

Integration of Biophilic Design Principles in Urban Planning, Analysing Zoning Ordinances and Land-Use Regulations in Hong Kong

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Figure 1 (M. Deackelis, n.d.)

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1. Summary

This thesis explores the integration of biophilic design into urban planning, with a specific focus on Hong Kong—a city characterized by high population density, limited land availability, and significant environmental challenges. Biophilic design, grounded in the biophilia hypothesis, advocates for the incorporation of natural elements into urban environments to enhance human well-being and promote ecological sustainability. Despite its recognized benefits, the implementation of biophilic principles within urban policies and zoning ordinances remains underdeveloped, particularly in densely populated cities like Hong Kong, where space is at a premium and economic pressures dominate planning decisions.

The research seeks to understand how biophilic design can be effectively integrated into Hong Kong's spatial planning framework. It investigates the role of zoning tools, land-use regulations, and policy directives in facilitating biophilic urbanism, while also addressing the socio-economic and environmental challenges that complicate its adoption. Employing a qualitative methodology grounded in social constructivism, the study analyses the perspectives of urban planners and policymakers through interviews, focusing on their interpretation and application of biophilic principles in urban planning.

Key findings of the research reveal significant barriers to the widespread adoption of biophilic design in Hong Kong. The rigidity of existing zoning ordinances, which are often not designed to accommodate the flexibility required for biophilic urbanism, emerges as a major challenge. The study suggests that a shift towards performance zoning—where environmental outcomes are prioritized over prescriptive zoning categories—could offer a solution. This approach would allow urban planners to tailor zoning codes that incentivize the inclusion of green infrastructure, such as green roofs and public green spaces, in new developments.

Another critical challenge identified is the lack of clear policy support for biophilic design. While there is growing recognition of the benefits of incorporating nature into urban settings, the absence of comprehensive policy frameworks and guidelines hinders its implementation. The research recommends that policymakers develop targeted policies that prioritize biophilic design, incorporating specific incentives for developers to include biophilic elements in their projects. These policies should also address the economic realities of Hong Kong, where high land and development costs may deter the adoption of biophilic practices.

Community engagement is highlighted as an essential component for successful biophilic urbanism. The research finds that raising public awareness about the benefits of biophilic design and involving residents in the planning process are crucial for building support for biophilic initiatives. Such engagement not only fosters community buy-in but also ensures that biophilic projects are aligned with the needs and desires of the local population. This approach could lead to more effective and sustainable outcomes in urban development.

The thesis concludes by proposing a conceptual model for integrating biophilic design into urban planning practices in Hong Kong. This model advocates for a multi-scale approach to biophilic urbanism, recognizing that biophilic elements can be implemented at the building, street, and city levels. It also emphasizes the need for a holistic and interdisciplinary approach, involving collaboration among urban planners, architects, policymakers, and the community. By adopting this model, Hong Kong can overcome the challenges of limited land and high density to create a more sustainable and liveable urban environment.

In summary, this research contributes to the broader discourse on sustainable urban development by providing a detailed case study of biophilic urbanism in Hong Kong. It offers valuable insights into the

challenges and opportunities of integrating biophilic design into urban planning, and provides practical recommendations for policymakers and urban planners. The findings are relevant not only to Hong Kong but also to other cities facing similar challenges, making this thesis a useful resource for those in the field of urban planning and sustainability.

2. Introduction

The world population is expected to reach 8.5 billion people in 2030. Just 20 years later in the year 2050 it is forecasted to be 9.7 billion people (United Nations, n.d.), 68% of them will be living in urban areas (United Nations, 2018). This comes down to approximately 6.6 billion people being nested in urban areas. In order to keep urban areas especially cities liveable it is important to plan a decade at minimum ahead. The importance of planning ahead is essential to ensure the quality of living in cities. Achieving this quality requires active and mindful spatial planning practices. The collateral damage that comes with this population growth, is the increasing footprint of villages, towns and cities. Forests, plains and grasslands need to make way for the concrete jungle that comes with urbanization. It is proven that green spaces boost the overall well-being, including physical and mental health of humans (Kondo et al., 2018; Wilson, 2017). These urban green spaces have a positive effect on human well-being and their physical activity (Kondo et al., 2018). The incorporation of green spaces in cities is not new, with the rise of new urbanism movements the incorporation of green spaces has become a new form of spatial planning called biophilic spatial planning. This form of spatial planning has been mentioned by Beatley (2011). It addresses the need for the incorporation natural elements in cities. This form of spatial planning focuses on the connection to nature, well-being and sustainability. Biophilic planning brings new perspectives on how natural systems need to be adopted into spatial planning. A biophilic city is a city that puts nature first in its design, planning and management (Haas & Olsson, 2014, p. 22). A biophilic city embodies biodiversity, abundant in natural elements where residents engage with and appreciate nature in their daily lives (Haas & Olsson, 2014). This encompasses a spectrum of natural entities, ranging from tree-top lichens, invertebrates, and microorganisms to prominent ecological features that shape a city's identity. Biophilic cities value and preserve existing natural resources within and around urban areas, while also actively working towards restoring degraded environments and incorporating new natural elements into architectural and infrastructural designs. The integration of nature into urban settings extends beyond physical contact to include symbolic representations and designs that evoke natural forms (Haas & Olsson, 2014, p. 22).

Biophilic spatial planning is new and upcoming trend in urban planning and there for not much is known about how urban planners and policymakers interpret and integrate biophilia in cities. This is because there is limited knowledge on the benefits of implementing biophilic principles into planning regulations. Moreover, when urban planners and policymakers attempt to implement biophilic design principles into zoning and planning regulations certain challenges might emerge. These challenges consist of the lack of knowledge on how to implement more biophilic design elements, but also the absence of correct zoning ordinances and land-use regulations. Urban planners and policymakers are not the only organs which steer spatial planning in a certain way. The communities of people living in the cities also influence urban planners and policymakers in their decisions. There is limited knowledge on how urban planners and policymakers promote community buy-in and how they form collaborations with stakeholders in the development and implementation of biophilic zoning regulations.

The elements above will be discussed in this thesis. This thesis will analyse the implementation of biophilic design and how these principles and challenges are perceived and implemented in the city of Hong Kong. In Hong Kong where land-values are high because of high density population (Jim & Chan, 2016) it is essential to have enough public-green spaces (Jim, 2002). Hong Kong is a rapidly urbanizing city, this leads to rising demand for buildable area in order to keep up with the growth of

the city which leads to land scarcity for implementing biophilic urbanism. Land scarcity is common in Hong Kong, making it interesting to examine how the city aims to implement more biophilia. Urban planners and designers are exploring innovative green space strategies, such as rooftop gardens and vertical greening systems (Morakinyo et al., 2019), to integrate biophilic elements despite limited land availability. The city of Hong Kong has been chosen because it is trying to implement more biophilic spatial planning. Yet, it struggles to do so because it has little land available due to zoning and planning issues (Cuthbert & McKinnell, 1997, p. 295). The city of Hong Kong had approximately 7.41 million residents mid-2021, this number is forecasted to increase to 8.19 million by the year 2046 (Government of Hong Kong, 2023a, p. 5). This steep increase in population makes Hong Kong an interesting case due to the limited land it has available to build on. Together these two developments create an interesting dynamic to investigate the feasibility of biophilic spatial planning.

