# The Architecture of Defying Gravity

## An Exploration of Future Environments that Focuses on the Poetics, Innovation, and Potential of Airborne Architecture

**future environments**
**gravity defiant**
**airborne architecture**
**sustainable futurism**

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Citation: Kachaamy, G. (2024). "The Architecture of defying gravity", UOU scientific journal #08, 132-143.

ISSN: 2697-1518. https://doi.org/10.14198/UOU.2024.8.13


Article Received: 06/10/2024
Received in revised form: 28/10/2024
Accepted: 28/10/2024

The evolution of architecture is a narrative of humanity's enduring aspiration to transcend the constraints of physical and environmental limitations. In the 21st century, this timeless pursuit has been reimagined through the innovative paradigm of Airborne Architecture, epitomized through the research of Gravity Defiant Architecture (GDA). This article delves into the origins, foundational principles, and transformative potential of GDA, with particular emphasis on the Rising Oases Saga - an ambitious project that exemplifies the poetic and revolutionary possibilities of architecture that defies gravity. By integrating a thorough literature review, in-depth case studies, and rigorous theoretical analysis, this article positions GDA within the broader continuum of architectural evolution, exploring its implications for sustainability, resilience, and ethical design. Ultimately, it proposes a radical vision of architecture that not only redefines the built environment but also fosters a profound harmony with the natural world.

## INTRODUCTION

From the dawn of civilization, the skies have served as a source of inspiration, embodying the unattainable and the divine. The celestial bodies - sun, moon, and stars - have long been revered, symbolizing the mysteries of the universe and the eternal quest for knowledge and transcendence. This fascination with the heavens has permeated every aspect of human culture, influencing mythology, religion, art, and, notably, architecture. Throughout history, architecture has been more than a mere response to functional needs; it has been an expression of humanity's desire to reach beyond the earthly and to connect with the skies. Tall buildings, whether religious or secular, have been culturally perceived as iconic landmarks and powerful symbols of authority and dominance (Dobraszczyk 2019, 108-110), embodying both spiritual ambition and societal influence. GDA also known as Airborne Architecture (Fig 1), emerges as an ambitious response to this ancient yearning and challenges conventional notions of architecture by proposing structures that defy gravity, floating, hovering, and ascending into the sky. This article covers the philosophical and practical implications of GDA, and focuses on the case of Rising Oases Saga, a project that creates prototypes in order to bring this radical and innovative architecture closer to a tangible reality.

## THE THEORETICAL AND HISTORICAL BACKDROP OF GRAVITY DEFIANT ARCHITECTURE

The idea of defying gravity in architecture is deeply rooted in historical and cultural narratives. The exploration of verticality has been a central theme in architectural design reflecting humanity's enduring desire to reach beyond earthly constraints. This ambition, driven by technological advances and cultural aspirations, has not only shaped architectural endeavours but has also been reflected in other fields such as literature, art, engineering, and various scientific pursuits, illustrating a longstanding fascination with transcending the limits of what might look unfeasible Frampton 2007, 315-318). Throughout human history, celestial bodies appearing in the skies - mysterious and weightless - have been sources of adoration, admiration, inspiration, and aspiration. These heavenly objects have sparked a profound sense of wonder and a persistent aspiration to conquer the skies. This fascination with the celestial is evident across various cultures and eras, where the desire to levitate, fly, or transcend earthly limits is a common thread. One of the earliest and most significant figures in the history of human flight is Abbas Ibn Firnas (Fig.2), who is often credited as the first aviator. His experiments in the 9th century with gliding and attempted flight mark a crucial moment in the ongoing human quest to defy gravity. Ibn Firnas's pioneering spirit laid the groundwork for subsequent explorations into aviation and the possibilities of overcoming gravity (Anderson, 2024, 122–152).

The theme of levitation and anti-gravity has also been richly explored in literature, where authors have imagined technologies and worlds free from the constraints of gravity. H.G. Wells's First Men in the Moon introduces the concept of "Cavorite," a fictional material that negates gravity, enabling space travel (James, 2012, 125–156). Similarly, James Blish's Cities in Flight series explores the idea of "spindizzy" technology, allowing entire cities to break free from their terrestrial anchors and move through space. These literary works, alongside others such as the "Laputa Flying Island" from Jonathan Swift's Gulliver's Travels (Fig.3) and the "Minerva Balloon" depicted in Etienne-Gaspard Robert's 1820 novel, eloquently embody the human aspiration to surpass the confines of physical limitations. This theme resonates deeply with the principles of GDA.

