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Floating Cities:

Pioneering the Future of Sustainable Urban Living

As the planet grapples with the dual challenges of climate change and unprecedented urban expansion, the quest for innovative, resilient living solutions has never been more urgent. Rising sea levels, extreme weather events, and the depletion of land resources are compelling urban planners and architects to rethink the future of cities. Floating cities have emerged as a visionary response to these global challenges, representing a paradigm shift in how and where we can sustainably live and thrive. Floating city projects like Oceanix Busan in South Korea, Oxagon in Saudi Arabia, and the Maldives Floating City exemplifies cutting-edge approaches to construction, sustainability, and climate resilience, offering a glimpse into a future where human habitation harmonizes with the aquatic environment.

Oceanix, BIG-Bjarke Ingels Group

Oceanix Busan: South Korea's Aquatic Metropolis

Oceanix Busan, developed by Oceanix in partnership with the United Nations Human Settlements Programme (UN-Habitat) and the city of Busan, represents a bold vision for urban sustainability. Located off the coast of Busan, this floating city is designed to combat rising sea levels and provide a sustainable living environment for its inhabitants.

The city is constructed on modular floating platforms that interlock to create a stable and adaptable urban landscape. Each platform can serve various functions, from residential to commercial, and can be easily reconfigured or expanded as needed. The modular design ensures flexibility and resilience, allowing the city to adapt to changing conditions and requirements. Oceanix Busan employs sustainable building materials such as locally sourced timber and recycled materials. The platforms are crafted from buoyant materials like steel and concrete, which are treated to resist marine corrosion. The city integrates renewable energy systems, including solar panels, wind turbines, and wave energy converters, to ensure self-sufficiency in power generation.

Emphasizing the blue economy, Oceanix Busan integrates aquaculture and hydroponic systems for local food production. Advanced waste management systems recycle and repurpose waste, contributing to a circular economy. This approach minimizes the ecological footprint and fosters a self-sustaining community. Designed to withstand extreme weather events such as typhoons and tsunamis, the floating platforms provide a safe and stable living environment. The city includes green spaces and water management systems to enhance resilience against floods and rising sea levels, promoting a sustainable coexistence with the marine ecosystem.

Oceanix, BIG-Bjarke Ingels Group

Oxagon: Saudi Arabia's Innovative Industrial Hub

Part of the ambitious NEOM project, Oxagon is set to be the largest floating structure in the world. Situated in the Red Sea near the Gulf of Aqaba, this octagon-shaped city combines advanced technology with sustainable practices to create a revolutionary industrial and residential complex. The unique octagonal shape of Oxagon optimizes space and enhances structural stability. The interconnected platforms that make up the city distribute weight evenly and provide a robust foundation for various industrial and residential activities. This design not only maximizes space efficiency but also ensures the structure's stability in dynamic marine conditions.

Oxagon, Image courtesy: NEOM

Oxagon employs modular construction techniques, allowing for the rapid and efficient assembly of its components. Prefabricated modules are used to minimize construction waste and enhance the precision of the building process. This approach facilitates future expansion and reconfiguration, ensuring that the city can adapt to evolving needs. The city harnesses renewable energy sources, including solar, wind, and hydrogen, to power its operations. Smart grids and advanced energy management systems ensure efficient energy use, while water desalination and recycling systems provide a sustainable water supply. These technologies collectively create a high-tech, environmentally friendly urban environment.

Oxagon aims to be a hub for advanced manufacturing and logistics, leveraging autonomous vehicles, drones, and AI-driven systems for efficient operations. The city's strategic location near major shipping routes enhances its role as a global trade center. Automated systems streamline logistics and supply chain management, reducing costs and improving efficiency.

Maldives Floating City: A Paradigm of Climate-Resilient Urban Living

The Maldives Floating City, developed in collaboration with Dutch Docklands, is an innovative solution designed to address the challenges posed by climate change, particularly rising sea levels. Located near the Maldivian capital, Male, this project envisions a sustainable, floating community that coexists harmoniously with its natural surroundings.