2.2 Research problem

This study addresses the pressing need for a comprehensive understanding of how biophilic design principles can be effectively integrated into spatial planning practices. Currently, there is a significant gap in knowledge regarding the implementation of biophilic design within urban planning frameworks. Brown (2016) highlights the absence of a standardized framework for incorporating biophilic principles into spatial planning. The current challenge lies in the fact that nature and green spaces are often considered secondary in the planning process, primarily due to the limited understanding of how to successfully integrate biophilic elements into urban environments.

To address this issue, it is crucial to gain deeper insights into how zoning ordinances and land-use regulations are interpreted and utilized by urban planners and policymakers. Although biophilic design has been recognized for its potential to enhance human well-being and promote ecological sustainability in urban areas, there is a lack of empirical evidence on how these principles are translated into practical regulatory frameworks. This study seeks to fill this critical gap by exploring the real-world applications of biophilic design within the context of spatial planning and policy development. By doing so, it aims to contribute to the development of more effective strategies for integrating nature into urban environments, thereby promoting more sustainable and liveable cities.

2.3 Research aim

The aim of this research is to gain a deeper understanding of how biophilic design elements can be integrated into the cityscape of Hong Kong. This study will explore public perceptions of biophilic spatial planning and examine the challenges associated with implementing biophilic design principles. By investigating how residents view biophilic design and identifying potential obstacles to its adoption, the research seeks to offer insights into effective strategies for incorporating biophilia into urban environments. This includes addressing any regulatory or practical issues that may arise in the process.

2.4 Research question

Considering all the recently discussed problems such as policy problems for implementation, conflicting claims on the available space and the need for more community participation the following research question has been composed:

How do urban planners and policymakers interpret and integrate principles of biophilic design within zoning ordinances and land-use regulations in the city of Hong Kong?

To answer this main research, question the following sub-questions have been formulated:

1. What are the perceived benefits of incorporating biophilic principles into urban planning regulations?

2. What challenges do urban planners and policymakers encounter when attempting to integrate biophilic design principles into zoning and planning regulations?

2.5 Societal relevance

The research on how urban planners and policymakers interpret and integrate biophilic design principles within zoning ordinances and land-use regulations in Hong Kong is highly relevant for several key reasons, with different benefits for various stakeholders.

First, the findings of this research are insightful to policymakers and urban planners themselves. By gaining insights into effective methods for incorporating biophilic design into urban planning, they can develop more informed, innovative strategies that align with the unique challenges of densely populated cities like Hong Kong. This enables them to create urban spaces that not only support economic growth but also enhance the well-being of residents by fostering a stronger connection to nature. As a result, planners can achieve a more balanced approach to urban development, one that considers environmental sustainability alongside other critical objectives.

Additionally, the research benefits the residents of Hong Kong and other cities facing similar challenges. Urban environments that successfully integrate biophilic design can lead to improved mental and physical health, increased social cohesion, and a higher quality of life (Kondo et al., 2018). Green spaces, natural lighting, and other biophilic elements contribute to creating more liveable cities, offering residents respite from the stresses of urban life. Therefore, the practical application of this research can directly improve the everyday experiences of people living in urban areas.

The business world of Hong Kong can also profit from biophilic spatial planning. Companies and investors involved in real estate development, construction, and urban infrastructure can leverage these insights to align their projects with emerging trends in sustainable urban design. By understanding how biophilic principles can be integrated into zoning and land-use regulations, these stakeholders can anticipate regulatory changes and adapt their strategies accordingly. This proactive approach not only ensures that their developments remain compliant with future regulations but also enhances their appeal to an increasingly eco-conscious market. Furthermore, incorporating biophilic design can add value to properties by attracting residents and businesses seeking sustainable, health-promoting environments, thereby providing a competitive edge in the real estate market.

Lastly, this research contributes to the broader field of urban studies and environmental design by providing a case study that can be referenced in other cities and regions. Scholars and students in these fields can benefit from the findings, using them to inform further research and education on sustainable urban planning and the implementation of biophilic design in diverse urban contexts.

2.6 Scientific relevance

Biophilic design has been the subject of various studies, focusing on its application to the built environment. This concept, known as biophilia, is divided into different attributes that provide a basic foundation for implementing biophilic design (Kellert et al., 2008). However, these attributes currently lack concrete indicators that could facilitate their application. The development of universal indicators for biophilic design could promote a common understanding and interpretation of this approach, streamlining its integration into spatial planning practices. Such indicators would allow urban planners and architects to adopt biophilic design principles more systematically and effectively. Despite the importance of these indicators, this study will not attempt to create them. Instead, it focuses on understanding how urban planners and policymakers interpret and apply biophilic design principles within zoning ordinances and land-use regulations. By concentrating on

the practical application and interpretation of these principles, the study aims to shed light on how these design concepts can be effectively integrated into real-world planning scenarios.

Although the concept of biophilic design is promising, and numerous examples exist of cities utilizing biophilic design elements, there is often a lack of detailed explanation of how these cities have achieved success in this area (Beatley, 2011). Studies typically show what biophilia can bring to a city, such as improved mental health, increased biodiversity, and enhanced aesthetic value, but they often fall short of highlighting the importance of having adequate policies and strategic frameworks to support these initiatives. The current gap in understanding how policies contribute to biophilic design is a critical issue. This research aims to delve deeper into the role of policies, offering insights into the mechanisms that allow cities to effectively incorporate nature-based solutions into urban development.

One aspect that could strengthen the implementation of biophilic urbanism is the use of specific zoning tools. These tools can guide development practices in ways that encourage the incorporation of nature into urban spaces. Incentive zoning is one such zoning technique that might help developers implement more biophilic elements into their projects (Brown, 2016). This technique can offer benefits or incentives to developers who incorporate features like green roofs, living walls, or increased green spaces in their developments. However, the research surrounding incentive zoning is somewhat unclear about the specific conditions under which it can be implemented and the overall effects it may have on urban development and sustainability (Brown, 2016). This lack of clarity presents a challenge for urban planners and policymakers who wish to utilize this tool effectively.

3. Theoretical framework

3.1 Biophilic design

Biophilic design emphasizes the integration of nature into urban environments as a fundamental component of urban planning and development (Beatley, 2011). This approach is grounded in the biophilia hypothesis, which posits that humans possess an inherent connection to nature. Cities that adopt a biophilic design strategy aim to foster a deep and meaningful connection between people and the natural world. This approach extends beyond the mere presence of parks and green spaces; it also involves the thoughtful incorporation of natural elements into buildings, streets, and infrastructure. By doing so, biophilic design seeks to create environments that promote human well-being and ecological sustainability.

The health benefits associated with biophilic design underscore the significant value of integrating biophilic principles into urban planning (Beatley, 2011). These benefits highlight the potential for biophilic cities to enhance the physical and mental health of their residents by providing more natural and restorative environments. Beatley (2011) provides several compelling examples of how biophilia can be applied at various urban scales, demonstrating its versatility and wide-ranging impact.

However, while the examples offered by Beatley (2011) illustrate the practical potential of biophilic design, the research does not delve into the crucial aspect of how these biophilic elements can be systematically integrated into urban policies and zoning ordinances. This gap highlights the need for further exploration into the mechanisms by which biophilic design can be effectively translated into regulatory frameworks, ensuring its widespread adoption and implementation across urban landscapes. Understanding how to incorporate biophilic principles into policy and zoning regulations is essential for realizing the full potential of biophilic design in creating healthier, more sustainable cities.