Fig.1 – "GDA" soaring above a natural context, a render by @gravitydefiantarchitecture.



Fig.2 – "Abbas Ibn Firnas" Mock-up at Ibn Battuta Mall in Dubai, United Arab Emirates.

Historically, the desire to overcome the constraints of gravity can be observed as early as the construction of the Gothic cathedrals. With their pointed arches, ribbed vaults, and flying buttresses, these cathedrals were designed to reach toward the heavens. These architectural elements were not merely technical innovations; they were also profound symbolic gestures designed to elevate the spiritual experience by directing the eyes - and the soul - upwards. As earthly dwellings of the Divine, Gothic cathedrals were intended to embody an otherworldly presence, achieved through their statuary, stained glass, and sheer scale, as well as their calculated transcendence of earthly limitations through architectural form (Trachtenberg and Hyman, 2002, pp. 223-227). This pursuit of verticality is exemplified by the soaring heights of structures like Notre Dame de Paris, which employed innovative techniques to achieve an ethereal sense of lightness within their massive stone facades.

A particularly compelling example of the architectural aspiration to create the illusion of defying gravity is evident in the domes of Renaissance and Baroque churches. Architects of these eras adeptly employed light as a medium to evoke a sense of weightlessness within their designs. These domes, spanning expansive spaces and ascending to great heights, were ingeniously crafted

Fig.3 – "Laputa Flying Island" (Left) and "Cloud Nine" (Right).

to appear as if they floated above the spaces below. This effect was achieved through the strategic incorporation of a ring of windows at the base of the domes, which permitted light to permeate the interior, creating an ethereal glow that gave the impression of the dome hovering effortlessly in mid-air. Filippo Brunelleschi's work, particularly his design of the dome for Florence Cathedral, employed innovative techniques to create an elevated, seemingly suspended form, challenging the structural limitations of his time. Brunelleschi's pioneering use of a double-shell construction and a herringbone brick pattern allowed for a more efficient distribution of weight, enabling the dome to soar prominently above the city and be visible from a great distance (King, 2000, pp. 160-167). This invention represented a groundbreaking advancement in architectural technology, as it facilitated the construction of a dome of unprecedented scale and complexity.

As Alberti noted, the dome appeared to rise "above the skies, ample enough to cover with its shadow all the Tuscan people" (Trachtenberg and Hyman, 2002, pp. 277-280). This represented a significant advancement in architectural design, foreshadowing later efforts to achieve structural lightness and verticality. The play of light and shadow, combined with the architectural mastery of these domes, served as early explorations into the possibility of creating structures that appear to defy the limitations of gravity - an idea that resonates deeply with the principles of GDA.

With the advent of modernism, the 20th century brought a paradigm shift in architectural thinking. Le Corbusier, whose concept of pilotis exemplified in the Villa Savoye, revolutionized the architectural design and allowed buildings to "float" above the landscape. The liberation of the ground has fostered a new sense of spatial openness by allowing the natural landscape or traffic to flow without any interruption underneath the structure (Curtis 1996, 175-178). This approach correlates with GDA principles that seek to transcend the conventional architectural limitations and suggest structures that are completely detached from the ground.

The common vision of reducing the physical footprint of buildings in order to preserve the ground for nature and public spaces can be observed in both Le Corbusier's pilotis and GDA. While the usage of pilotis in le Corbusier's work aimed at achieving a visual lightness and functional liberation of the ground, GDA evolve this idea into a more radical outcome that envisions architecture freely floating in the air. This freedom from being bounded by gravity maximizes spatial flexibility and environmental harmony.

