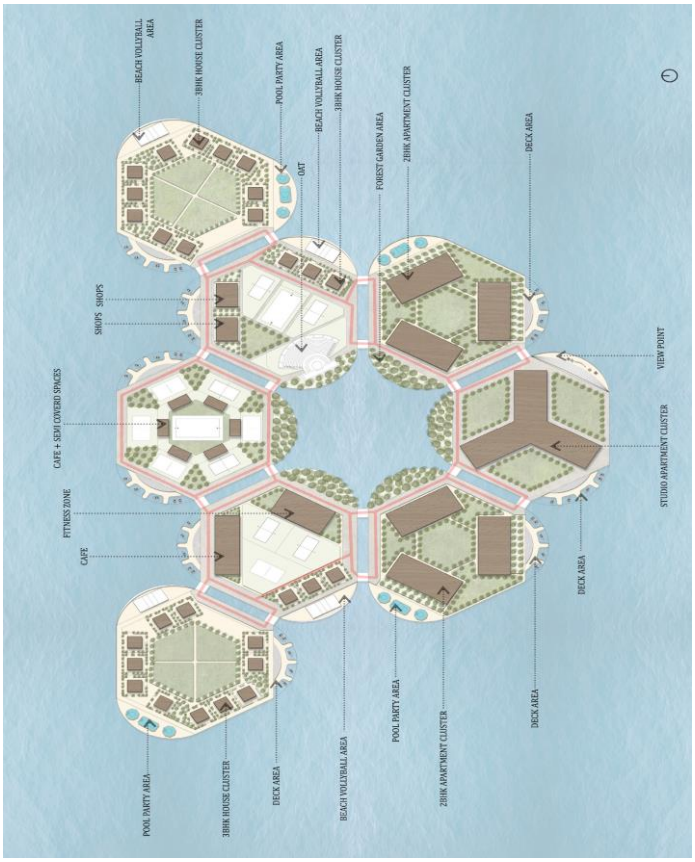
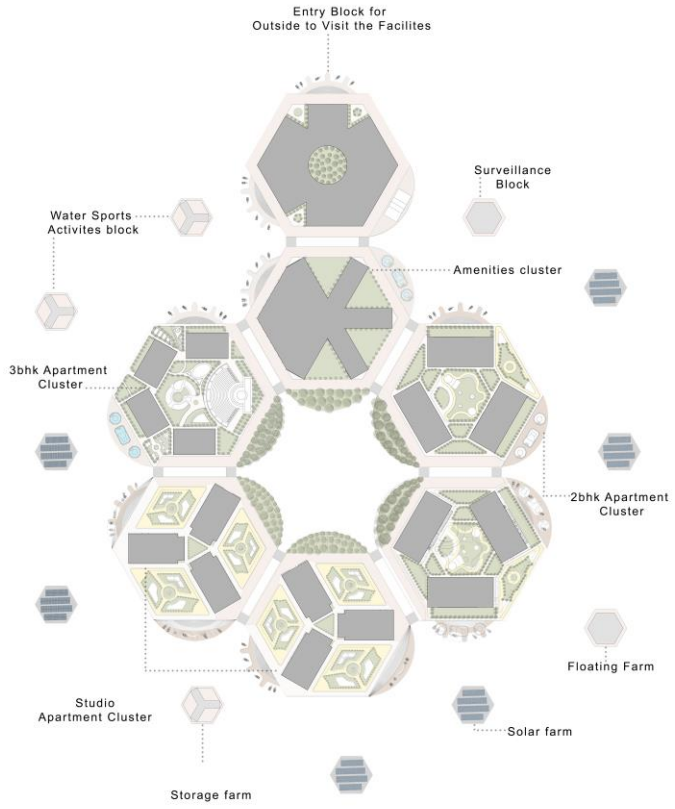


Fig-6: BASE PLATE DEVELOPMENT

7.2 MASTER PLAN DEVELOPMENT





7.2 STUDIO APARTMENT CLUSTER LAYOUT

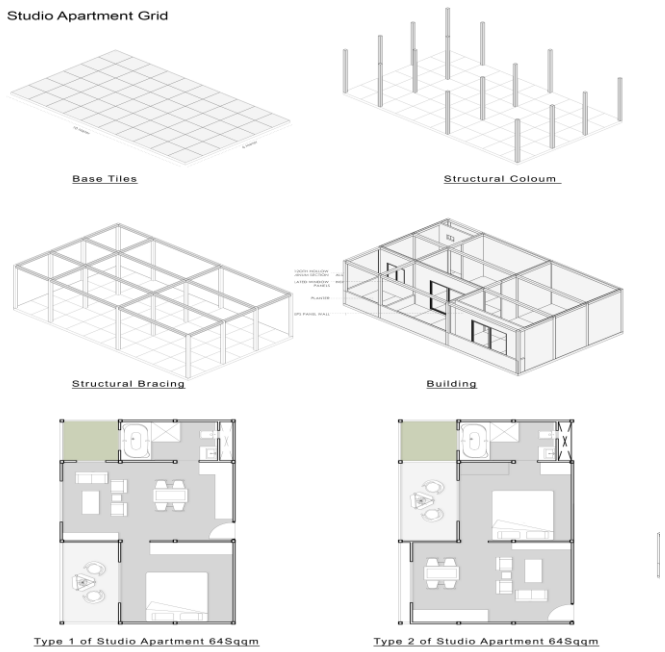


Fig -7: studio apartment cluster layout

3. CONCLUSIONS

By seeing how to oversee water and plan in its nearness, the tremendous size of the test of flooding that we are confronting turns out to be clear. Environment change and it is numerous impacts including expanding level, more extreme precipitation and increment in flood hazard is as of now being felt in numerous spots of India and it is a genuine impact that will be estimated in many years. This is the time period inside which arranging, plan and improvement ought to be created. The structure and places that we make in the following ten a long time will frame the foundation of a land amphibious way of life for next couple of many years and past. To get ready for the future, fashioners and manufacturers should not glance at the constraint of water yet at the chances it presents. In this dissertation the impact of environmental change also, the significance of the water abodes to reaction to environmental change is talked about and impacts are figured it out

As per theory whatever material choose for construction it will have density lower than water and volume should be bigger than mass. Construction material should be lighter and have some qualities for survive in ocean because in ocean there is some major factor likes considers corrosion, wind loads and potential Water damage.

This article also demonstrates the stability and usefulness of existing amphibious houses and their importance in India. Based on various contextual analyzes and detailed presentation of structural materials, the process of developing amphibious designs. An economical and minimum effort amphibious design can be fortified in India using locally available materials i.e. bamboo etc. as used in Bangladesh. These occupants may also be similar to ordinary residents on land, as amenities often similar to those of land-based structures may be provided, including heating, cool and ventilated. River bank improvements can be created by building these amphibious houses. The nature of these structures has been preserved as well as the structure of the land. The growing appeal of living in the next stage of immersion in fear demonstrates that people believe that increasing levels should not be feared but must be adapted to the changing environment.

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