Due to the high urban density of Hong Kong there is a need to apply biophilia in smaller scales which require less space. These scales are building-scale, street-scale and city-scale (Reeve et al., 2015). The framework zooms in on the efforts of implementing biophilia in such a way that it tries to minimize land competition. This is relevant in the case of Hong Kong, where land is scarce. The benefits of applying biophilia in densely urbanised spaces helps to reduce the urban heat island effect, improve air quality and improves the public health of residents (Reeve et al., 2015). The urban heat island effect is a growing concern in many large cities worldwide. The temperature in the urbanized city scape it noticeably higher than in the surrounding suburban regions (Jiang et al., 2018). Due to the increased temperature more energy is needed to keep apartment buildings cooled. The increased power needed to keep these buildings cool leads to higher emissions of air pollutants. This phenome can be countered with the inclusion of biophilia which can reduce the temperature increase significantly (Xiao et al., 2018; Zhou & Cao, 2020).

Biophilic design is not only valuable for enhancing the aesthetic appeal of living conditions, but it also has substantial positive health effects on citizens (Kellert et al., 2008). By integrating natural elements into the built environment, biophilic design contributes to the improvement of physical and mental health, boosts productivity, and enhances overall well-being. In urban settings like Hong Kong, where high levels of stress are prevalent due to the city's dense population and fast-paced lifestyle (Chan et al., 2021), the benefits of biophilic design become even more significant.

The stressors associated with urban living, such as noise, overcrowding, and limited access to nature, can have deep impacts on residents health and quality of life (Chan et al., 2021). However, biophilic design offers a means to mitigate these challenges by creating more restorative environments. Incorporating natural elements such as water features, green walls, and access to parks or other green spaces can provide urban dwellers with a reprieve from the concrete jungle, fostering a sense of calm and relaxation (Browning et al., 2014).

3.2 Zoning ordinances and land-use regulations

Zoning ordinances and land-use regulations form the foundation of urban planning, which will be further elaborated upon in a later chapter focusing on the planning system of Hong Kong. Urban planners and policymakers in Hong Kong should integrate overlay zoning as a strategic tool to enforce additional biophilic standards throughout the city. This method offers a flexible and context-sensitive means of incorporating biophilic design into urban development, allowing it to complement existing land-use regulations while enhancing the city's green infrastructure (Brown & Fink, 2022). By doing so, urban developments can contribute to a more sustainable and ecologically diverse environment. Moreover, planners in Hong Kong can employ the strategies outlined in the paper to incorporate biophilic design into site development standards. This involves embedding biophilic principles not only in the design of buildings but also in the spaces between them (Brown & Fink, 2022). This ensures that these areas support biodiversity and foster daily interactions with nature. Setting performance standards that align with biophilic objectives is crucial, as it enables urban planners and policymakers to create an urban environment that not only preserves but also enhances the natural ecosystem. It ultimately improves the quality of life for residents.

Different zoning types allow for other developments. Overlay zoning, land-use controls, and performance zoning, offers significant relevance to the urban planning landscape (Brown, 2016). Given Hong Kong's limited space and stringent land-use regulations, these mechanisms provide practical examples of how the city might adapt its zoning ordinances to integrate biophilic design principles. The discussion on these legal tools is directly applicable to how urban planners and policymakers in Hong Kong could approach the incorporation of nature into the built environment, thereby addressing the primary research question on the interpretation and integration of biophilic design within the city's zoning and land-use regulations. Hong Kong's high-density urban

environment poses distinct challenges for introducing nature into its urban spaces. The research by Brown (2016) made examinations of cities with similar constraints using performance zoning and open space zoning offers a blueprint for overcoming these challenges. It provides valuable insights into how biophilic elements can be integrated into a dense urban fabric, which is particularly relevant for Hong Kong where innovative approaches are necessary to create and maintain biophilic spaces. Brown (2016) emphasizes the importance of incentives for private sector involvement, such as tax breaks and development agreements, which are crucial in Hong Kong's context due to the high cost of land and development. These incentives can be tailored to encourage developers in Hong Kong to incorporate biophilic design, aligning private interests with public biophilic goals. This directly informs the research by suggesting practical approaches for incentivizing biophilic integration in Hong Kong's zoning and planning regulations. Moreover, the adaptability of zoning laws (Brown, 2016), is particularly useful for Hong Kong, where existing regulations may need to evolve to reflect growing environmental concerns and public demand for green spaces. The concept of flexible and adaptable zoning laws is critical in the Hong Kong context, where regulatory frameworks must be dynamic to effectively support the integration of biophilic design.

The dense urban environment of Hong Kong needs a flexible zoning approach to being able to successfully integrate biophilic design. The need for flexible zoning can be met with the implementation of mixed-used zoning (Mandelker, 2023). Urban planners and policymakers in Hong Kong can use these principles to modify zoning ordinances. This would allow Hong Kong to better integrate biophilic spaces within high density developments. Examples of this are vertical gardens or rooftop green spaces in mixed-use buildings. Due to the competitive nature of the Hong Kong real estate market the inclusion of biophilic design might cause conflict in profitability. The analysis of market related zoning challenges highlights the importance of balancing economic and environmental goals (Mandelker, 2023). The zoning structures described by Mandelker (2023) mirror the challenges of Hong Kong where zoning laws have traditionally separated land uses. The insights provided on the need to reform these structures could be applicable to Hong Kong. Urban planners of Hong Kong can look at these described cases and work on zoning reforms that allow mixed-use developments to incorporate biophilic elements.

3.3 Implementation

In urban planning it is crucial to align economic competitiveness with sustainability goals. Performance zoning provides a flexible regulatory framework that allows urban planners to integrate biophilic design and green infrastructure into land use policies and zoning ordinances (Widener, 2015). Performance zoning offers flexibility by shifting from traditional prescriptive zoning to one that evaluates the actual environmental impacts of a development (Widener, 2015). This system allows urban planners in Hong Kong to tailor zoning codes that incentivize the incorporation of green spaces. By setting performance standards for environmental outcomes such as stormwater retention or air quality, developers can be encouraged or required to include green infrastructure, such as parks, green roofs, and permeable surfaces, in their projects. Incorporating sustainability goals into development processes such as zoning ordinances and land use planning give cities a competitive edge (Widener, 2015). For Hong Kong, a city striving to keep its place as a top global centre, incorporating biophilic design principles through performance zoning can make it more attractive to businesses run by millennials and to investors who care about the environment. This link between economic success and environmental responsibility highlights the importance of green spaces as key parts of sustainable urban development (Widener, 2015). Although performance zoning presents substantial advantages, implementing it in Hong Kong would involve addressing certain challenges. These include the difficulty of managing flexible standards and the possible resistance from developers who are used to traditional zoning methods. However, the chance to develop a more sustainable and resilient urban environment makes these challenges worth tackling (Widener, 2015). By clearly outlining performance standards and offering incentives for compliance, Hong Kong can

reshape its urban landscape to prioritize green spaces as key elements of its zoning and land-use policies.