In the mid-20th century, Buckminster Fuller explored the concept of structures that float in the air. He was considered a pioneering figure in the development of structures that span large spaces without internal supports. His invention of the geodesic dome, represented a significant advancement in the quest for architectural lightness and efficiency. The geodesic dome's hemispherical shape, composed of interlocking triangles, distributed structural stress evenly, making it one of the most efficient structures in terms of material use versus enclosed volume. In collaboration with Shoji Sadao, Fuller further expanded the possibilities of Airborne Architecture with the "Cloud Nine" project (Fig.3). The project envisioned floating habitats

Fig.4 – "The Museum of Tomorrow" by Santiago Calatrava, Photo by Rodrigo Menezes.



consisting of enormous geodesic tensegrity spheres, each with a diameter of 1.6 km (1 mile) and capable of housing autonomous communities of several thousand people. Fuller proposed that these sky cities could drift at chosen altitudes, allowing their inhabitants to view the world from above or even migrate to different locations (Baldwin, 1997, p. 190). Another visionary architect known for his avant-garde ideas, particularly in the realm of futuristic architecture, was Georgii Krutikov. His project "The Flying City" envisioned a utopian airborne structure suspended in the air as a solution to the spatial constraints of urbanization. For him placing buildings in the sky was to enable the land to then be cultivated (Maksel, 2016). Yona Friedman's unrealized theoretical construct, "Ville Spatiale" proposed a framework of a second city, as high as 20 meters, on top of an existing one. The layout of each level would not occupy more than fifty percent of the overall structure to provide proper ventilation and light to each residence and to the city below (Cline and Carlo, 2002, p. 40).

In the late 20th and early 21st centuries, architectural endeavours have become increasingly ambitious in their attempts to appear to defy gravity. Santiago Calatrava's Museum of Tomorrow in Rio de Janeiro (Fig.4) exemplifies this trend with its striking 75-meter overhang, achieving a sense of weightlessness through a cantilevered design. Similarly, Richard Rogers's Cantilevered Gallery, Makoto Sei Watanabe's K-Museum, and Ithra's The Link - a panoramic sky concourse connecting the two towers of One Za'abeel in Dubai (Fig.5) - demonstrate the potential of architecture to challenge conventional structural norms. Notably, The Link features the world's longest cantilever, an awe-inspiring structure that floats 100 meters above the ground, further pushing the boundaries of architectural innovation in terms of structural lightness and suspension. Other contemporary architects, such as Kazuyo Sejima, have also contributed to this dialogue with the Serpentine Gallery Pavilion, where she employed slender structural pillars that almost disappear, making the roof seem as though it is hovering effortlessly above the space below.

Another well-established Japanese architect who is known for his "surreal animated movie feel" designs, is Terunobu Fujimori. His design for the "Flying Mud Boat," can be perceived as a case study for architecture that is elevated off the ground (Hudson, 2012).

Many contemporary architects have attempted to visually eliminate the presence of pillars in their projects. Norman Foster's more recent work, particularly his design for the roof of Apple Park's Steve Jobs Theatre, eliminates all visible pillars, creating the effect of a hovering floating roof. Such projects collectively reflect the evolution of architectural practice towards creating structures that are visually and conceptually aligned with the principles of GDA and its pursuit of architectural forms that challenge gravity.

Similarly, Lebbeus Woods, who was one of the most innovative and visionary architects of the contemporary era, challenged traditional confines of architectural practice by imagining a world unconstrained by conventional boundaries. His Geomagnetic Flying Machines visually made manifest his exploration of "what the world would be like if we were free of conventional limits." As Woods articulated, he aimed to illustrate what could be possible if we chose to live by a different set of rules. His experimental approach aligns with

Fig.5 – "The Link" of One Za'abeel, a render by Ithra Dubai, United Arab Emirates.

the principles of GDA, envisioning architectural structures liberated from the earth's surface, further pushing the boundaries of what architecture might aspire to achieve.

## THE RISING OASES SAGA: BRINGING INNOVATIVE ARCHITECTURE TO LIFE

This paper discusses the Rising Oases Saga (Fig.6) that sketches out a possible future in which there are “platforms inside the city where humans can unwire themselves from their daily restraints” (Monks, 2019). The project was first conceived in 2007 at the University of Tokyo. It has evolved to be regarded as pioneering ongoing research into GDA (Alsammarae, 2019). The Rising Oases consist of sanctuaries of well-being, ethereal retreats that float above their context, offering a refuge from the frenetic pace of urban life. The aim is to allow visitors to reconnect with nature and find inner tranquility. Unlike traditional buildings, the Rising Oases are not grounded in the earth; but are aerial retreats, floating above the cityscape or the natural landscape. The project, proposes a model where architecture coexists with, rather than dominates, it's environments.