The city is constructed on a series of floating islands interconnected by walkways and canals, creating a vibrant and dynamic urban landscape. Each island can house residential, commercial, and recreational facilities, offering a diverse and integrated living environment. The floating islands are designed to rise and fall with the tides, ensuring stability and safety for residents. Maldives Floating City prioritizes the use of eco-friendly materials and construction techniques. The buildings are constructed using lightweight, buoyant materials such as high-density polyethylene and composite wood, which are resistant to water damage

Maldives Floating City, Image courtesy: Popular Mechanics

and environmental degradation. The city incorporates green technologies such as solar panels and rainwater harvesting systems to support sustainable living.

The city integrates aquaculture and marine conservation initiatives, promoting a sustainable coexistence with the surrounding marine ecosystem. Floating gardens and green spaces enhance biodiversity and provide recreational areas for residents. Advanced waste management systems ensure that waste is recycled and repurposed, minimizing environmental impact. Designed to withstand rising sea levels and extreme weather conditions, Maldives Floating City provides a resilient living environment. The floating islands are anchored to the seabed using flexible mooring systems, allowing them to adapt to changing water levels and wave conditions. This ensures the safety and stability of the city in the face of climate change. Oceanix Busan, Oxagon, and Maldives Floating City represent bold and innovative approaches to urban development in response to the challenges of climate change and rapid urbanization. By integrating advanced technologies, sustainable practices, and resilient designs, these floating cities provide a blueprint for future urban living that is both adaptable and environmentally friendly.

These projects demonstrate that it is possible to create thriving, self-sufficient communities that coexist harmoniously with nature, setting a new standard for sustainable urban development. As climate change continues to impact cities worldwide, the lessons learned from these pioneering floating cities will be invaluable in shaping a resilient and sustainable future for urban living.

Building Resilience: The Advantages of Steel Framing in Disaster-Prone Areas

Natural disasters can pose a significant challenge to homes. Steel framing offers a robust and durable solution for building in these areas. One of the primary benefits of steel framing is its unmatched strength and durability. Steel is a much stronger material than wood, making it significantly better equipped to withstand powerful winds, earthquakes, and other natural disasters. Homes built with steel frames are far less likely to collapse or suffer major structural damage during a disaster. This translates to greater safety and peace of mind for homeowners in disaster-prone areas.

Steel frames are also resistant to termites, decay, fire, and water, providing long-lasting protection for your home. Unlike wood, steel will not warp, twist, or shrink over time. This means that your steel-framed home will maintain its structural integrity for many years to come, even in harsh environments. Steel framing is known for its precision and consistency, which minimizes waste and expedites construction. This translates to cost savings and faster project completion times. Additionally, steel is a recyclable material, making steel framing an environmentally friendly choice.

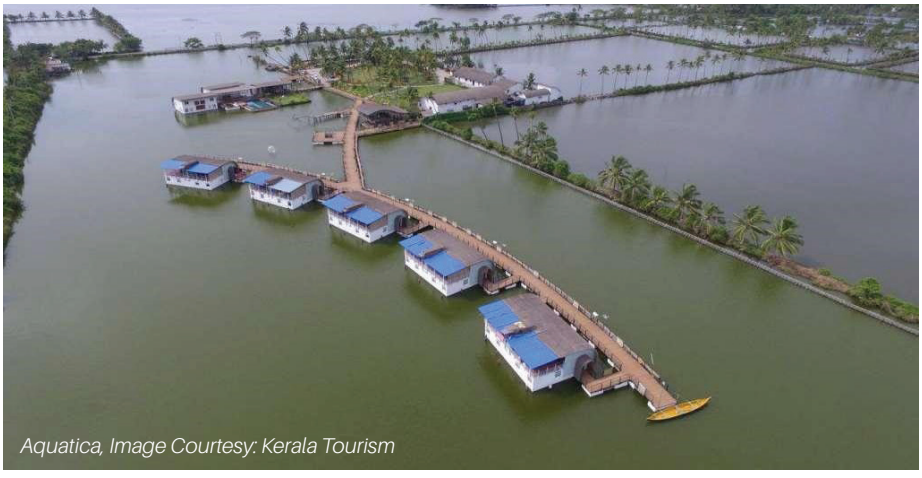
When compared to wood framing, steel framing offers greater design flexibility. Steel's strength allows for the creation of open floor plans and expansive windows, fostering a more modern and airier feel in your home.