The biophilic streets framework emphasizes the reimagining of streets as spaces that not only facilitate movement but also enhance human-nature interactions (Cabanek et al., 2020). This approach advocates for the integration of natural elements, such as green walls, tree canopies, and water features, into urban streets. In the context of Hong Kong, a city with high population density and limited green spaces, this framework could significantly improve the quality of urban life. By incorporating biophilic elements into zoning ordinances and land-use regulations, Hong Kong can create streets that support biodiversity, reduce the urban heat island effect, and provide healthy environments for residents. The case studies within the framework demonstrate successful applications of biophilic design in various cities such as Melbourne and Portland, each with unique challenges and opportunities. Hong Kong could learn from these examples by customizing zoning ordinances and land-use regulations to encourage the development of biophilic streets. This could include incentivizing developers to integrate green infrastructure into new projects, mandating green coverage ratios in urban planning, and protecting existing green spaces from further development. To effectively integrate biophilic design into urban planning, it is essential to adopt a holistic approach that aligns with broader sustainability goals (Cabanek et al., 2020). This includes addressing potential trade-offs, such as higher initial costs and maintenance challenges, by involving the community in workshop programs and leveraging public-private partnerships. By prioritizing biophilic design in policymaking, Hong Kong can ensure that its urban development is not only sustainable but also resilient to the impacts of climate change and urbanization.

3.4 Conceptual model

The conceptual model that will be used for this research consists of four main theories. Cities are planned and shaped through zoning ordinances and land-use plans. These documents describe and prescribe what is allowed in certain zoning areas. This research follows the definitions of zoning ordinances and land-use plans as defined by Brown (2016). As described in “2.2 zoning ordinances and land-use regulations” different land-use controls such as overlay zoning, performance zoning, open space zoning, incentive zoning and development impact fees and taxes all have their own set of rules. Dividing an area into different zones completely changes how the area can be developed. The type of zoning district thus dictates if there is room for the implementation of biophilic design. The implementation of biophilic design is difficult since there is no city-wide strategy for the implementation of urban greenspaces (Jim & Chan, 2016, p. 68).

Hong Kong has no adequate policy for the adaptation of green roofs and green walls, the same is true for roadside tree planting. Most importantly Hong Kong does not have guidelines on their urban greening hierarchy, this can be solved with the implementation of setbacks (Jim & Chan, 2016, p. 67). In land use planning, a setback refers to the minimum required distance that a building or structure must be positioned away from a street, road, river, shoreline, flood plain, or any other sensitive or protected area. The space created then allows for the implementation of biophilia. The 25 key-issues as defined by Jim & Chan (2016) also come with proposed solutions. The solutions commonly mention the need for suitable policies and zoning regulations, the lack of policy and zoning might be solved through the different zoning tools depicted by Brown (2016).

Due to the high density of Hong Kong the implementation of larger scale biophilic features is a challenge. Implementation should here for be divided over different scales. Building-scale, street-scale and city-scales are categories that allow for a more streamlined implementation of biophilia (Reeve et al., 2015). The division of what can be implemented where leads to a more efficient approach since certain options can be allocated to a certain scale which leads to a faster decision-making process. The scales described by Reeve et al (2015) can be linked back to Brown (2016) since

different zoning areas allow for different implementation scales of biophilia. An example would be a park that is zoned for a new planned development. The zoning ordinance and the associated land-use plan will determine whether the proposed park will be designed on a street-scale or a city-scale. This decision depends on the amount of land that has been designated as a public park within the zoning regulations. The zoning ordinance offers detailed guidance on the appropriate scale of development or land use implementation for a specific area. This insight helps determine whether a project should be designed on a smaller, more localized scale or a larger, broader scale, ensuring compatibility with the area's designated zoning and planning objectives.

Increasing the implementation of biophilia in cities can be achieved faster when goals and targets are clearly defined (Panlasigui et al., 2021, p. 9). These targets then need to be translated into spatial plans which can be carried out. Contractors might also be more willing to implement more biophilic design elements when they are aware of the benefits it could bring. An example of this are multi-functional spaces. A green strip, or a vegetated area integrated into urban or landscape design, serves a dual purpose. Beyond merely enhancing aesthetic appeal and promoting nature inclusion by incorporating greenery into built environments, it can also play a critical role in stormwater management (Panlasigui et al., 2021). When setting goals and targets for the implementation of more biophilic design elements it might show the need for new planning policies which would make implementation easier. These goals are quantitative goals and help for motivating the reason behind the implementation of biophilia. The framework described by Panlasigui et al. (2021) links with Brown (2016) by defining clear goals and targets that could lead to policy changes which in turn cause governments to reevaluate their zoning ordinances and land-use plans for future developments or the redevelopments of older neighbourhoods. These four frame works together lead to the following conceptual model (*Figure 2*).

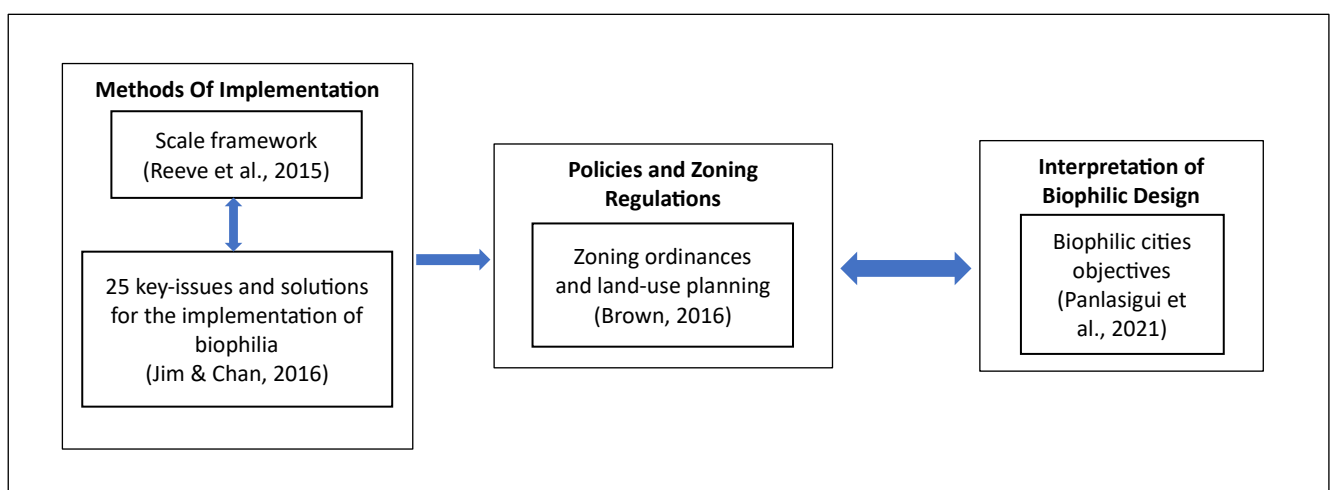


Figure 2

The model shows that the frameworks have been categorised in groups. The group “Methods and Implementation” (MOI) includes the framework of Reeve et al. (2015) and Jim & Chan (2016). These two frameworks both look at possible ways of implementation of biophilic design elements and highlights possible issues when trying to implement biophilic features. Brown (2016) is placed in the “Policies and Zoning Regulations” (PZR) group because it defines how this study approaches zoning ordinances and land-use plans. Also, it enables the frameworks in the MOI group to be implemented since these are solutions that can only be implemented when zoning ordinances and specific policies are designed. The last group “Interpretation of Biophilic Design” (IBD) contains the framework of Panlasigui et al. (2021) which explains how policies in favour of implementation of biophilic design elements can be created with setting goals and targets. The MOI group has influence on the PZR group because they define the possible implementations that are held back due to a lack of

adequate zoning ordinances and land-use plans that are need for implementation. The PZR group and the IBP group might influence each other because the creation of new policies requires targets and goals to be set first, to develop policies on the matter and to draw accompanying zoning plans. When there is lack of policy and zoning plans it in return influences the IBP group again because urban planners and policymakers might set new goals and targets based on the current needs for biophilic design implementation.