Since 2018 the Rising Oases have been exhibited in various forums from Venice to Dubai (Fig.7). The most notable prototype - the River Prototype - showcased at the Dubai Design Week in 2019. This project garnered international attention, including coverage by CNN, for its innovative approach to architecture (Monks, 2019). The Spring Prototype was one of the earliest publicly exhibited models advocating for the architectural discipline to defy gravity and ascend, urging it to advance in line with the technological and conceptual innovations of the current era (GAA 2018, 372-373).

The Rising Oases symbolise a proposal for a new way of living, where humanity's creations float above the earth, leaving the ground free for nature to reclaim. This initiative aligns with broader trends in sustainable futurism, advocating for reduced land consumption and minimizing environmental impact. Advancements in any field of study are dynamic and continually evolving through an iterative process of exploration and refinement. Although GDA aspires to defy gravity, it remains bound by the progression of time and technological innovation. The primary challenge of the research was to conceptualize and develop a fully self-sustaining architectural form that liberates itself from the earth and achieves equilibrium in the air. Historically, the application of such avant-garde concepts was impeded primarily by technological limitations. However, recent technological advancements have shifted this paradigm, enabling the exploration of GDA in unprecedented ways. The findings from this research indicate that, though many factors play significant roles, the stability and success of Airborne Architecture hinge on three interrelated components: design, technology, and materiality. Beyond the architectural composition and form, a crucial aspect is achieving equilibrium by managing the interplay between dead load (the intrinsic weight of the structure) and live load (the dynamic weight it must support). This necessitates the use of lightweight materials that maintain structural integrity while being robust enough to support the architecture's levitation. Thus, the materials and technologies employed must be sufficiently advanced to counteract the weight and allow the structure to float. Several practical concerns arose during the development process, such as ensuring accessibility to floating platforms, efficient water distribution, and