Steel framed structures in disaster prone areas.

India's First Floating Resort - Aquatica

The innovative resort at the backwaters of Kumbalanghi, Kerala, not only marks India's first floating resort but also boasts the distinction of housing Asia's first floating infinity pool. A testament to architectural ingenuity and environmental stewardship, Aquatica stands as a proud achievement for Kochuthommen & Associates (KTA). The genesis of Aquatica emerged from a visionary client's ambition to develop a resort within his expansive 100-acre fish farm, where dry land was scarce. Facing the challenge of preserving the natural ecosystem and supporting local livelihoods, Kochuthommen Mathew and his team opted for a floating design. This decision not only minimized environmental impact but also offered guests unparalleled views of Kumbalanghi's picturesque backwaters.

Set on five floating structures housing ten exclusive cottages, the resort features luxurious amenities including a health club, spa, multi-cuisine restaurant, and a lounge bar. The highlight, however, remains the movable floating infinity pool- an architectural marvel that allows guests to



Aquatica, Image Courtesy: Kerala Tourism

enjoy panoramic views while floating gently on the water. Each floating unit at Aquatica is modular and detachable, ensuring flexibility for future expansions and adaptations. The construction process involved meticulous planning, starting with a dry dock base and utilizing innovative sinking techniques to set the modules afloat.

The resort's design emphasizes interaction with water, with living areas floating above the surface, submerged bedrooms below water level, and viewing decks offering stunning vistas of the surroundings. This thoughtful arrangement allows guests to witness sunrise and sunset from unique vantage points, enhancing their connection with Kerala's natural beauty. By embracing the challenges of limited land availability and fragile ecosystems, Kochuthommen & Associates have created not just a resort, but a sanctuary where guests can reconnect with nature while enjoying unparalleled comfort and luxury.

Ask the **Expert**

Ar. Kochuthommen Mathew
Kochuthomen & Associates
Tel: +91 97421 10007

Oxford-educated architect, leads global projects with a focus on merging international expertise with local insights. His work spans hospitality, residential, and commercial sectors, driving initiatives like "Kochi Meet Cochin" for urban enhancement and community welfare.

Q. As advancements in materials science continue, what potential do you see for novel steel alloys or 3D printed steel structures to revolutionize the construction industry? What challenges would need to be addressed for wider adoption?

When contemplating construction, our minds often gravitate towards traditional methods and the plethora of materials available in the market. However, these conventional approaches come with their own set of challenges, including limited structural strength, susceptibility to corrosion, prolonged construction timelines, and elevated costs for both materials and labour. Moreover, the potential for human errors during construction further compounds these issues.

In response to these challenges, the construction industry is witnessing a paradigm shift propelled by the integration of novel steel alloys and 3D printing technology. These innovations hold the promise of revolutionizing the sector by addressing longstanding limitations and introducing a new era of efficiency and durability.

Novel steel alloys, characterized by their enhanced tensile and yield strength, are ideally suited for large modern structures that demand superior performance. Their utilization promises not only heightened structural integrity but also the potential for cost savings through reduced material usage and construction time. However, their adoption necessitates specialized welding procedures and careful consideration of challenges related to joining dissimilar materials.

Similarly, 3D-printed steel structures offer a myriad of advantages, including advanced design possibilities, reduced production costs, and minimal material waste. The technology's ability to fabricate complex and sustainable metal structures in a fraction of the time compared to traditional methods is particularly noteworthy. Nonetheless, the widespread implementation of 3D-printed steel structures requires advancements in printing technology to ensure structural integrity and the establishment of industry-wide standards for quality control and certification.

In conclusion, the advancement of novel steel alloys and 3D printing technology represents a transformative leap for the construction industry. By enhancing efficiency, bolstering structural strength, and mitigating human errors, these innovations hold the potential to redefine construction practices for the better. However, realizing this potential will necessitate ongoing research, collaboration, and adaptation to overcome the inherent challenges associated with their adoption.

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for **Metrolla Steels Pvt. Ltd.**, Muvattupuzha, Ph: 9447 065360, www.metconindia.com