4. Spatial planning system of Hong Kong

Urban planning in Hong Kong is complex due to its unique geographic and demographic constraints. With a population density of approximately 7,060 people per square kilometre (Government of Hong Kong, 2023b) and only 25.5% of land developed, the city faces significant challenges in land use (Government of Hong Kong, 2023b). The mountainous terrain, which covers about 60% of the land, further limits available space (Government of Hong Kong, 2023b). These conditions necessitate innovative solutions, such as high-rise buildings and land reclamation projects, to efficiently use limited space.

4.1 Historical context of spatial planning

The groundwork for the modern planning system of Hong Kong originates from the period the British ruled Hong Kong island. Starting in the 1840s, the British colonial administration employed a land-leasing system, which led to the systematic planning of the city using a grid pattern to optimize land use and infrastructure (Booth, 2003). This is common for colonial towns as it reflects focus, order and efficiency in urban layouts. The land administration system in Hong Kong was initially established to support economic activities and generate revenue for the colonial administration through land leasing arrangements. After the conclusion of World War II and the end of Japanese occupation, Hong Kong had to accommodate a significant influx of refugees, creating a pressing need for additional housing. This situation led to the renewed interest in urban planning to effectively manage the growing population. Hong Kong needed a system that was capable of organising the lease processes and reduce the negative effects of new developments on nearby properties. This led to the creation of the Building (Planning) Regulations of 1956 (Booth, 2003). It introduced reasons why building plans could be rejected and set up a way to appeal those rejections. The new established regulations allowed for much higher building densities, which is why modern Hong Kong now has such high-density areas. Hong Kong began to develop a planning system that prioritized the swift and straightforward initiation of new urban developments, which came to be known as Outline Development Plans, later referred to as Outline Zoning Plans (OZPs).

When the Town Planning Board was reinstated in 1947 after the war, its focus shifted away from long-term strategic plans to emphasize Outline Zoning Plans (OZPs). This shift was primarily driven by the urgent need to address the massive influx of refugees, which created an immediate demand for new developments to accommodate the growing population. While the system of OZPs has been optimized over the years, it remained largely unchanged since its establishment. However, this stability was disrupted in the 1970s when development pressures resurfaced, necessitating a renewed emphasis on strategic planning (Booth, 2003). This shift led to the reintroduction of comprehensive planning, which established overarching plans for the entire territory of Hong Kong. These plans encompassed the five subregions, detailed Outline Zoning Plans, and administrative departmental plans at the district level, reflecting a more integrated approach to urban planning and development across the city (Booth, 2003). This comprehensive framework aimed to manage development pressures while ensuring that growth was coordinated and sustainable throughout Hong Kong's rapidly urbanizing landscape.

4.2 Governance and administrative structure

The Planning Department is tasked with translating policies into the built environment (Kam Ng, 1999). The department is made-up of different divisions. The Housing and Land Supply Division is tasked with planning the development of specific housing sites, evaluation of the demand and supply for public and private housing, projections of land needs and the availability for housing and other significant land-uses, and the monitoring of potential redevelopment sites in the area. The Planning Department is also tasked with supporting the statutory Town Planning and Appeal Boards. The functions of the Town Planning Board are constrained by the Town Planning Ordinance. This Board, established under the Town Planning Ordinance, must include seven official members. Two of them are Chairperson and the Vice-chairperson, 5 other official members and 24 non-official members (Government of Hong Kong, Town Planning Board, 2024). All which are appointed by the Chief Executive. The Town Planning Board has two main functions: creating statutory plans and reviewing development applications. Members of the Appeal Board are also appointed by the Chief Executive. If applicants are dissatisfied with the decisions of the Town Planning Board, they can appeal to the Appeal Board, whose decisions are final.

In Hong Kong, control of land use and development is centralized and monitored by the Planning, Environment and Land Bureau. Major policy decisions are made by the Chief Secretary's Committee, they are tasked with reviewing proposed policies before they are sent to the Chief Executive. Initiating and approving these plans lies with the Chief Executive in Council, which is the highest decision-making body for policies. Policy proposals are made available for public consultation, but the Chief Executive remains to have the final say. The Chief Executive is in charge of appointing the Town Planning Board (TPB) and the Appeal Board, these are intended to function as independent decision-making bodies concerning development applications (Kam Ng, 1999). Yet they work closely with the Planning Department. The Planning, Environment and Lands Bureau is entitled with making land-use planning policies. These policies are then implemented by the Planning Department.

4.3 Implementation of planning policies

In Hong Kong, land management is conducted through leases, public auctions, tenders and private treaty grants (Cheung & Wong, 2019). A tender is a formal process where interested parties submit their offers or bids to acquire land or property. This process is competitive and involves public solicitation (Shen et al., 2019). A private treaty grant is a method of land allocation where the terms and conditions are negotiated directly between the government and the interested party, without a public bidding process (Li et al., 2016). Hong Kong utilizes a leasehold tenure system, this means that all the land is owned by the government (Kushwaha, 2020). When someone acquires land, they do not acquire ownership of the parcel but they receive a lease for a fixed period (Yau & Choi Cheung, 2021). Land intended for non-institutional use is most commonly leased to the highest bidder at public auctions for a minimum of 75 years. Land designated for residential, commercial or industrial purposes is usually sold through public auction or tender. Land designated for government projects is allocated through private treaty grants (Kushwaha, 2020). Buyers make a substantial one-time payment and a small annual rent. This rent serves mainly as a formal acknowledgement of the lease agreement, while the initial payment reflects the land's value (Mushkat & Mushkat, 2015).

Hong Kong has successfully managed to implement and revise their plans by setting specific targets in their policies. They use recent action plans and annual implementation plans to guide their timelines (Kushwaha, 2020). Hong Kong uses a unique approach by distinguishing between long-term and short-term planning periods. It bases its planning around a 30-year scheme focuses on regional development, with different time frames for various proposals. For instance, more concrete projects are prioritized in the first 10 years, followed by broader proposals. Regular assessments of these plans allow for adjustments to policies, making the spatial plans of Hong Kong more dynamic, flexible and responsive (Kushwaha, 2020).

4.4 Planning system of Hong Kong

4.4.1 Hybrid planning system

The Town Planning Ordinance outlines the procedure for creating and approving statutory town plans, ensuring all necessary data is incorporated into a strategic territorial plan. At the base of the planning hierarchy are the Structure Plans followed by the Outline Zoning Plans, as indicated in figure 3 (Kushwaha, 2020). These put emphasis on short-term time frames. These plans are guided by the Hong Kong Planning Standards and Guidelines (HKPSG). This manual helps to determine the scale, location and site requirements for various land uses and facilities over time. This framework allows for more responsive and flexible spatial planning.