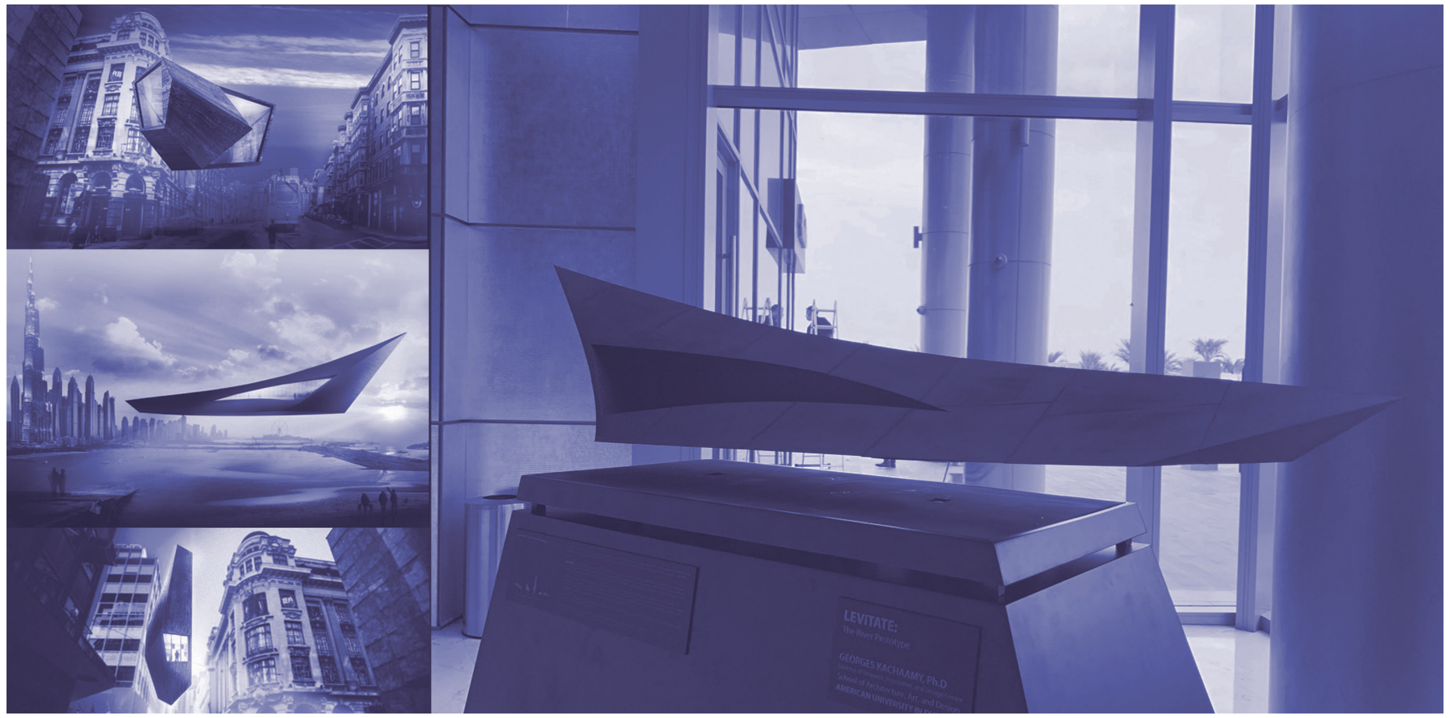

Fig.6 – “The Rising Oases Saga” (Spring, River, and Waterfall Prototypes) photo by Georges Kachaamy.



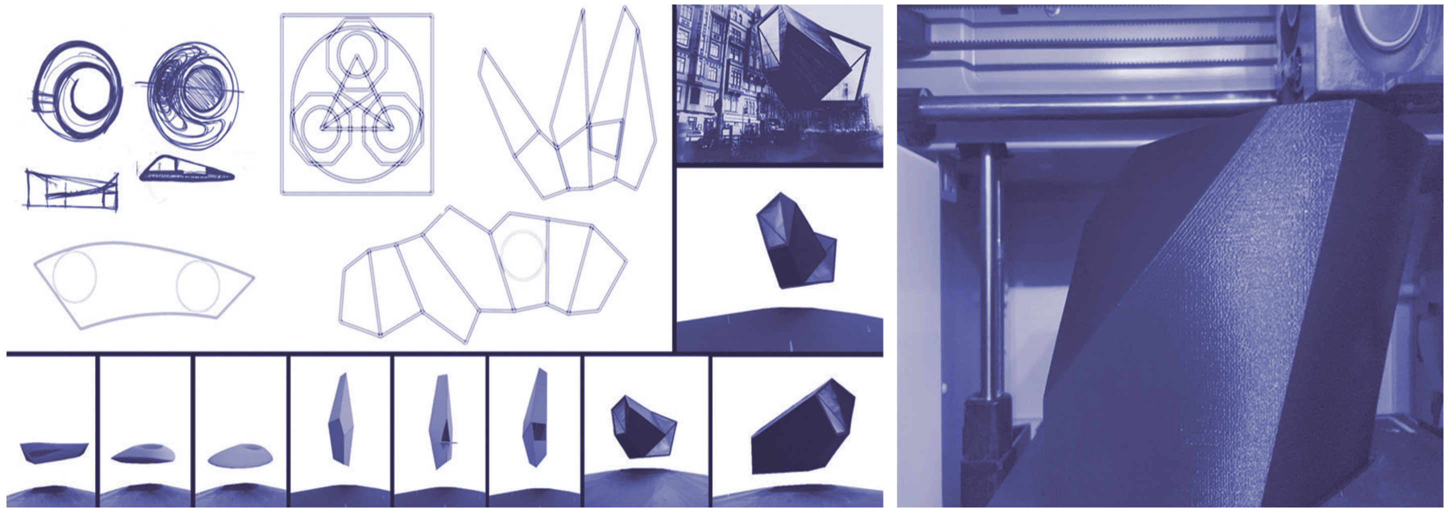

Fig.8 – Design Process & Iterations (Left) and 3D-Printed Material of the Prototypes (Right).

wastewater drainage. These were seen not as insurmountable obstacles but as stimulating challenges to be creatively addressed. Key aspects essential to the successful realization of GDA, which are deeply interconnected, include the following:

Technology: Various technologies are under consideration to achieve levitation, including electromagnetic suspension, superconductivity, and unmanned aerial vehicle (UAV) systems. The technologies at hand relates to existing applications such as but not limited to maglev trains or UAVs that can maintain stability in the air without any human intervention. Of course, with the advancement of these types of technologies the capacities to levitate larger and heavier structures will improve. The current research has utilized electromagnetic levitation devices for its prototypes that are known by “Octo88” that allows levitation of 88 mm and up to a weight of10 Kg.