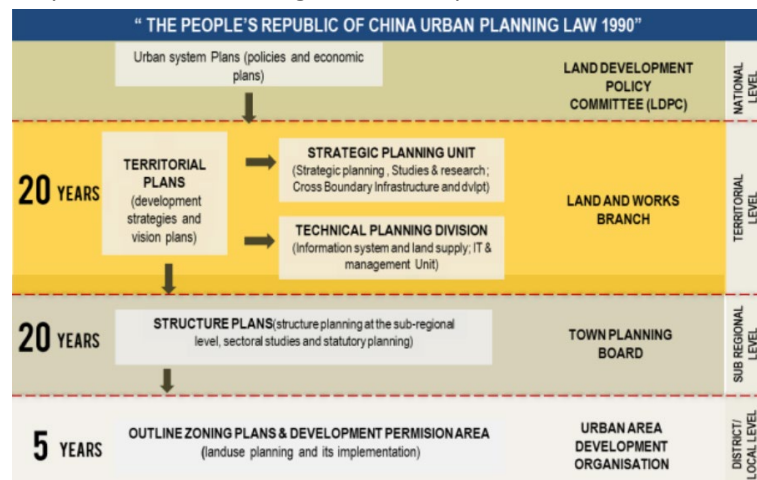


Figure 3 (Kushwaha, 2020)

Hong Kong makes use of a hybrid planning system that maintains a balance between predictability and adaptability. The primary aim of town planning in Hong Kong is to enrich the welfare of the community (Das & Shahriyar Parvez, 2021). The cities achieve this by strictly guiding and monitoring land-use plans and land developments. The urban planning system in Hong Kong is split over a three-tier planning hierarchy (1) Territorial, (2) Sub-regional and (3) Local (Chiu, 2021). For the long-term planning approach Hong Kong uses the Territorial Development Strategy (TDS) this model provides the basis for directing the lower-level planning authorities. The sub-regional level, also referred to as district level, utilizes schematic spatial plans and district draft plans. These plans direct development proposals at the district level. A broader spatial development plan has been created for the local level of planning in Hong Kong. These tools are Outline Zoning Plans (OZPs) and Development Permission Area Plan (DPA) (Chiu, 2021).

4.4.2 Outline Zoning Plans (OZPs)

The Town Planning Ordinance of 1974 formalized the division of land uses into two different Columns as part of Outline Zoning Plans. Column 1; "as-of-right" uses and Column 2; those requiring planning permission, establishing a clearer regulatory framework (Booth, 2003, p. 85). Column 1 uses are land uses that can be conducted without needing additional approval or permission; they are automatically permitted under the ordinance. Land uses listed in Column 2 require planning permission and need explicit approval from the planning authorities before they can be undertaken. In 1991 Hong Kong introduced Development Permission Areas (DPAs) to regulate development in rural areas where the lack of planning controls had led to unregulated growth (Booth, 2003). The creation of DPAs was embedded in the broader strategy of ensuring orderly development and protect rural land from unauthorized developments.

OZPs and DPAs fall under the statutory plans which are prepared and published by the Town Planning Board. Outline zoning plans depict land-use designations, development restrictions and main road networks of a specific planning area (Government of Hong Kong, Planning Department, 2023). OZPs are commonly zoned over areas which include residential, commercial, industrial, green belt, open space, government institution or community uses or other specific uses (Government of Hong Kong, Planning Department, 2023). Each OZP comes with a set of notes indicating the uses which are always permitted in a specific zone and different uses for which a permit is needed, this permit can

be granted by the TPB (Kam Ng, 1999). DPA plans are used as temporary zoning ordinances to provide planning control and development guidance for areas that still need to be included in outline zoning plans. DPA plans are valid for a period of three years after that they must be replaced with OZPs (Government of Hong Kong, Planning Department, 2023).

4.6 Zoning types and techniques

As discussed, Hong Kong makes use of Outline Zoning Plans (OZPs) which are then split into Column 1 and Column 2 uses. There are other zoning tools which Hong Kong uses, they are essentially combined with Column 1 and Column 2 uses so that it is easier for the public to understand better what zoning entails for them (Booth, 2003). Having different types of zoning allows the government to introduce flexibility into zoning ordinances. It is important to analyse the techniques themselves in greater detail, as they show variations in the degree of application and who beneficiaries by them. Furthermore, these techniques differ in the extent to which they are perceived as legitimate or ethical to use (Booth, 2003).

The most evidently controversial method, and the one most prone to misuse, is spot zoning. This method involves changing the zoning rules for a specific site. In many cases, courts have identified favouritism by local planning commissions, indicating potential corruption (Cai et al., 2009). However, spot zoning can also be beneficial in reducing the harshness of single-use zones. The main issue is that spot zoning contradicts the principle of applying the same law to everyone: it undermines the comprehensiveness of the zoning rules and plans. It encourages neighbouring property owners to apply for spot zoning as well further diversifying and fragmentising the initially zoned area.

The second approach, known as floating zoning, allows a planning commission to set guidelines for a desired type of development without designating a specific location in advance (Committee on Public Regulation of Land Use, 1972, p. 61). The exact site is determined when a developer presents a proposal for a particular area. Floating zoning can be seen as “a political cop-out” and may represent a neglect of responsibility in managing the distribution of activities by the government since they can just choose a development site that is most beneficial to them (Yu & Hui, 2019, p. 87). Floating zones give developers considerable freedom to make decisions. This method is often used when there is a need for affordable, high density housing areas in areas that are usually in low-density zones (Yu & Hui, 2017). By utilizing floating zoning, land prices are kept stable. This helps to maintain the original goals of the zoning plan (Lai & Yu, 2001).

A third option is the planned unit development, which allows a variety of uses within a specific area without detailing the development’s form in the zoning ordinance (Mandelker, 2023, p. 27). A consequence of this is that the zoning ordinance does not outline all constraints but may set performance criteria that developers must reach. This approach provides developers with flexibility to create proposals that once approved become an integral part of the ordinance. This method requires discussions between the developer and the municipality, which allows for the flexibility of the ordinances (David, 2015, p. 401). However, it is important to note that this process differs significantly from traditional zoning practices since there is room for discussion between the municipality and the contractor which is different from the other discussed zoning techniques.

A fourth method involves creating special districts to preserve the unique characteristics of a particular area and protect it from market forces. These districts are added on top of the regular zoning rules in major urban areas. Whilst their intended use is to counter market forces, special districts are often seen as ineffective responses to local political pressures (Tang, 2017, p. 82). Their main drawback is that they are not established within a comprehensive planning framework (Cheung & Tang, 2016).

The final type of zoning technique is also distinct from the other types. Incentive zoning, also known as zoning bonuses, allows developers to obtain increased zoning allowances when they incorporate a public benefit or service into their development plans (Serkin, 2020). Since the increased floor space is significantly more valuable than the cost of including a plaza or green feature many developers opt for this option. There are however concerns about the effectiveness of this method, as the benefits of certain public spaces created through incentives are not always apparent (Homsy & Kang, 2023). This approach transforms zoning from simply defining development rights into a system where both developers and public authorities gain, which may compromise long-term planning strategies (Ng, 2014).