Design: The form, function, and structural elements are fundamental to creating a self-sufficient architectural entity that achieves both aesthetic and functional balance in the air. The design must integrate principles that allow for levitation while maintaining the desired aesthetic and operational effectiveness (Fig.8).

Size: The scale of the project determines the type and feasibility of the architecture. It directly influences the overall weight of the structure and, consequently, the strength and type of technology required to achieve levitation. Early prototypes were developed on a miniature scale, measuring approximately 10 centimeters (4 inches) in length and weighing around 20 grams. Over time, these prototypes have been progressively scaled up. The most recently exhibited model that occurred just before Covid measured nearly 2 meters (7 feet) in length and weighed 2000 grams. Future iterations aim to further increase in size and scale, potentially utilizing different technologies to accommodate the additional dimensions.

Materiality: The search for suitable materials is critical, focusing on those that are light yet rigid enough to withstand both natural forces and human use. Material choice directly impacts the visual appearance, structural weight, and overall integrity of the project, determining how minimal the architectural elements can be while still ensuring stability. The research has explored a range of materials, beginning with paper and cardboard, progressing to 3D-printed ultra-light plastic filaments (Fig.8), and currently experimenting with carbon fiber, known for its strength-to-weight ratio and rigidity.

Weight: The balance between dead load and live load is crucial for determining the feasibility of the structure to float. The dead load includes the intrinsic weight of the structure, while the live load


Fig.7 – The Spring Prototype Exhibition in Venice (Top) and The River Prototype Exhibition in Dubai (Bottom).

Fig.9 – "The Rising Oases Saga" (Waterfall Prototype) Exhibition in the Virtual Realm.

refers to the dynamic weight it must support. This balance directly affects the plausibility of maintaining altitude and the hovering height that the structure can achieve, given the available technological capabilities.

While the aforementioned elements are not exhaustive, they are among the most critical factors influencing the development of GDA. These factors are inherently interconnected and interdependent, requiring a holistic approach. The architect, in this context, assumes the role of a researcher who synthesizes these various elements, guiding the project toward equilibrium, and ultimately enabling the structure to become airborne.

Through iterative experimentation, diverse materials have been explored, beginning with paper and cardboard, progressing to 3D-printed ultra-light plastics, and the work is currently focusing on carbon fiber for its superior strength, rigidity, and lightweight properties. This ongoing process illustrates the continuous evolution required to achieve the ambitious objectives of GDA.

In 2020 and 2021, as part of the ongoing "Rising Oases Saga," the "Waterfall Prototype" (Fig.9) advanced into the virtual realm by employing immersive technologies to enable users to experience GDA at a full-scale, 1:1 model. This innovative step utilized virtual platforms such as Sansar and was exhibited at Palazzo Mora during the Venice 2021 Architecture Biennale to reflect the potential and significance of immersive experiences for engaging with airborne structures (ECC 2021, 124-125). Virtual Reality (VR) and Augmented Reality (AR) offer a unique advantage in simulating GDA by allowing gravity to be effectively neutralized, thus providing users with a realistic sense of how they might interact with such spaces in the physical world. These technological tools are significant in the way that they can test and visualize spatial dynamics and user experiences within a gravity-defiant environment. In this context the use of VR and AR has demonstrated the technological possibilities for future architectural endeavours and has highlighted the importance of virtual environments as experimental grounds for innovative architecture that challenges conventional limitations usually imposed by gravity.

These digital tools and immersive technologies facilitate new understandings of architectural space and prepare designers and users for a future where GDA structures may become viable. The virtual representation of the "Waterfall Prototype" served as a simulation model, and offered insights into the functional, aesthetic, and experiential qualities of GDA, and by that furthered the discourse on how technology can transform architectural design, representation, and experience.