5. Methodology

5.1 Introduction

This section will discuss the research approach of this thesis. The focus of the study is to gain a better understanding of how biophilic design is interpreted and implemented among urban planners and policymakers, specifically in the city of Hong Kong and how they use zoning ordinances and land-use regulations to create a biophilic city. Firstly, the research philosophy, this section discusses the underlying philosophical assumptions that shape the research, including the epistemological and ontological perspectives. Next is the research design which explains the general approach of the methodology. Thirdly the sampling of respondents will be discussed. Consecutively the data collection will be discussed, which is followed by the data management. After that comes data analysis. This part explains the techniques and processes employed to analyse the collected data, including any software or statistical methods used. Lastly the research limitations are discussed. This section acknowledges the potential constraints and challenges faced during the research, discussing their impact on the findings and how they were mitigated.

5.2 Research philosophy

The research philosophy guiding this study is social constructivism, a paradigm that emphasizes the understanding of social phenomena from the perspectives of those involved (Moon & Blackman, 2014). This philosophy is chosen because it prioritizes the subjective meanings and experiences of individuals, which is essential for comprehending the nuanced and context-specific ways in which biophilic design principles are interpreted and applied in spatial planning (Guba & Lincoln, 1994). Interpretivism is grounded in the belief that reality is socially constructed and that understanding this reality requires an in-depth exploration of the subjective meanings and interpretations held by individuals (Berger & Luckmann, 1967, p. 15). Key principles of interpretivism relevant to this research include the subjectivity of social reality, which states that social reality is not objective and fixed but is constructed through human interactions and interpretations (Creswell, 2013, p. 25). This is particularly relevant for studying how urban planners and policymakers in different cities understand and implement biophilic design. Additionally, contextual understanding is emphasized, recognizing the importance of context in shaping human behaviour and beliefs. The unique socio-cultural, political, and environmental contexts of Hong Kong will significantly influence how biophilic design is interpreted and integrated into urban planning. Furthermore, interpretivism focuses on the meaning-making processes through which individuals and groups make sense of their world. This study aims to uncover how urban planners and policymakers conceptualize biophilic design and the meanings they attach to it within the framework of their professional practice and regulatory environment (Schwartz-Shea & Yanow, 2012).

5.3 Research design

This research is designed with a single-case study. The reason for choosing Hong Kong as case is because it can be approached as a unusual case since Hong Kong is often overshadowed by Singapore in-terms of biophilic urbanism (Yin, 2018). Case studies is also valuable when the proposed research question and sub-questions require a more in-depth dissection of the topic. A case study is a research strategy which puts emphasis on examining the interactions between individuals, groups or components withing the setting interact with each other (Eisenhardt, 1989, p. 534). These interactions, or the "case" can only be analysed in their real-world context because the distinction between the phenomena and context may not be clear in the first place. Conducting a case study is essential when aiming to understand a real-world scenario and expect that this understanding will include significant contextual factors relevant to your case (Yin, 2018, p. 46). Case studies can be utilised to conduct research with an embedded design, this is the usage of multiple analysis withing a single study. Case studies often use triangulation to get to grounded research. Case studies make use of multiple data sources such as archives, interviews, questionnaires and observations (Yin, 2018, p. 46). This research also makes use of triangulation, data triangulation in specific. The research makes use of primary data which will be gathered through interviews. The second source of data comes from existing literature. These two sources of knowledge will be compared to each other in the discussion to look for similarities or contradictions.

5.4 Sampling strategy

This research employs a combination of purposive sampling and snowball sampling methods to identify participants. Purposive sampling, also known as non-randomized sampling, is chosen because the research emphasizes the expertise of participants. Purposive sampling allows researchers to select individuals who are knowledgeable about the subject matter, ensuring that the data collected is rich and relevant (Etikan et al., 2016). This is particularly important in this research, where the complexity of the topic requires input from those with substantial experience and understanding (Etikan et al., 2016).

Participants are selected based on their professional background in urban planning, land use planning, spatial and urban design, or related fields. This approach aligns with the recommendations by (Patton, 2002), who advocates for selecting information-rich cases that provide valuable insights (Patton, 2002, p. 230). The focus on Hong Kong residents and workers is due to the localized nature of the research, which investigates the implementation and interpretation of biophilic spatial planning within the specific context of Hong Kong. As noted by (Bryman, 2016), local expertise is crucial for understanding the unique challenges and characteristics of the study area (Bryman, 2016).

The snowball sampling method complements purposive sampling by identifying additional participants through referrals from initial respondents. This method is useful in reaching a broader network of experts who might not be easily accessible through traditional contact methods. As described by Noy (2008), snowball sampling is effective in accessing hard-to-reach populations and is often used in qualitative research to build a sample through participant recommendations (Noy, 2008). After each interview, respondents are asked if they know other potential participants who are relevant to the research. This iterative process helps to expand the pool of knowledgeable respondents, ensuring a diverse range of perspectives. Heckathorn (1997) highlights that snowball sampling can enhance the depth of qualitative research by leveraging social networks to gather comprehensive data.

5.5 Data collection method

The study employs a semi-structured interview approach, which is particularly effective for research that requires the exploration of specific questions while maintaining flexibility in how those questions are presented. This style is advantageous because it allows researchers to cover predetermined topics while adapting the flow of the conversation based on the respondent's answers. This flexibility is crucial when exploring complex subjects where the order of questioning can vary depending on the discussion.

The interviews were guided by a structured interview guide (see annex), which organized questions into thematic categories. This thematic division helped to systematically address different aspects of the research topic while preserving the inherent flexibility of the semi-structured format. By categorizing questions into themes, the interviews maintained a coherent structure, ensuring that each important area was covered without confining the conversation to a rigid sequence.

Each interview typically lasted between 30 to 45 minutes, allowing for a thorough exploration of each theme within a manageable timeframe. Given that all respondents were located in Hong Kong, the interviews were conducted online to accommodate geographic constraints and facilitate ease of access for participants.

Prior to the interviews, respondents were sent a consent form requesting permission to record the session via video, only respondent 2 gave oral consent so there is no written consent form of them. These recordings are essential for accurately transcribing the interviews, which enables a comprehensive analysis of the respondents' answers. The video recordings provide a valuable resource for reviewing non-verbal cues and ensuring the accuracy of the transcriptions, thus supporting a deeper analysis of the interview data.

5.6 Data management

The interview recordings will be securely stored on an external hard drive, which will serve as the primary repository for this data. This hard drive will retain the recordings for a period of one year. After this duration, the recordings will be permanently deleted to ensure the confidentiality and security of the data.

In addition to the hard drive, all respondents who provided informed consent have agreed to the long-term storage of the audio transcriptions. Specifically, these transcriptions will be preserved for a duration of 10 years on the external cloud storage system of Radboud University. This extended storage period is in place to facilitate potential future reference and analysis while adhering to institutional guidelines.

Similarly, the written transcripts of the interviews and the AtlasTi file, which contains all the detailed transcripts and coding data, will be managed in accordance with the same data management policy. This approach ensures that all forms of data—both digital and textual—are handled consistently and in compliance with ethical and institutional standards.