## ENVIRONMENTAL STEWARDSHIP AND ETHICAL IMPERATIVE IN AIRBORNE ARCHITECTURE

One of the captivating aspects of Airborne Architecture lies in its potential to address the pressing environmental challenges of our time. Paul Dobraszczyk, in his book "Future Cities: Architecture and the Imagination," offers an exploration of the "Flood" scenario where rising sea levels, due to the melting of polar ice, herald a future that is shaped by dystopian events. Certainly, the concept of a "great"

Fig.10 – "GDA" soaring above a natural context, render by @gravitydefiantarchitecture.



flood is not novel and has populated human history through legends, myths, and stories, making it part of our collective consciousness. Specifically, in his section titled "Unmoored Cities," he changes the focus from mere mitigation to adaptation where he suggested ways in which urban environments might acclimatise to this existential threat of climate change. He identifies three strategies: the drowned, the floating, and the airborne that aligns closely with the principles and aspirations of GDA. He then further elaborates on the airborne scenario in the works of Tomás Saraceno and its significance in representing what a city in the sky might look like, and how one might live in them (Dobraszczyk 2019, 77-104). In addition, deforestation, loss of biodiversity, and the degradation of natural habitats in the 21st century has foregrounded the consequences of unchecked urbanisation. When liberating buildings from the ground, GDA reduces the physical footprint of urban development, which might act to preserve valuable ecosystems by minimizing human encroachment on natural habitats (Fig.10).

Aligned with the principles of environmental stewardship, this approach advocates for a built environment that exists in harmony with the earth's ecosystems. Furthermore, it promotes qualities essential to biophilic cities by facilitating the creation of additional green spaces within urban environments, and by contributing to the connection between human habitation and nature. These qualities could play an important role in developing biodiversity, improving air quality, and enhancing both mental and physical well-being, which are fundamental for building resilience and sustainable urban areas that prioritize human-nature interaction (Beatley 2010, 45-53).

Many studies have demonstrated that reduction of carbon emission in architecture can occur through the minimization of land use and the incorporation of renewable energy sources such as solar panels, and wind turbines. According to the "Global Status Report for Buildings and Construction 2019," by the International Energy Agency's (IEA), the buildings and construction sector was responsible for 39% of global energy and process-related $CO_2$ emissions. Through energy efficiency, renewable energy integration, and reduced material use, sustainable architectural practices can minimize environmental impact. The report promotes the pressing need for the decarbonization of the building sector, which requires adopting policies and technologies that promote sustainable architectural designs.

GDA promotes airborne development that plays a role in decreasing the physical footprint of buildings and the efficient usage of land which often requires significant energy and resources to construct and maintain. As a result, the restoration of natural habitats could foster ecological resilience and offer a platform for biodiversity enhancement.

Moreover, to enhance the environmental credentials of GDA and demonstrate its commitment to sustainable futurism, solar cladding panels, wind turbines, and other renewable energy systems can be seamlessly incorporated into the design to ensure that they would operate with minimal carbon emissions.

## DURABILITY, FLEXIBILITY, AND VERSATILITY IN GDA

One of the advantages of GDA lies in its resilience, particularly, in mitigating the impacts of natural disasters. Earthquakes, floods, and rising sea levels, can easily affect buildings that are traditionally anchored to the ground. This can compromise the structural integrity of a building, lead to catastrophic failures and by that a significant loss of life. Accordingly, when structures are detached from the earth, they are less affected by these ground-based forces, and they potentially can provide a safer alternative in populated urban areas that are susceptible to these disasters. Structures that hover above the ground could be designed to endure natural hazards in an effective manner, to minimize property damage and reduce the risk to human life.

The flexibility and adaptability of structures that are not bound to the ground offer more possibilities for urban design, planning, and development in ways that conventional static architecture cannot. GDA allows the dynamic and responsive use of urban spaces. Due to its mobile nature, it can be relocated and repurposed according to the needs of the city (Fig.11).

Fig.11 – "GDA" soaring above a dense urban context, a render by @gravitydefiantarchitecture.

Fig.12 – "GDA" axonometric section with isolated technical zones by @gravitydefiantarchitecture.

The value of this flexibility and adaptability can be mostly used in rapidly urbanizing areas or regions facing disasters or uncertainties such as climate change, where the importance to adjust spatial configurations, in response to socio-economical or environmental changes are crucial.

The concept of GDA is not without its challenges. Maintaining stability and balance in the face of high winds, storms, or others weather related incidences, could bring engineering and technological challenges. The requirements to ensure the safety and stability of such structures under environmental conditions would need to be highly advanced, and would require interdisciplinary disciplinary collaboration between architecture, engineering, aerodynamics, artificial intelligence, and even materials science. Also, from an economical perspective, underdeveloped regions might not be able to afford the production and maintenance of such structures hindering both their feasibility and accessibility. Accordingly, while ground-based vulnerability can be avoided by GDA other technological, economic, and logistical constraints might limit its progress and therefore must be addressed. There might be further challenges when it comes to implementation; social and cultural implications of living in these spaces could include psychological impacts or cause disruptions on established communal bonds. In addition, the possible energy consumption of these structures might also have a negative impact on the environment.

## THE PATH FORWARD: CHALLENGES AND FUTURE DIRECTIONS

While there are many compelling benefits of GDA, probably the most technologically challenging aspect is its implementation for larger scale projects. The construction and development of these flying structures would need investments in advanced technologies, materials, and infrastructures, just to state few. In addition, the continued maintenance and operation, specifically when mobile, of these structures would incur costs, energy consumption, and the constant monitoring of environmental and safety measures. Even in situations where these structures were static, they would still need to overcome engineering challenges of structural integrity, material limitation, energy efficiency, and of course aerodynamics when hovering in place. Emerging technologies could play a crucial role in addressing these challenges. For instance, in lightweight materials, the new developments in carbon fibre composite could provide the necessary lightweighted and structurally stable shell for GDA. Advancements in AI could also play a fundamental part in maintaining the stability of GDA when in mid-air.

Another challenge is the impact of certain technologies on human health, both physically and psychologically. For example, the usage of levitation technologies, such as, but not limited to, electromagnetic fields may be harmful to the human body. Solutions therefore would need to be found such as creating isolated technical zones that would functionally serve the levitation purpose of GDA and at the same time avoid causing any physical damage to the occupant (Fig.12). Research would also be needed into the human experience of these aerial environments to study the psychological effect of airborne societies inhabiting GDA. Other aspects related to social and economic implications would need to be considered specifically when it comes to integration into an existing urban fabric. These integrations would need innovative solutions to land use policies and its allocated air space above. Road and transport regulations would also need to be revised to include the safe and secure movement of these structures. There could also be challenges around access and equity.

There is no doubt that many challenges would need to be investigated and studied in order to ensure an adequate framework and infrastructure for these airborne habitats. For GDA to meet the needs and aspirations of diverse communities including the future airborne societies, the involvement of all stakeholders and policymakers across many disciplines would be necessary to ensure the feasibility and sustainability of these future environments.



## EMBRACING THE VISION OF GRAVITY DEFIANT DESIGN

As we contemplate future environments, GDA and the Rising Oases Saga offer a glimpse of what might be possible when we dare to dream beyond the constraints of the ground. These innovative concepts challenge us to rethink the very nature of architecture, pushing us to explore new heights - literally and figuratively. In doing so, they open up a new horizon for architecture, one where our buildings no longer dominate the earth but coexist with it in a delicate balance (Fig.13). GDA with its emphasis on sustainability, resilience, and artistic freedom, represents more than just a technical or aesthetic innovation; it is a philosophical statement about the role of architecture in the modern world. It asks us to consider how we can build in ways that respect our planet, nurture our communities, and inspire future generations.

As a last thought, architecture throughout its evolution has crawled out of caves, settled on grounds, surfaced on water, climbed on pilotis and danced (GAA 2018, 372-373). It has even cantilevered into the air, yet it has never taken flight. The time has come to populate the skies, liberate the ground, and restore nature to its rightful place on our planet. In the end, GDA must not be looked upon as merely a vision of the future; it must be considered as a call of action for architects, engineers, explorers, and thinkers to embrace the possibilities of a world where our environments can take flight. As we embark on the challenges and opportunities of this century, GDA takes a bold and inspiring vision of what our cities could become.

Fig.13 – "GDA" soaring above a natural context, a render by @gravitydefiantarchitecture.

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