5.7 Data analysis

The transcripts of the interviews will be coded in AtlasTi. Descriptive coding will be used as a method to analyse the interview transcripts (Saldaña, 2021). Descriptive coding involves interpreting respondents' statements based on their own words and interpretations. For instance, when a respondent says, "I think the neighbourhood is a concrete jungle which mostly consists of grey office buildings and a few houses, there are a few trees but there could be more," codes like 'lack of urban green,' 'more biophilia implementation,' or simply 'biophilia' can be applied. These codes capture the essence of biophilia in the respondent's context, without implying a positive or negative causation in

biophilia but simply noting its presence (Miles et al., 2014). Given the focus on understanding how urban planners and policymakers in Hong Kong interpret and implement biophilic urbanism, descriptive coding is essential. This approach captures how respondents perceive biophilic spatial planning, offering deeper insights into their views. In the context of urban planning descriptive coding can reveal the perspective on how respondents describe their environment and experiences, such as feelings of inadequacy in urban green spaces or desires for more natural elements. These insights are crucial for urban planners who aim to create more liveable, biophilic cities. For example, the code 'More/less biophilia' indicates an insufficiency in natural spaces, which could inform policies aimed at increasing greenery in urban areas (Beatley, 2011). After the first round of coding the codes are reviewed to ensure no significant information is overlooked and to eliminate irrelevant codes.

The research will not make use of thematic coding. Using only descriptive coding keeps the analysis straightforward and manageable, particularly beneficial when the research has time or resource constraints like this research. Thematic coding can add complexity, requiring additional steps to identify and group codes into themes, which may not be feasible or necessary for all projects.

The process of coding the interview transcriptions involves developing a comprehensive definition for each code used. Each code is clearly described to ensure consistent application across the data set (see annex). It is important to acknowledge that some examples may overlap, and there may also be instances where the codes themselves overlap. Efforts have been made to minimize these overlaps during the code creation process, but it is acknowledged that complete elimination of overlap is not always feasible. The coding framework aims to balance clarity and inclusivity to accurately capture the nuances of the data.

5.8 Limitations

The complexity of this study introduces several notable limitations that affect the findings and their interpretation. One of the most significant constraints is the size of the sample, which includes fewer participants than originally intended. With only three respondents participating in the study, it is not feasible to draw generalized conclusions or make broad statements about the topic. The process of selecting these respondents also introduces potential bias, as they were chosen through networking. This means that the research was referred to them by others, leading to their subsequent involvement. Such a method of selection can skew the data and limit the objectivity of the study.

Additionally, the diversity of respondents is a crucial issue. The study lacks input from government officials in Hong Kong, which results in a one-sided perspective. The absence of interviews with these stakeholders prevents the research from presenting a comprehensive view of the various perceptions held by different groups. This limitation hinders the ability to understand the full spectrum of viewpoints, leaving out crucial insights from influential players in the field or urban planning.

Moreover, the responses provided by the participants must be interpreted with caution. Each respondent may have unique motives influencing their actions and statements, potentially affecting the authenticity of their responses. Participants might express certain views or claim to engage in specific behaviours, but these assertions may not accurately reflect their true actions or intentions.

Time constraints also impose significant limitations on this study. The limited timeframe restricted the number of respondents that could be included, thus impacting the validity of the research. Additionally, time restrictions affected the depth of data analysis. The study relied solely on descriptive coding for data interpretation, without the integration of other analytical methods that could have improved the research's validity and transparency. By incorporating diverse analytical techniques, the study could have offered more nuanced and robust findings, providing greater

insights into the complexities of the topic of how urban planners and policymakers interpret and implement biophilic design into zoning ordinances and land use plans.

6. Results

6.1 Introduction

This chapter examines the patterns and trends that emerged from the interviews conducted with respondents. Initially, it analyses the most frequently occurring codes, interpreting their significance within the context of the research. This analysis includes identifying recurring themes and drawing connections between participants' responses. Subsequently, the chapter highlights and discusses particularly noteworthy topics that arose during the interviews, providing a detailed exploration of their implications, relevance to the study, and potential impact on future research or practice. Additionally, it considers how these findings align with or diverge from existing literature, offering new insights and perspectives.

6.2 Urban density

Throughout this research there have been numerous mentions of the urban density of Hong Kong. That Hong Kong is a very dense city is reinforced by the statements of all three respondents. The code "Urban density" is referenced a total of 12 times within the three transcribed documents combined. Even though 12 times does not seem to be much the quotes that come attached to these codes give better insight of how urban density plays a role in affecting the adaptation of a more biophilic design across the city of Hong Kong. When respondent 1 was asked if they see an opportunity for the usage of incentive zoning to promote the inclusion of more biophilia in Hong Kong they answered the following.

"If a developer would like to contribute to building public facilities or public area for the local area for local residents, then they can earn more FARs, more development rights. But I'm not sure whether practically it would be kind of difficult because if there are higher development rights development density, then there would be more population and the demand for the public facility would be higher"

The respondent states that it might be difficult to work with incentive zoning since it might be controversial. They state that if you allow developers to increase the Floor Area Ratio (FAR) it will lead to higher population density and building density. The higher population density is caused by the increased FAR. These higher development rights allow the developer to build more apartments. In this case it means apartment buildings and skyscrapers would become taller in order to raise the capacity of people being able to live in them. The respondent thinks that when the population density rises because of the increased building density the effects of the created biophilic space is diminished or reduced greatly since there will be more people using the public space. When respondent 1 was asked if they meant in their answer that there would be a greater gap between housing prices based on the distance to a biophilic element they gave the following statement.

"Yeah, then if, because there are great demands over housing, and then developers can earn profits by increasing the FAR or development density, but, if, there is, lower demand for housing, or then the developers have no incentives to contribute to use, it depends. And then the gaps between the different areas would be higher, I think"

They provide a well-founded argument that incentive zoning is only feasible when there is a high demand for housing because developers will only opt to increase the Floor Area Ratio (FAR) if they are confident that all the apartments can be sold. Respondent 1 further emphasizes that the disparities between different areas will likely grow when some buildings incorporate biophilic elements while others do not. They interpret these "gaps" as differences in urban density, suggesting

that areas in Hong Kong with more biophilic elements will likely experience higher urban density compared to areas lacking such features. This implies that biophilic design could become a driving factor in intensifying urban development in certain regions.

Respondent 2 was even more sceptical of the usefulness of incentive zoning in Hong Kong. They stated that most buildings in Hong Kong are needle buildings. This means that the footprint of these buildings is very small and because of the small footprint are often very high to make effective use of the space. They think it would not be possible to make the footprint of the buildings smaller in return of biophilic space, since it would not be possible to build much higher.

“How do you build an extra high? I don't think you can build like use incentive zoning to get another 10 or 20 stories high. So you cannot handle the 77 or 50 to 70 stories”

The respondent was then asked if incentive zoning would be possible in new town developments since New Towns are newly planned districts in the city of Hong Kong and might have a lower urban density compared to Hong Kong Island since these New Towns are planned from scratch.

“No, the same. The buildings are extremely high as well. But the space between buildings are larger if you compare with Hong Kong island. And you can put some greenery between the space. But still it's really high”

This statement reveals that not only Hong Kong island is very densely urbanised but also the New Towns that are being newly developed. Their statement does however indicate that New Towns in their planning are a bit more spaced out since there is space to put biophilia between the different buildings. They reaffirm their initial statement with saying that buildings in New Towns are very high as well and that incentive zoning is not an option according to them.

Respondent 3 confirms what respondent 2 says about the urban density of Hong Kong island and mention that they think there is not much biophilic elements in that area. Respondent 3 does in turn support the claim of respondent 3 stating that on the edges of Hong Kong, further away from the centre of the urbanized landmass there is more biophilia present

“So, yeah, so when you're looking at the map is, in the middle of Hong Kong is around this harbour side. They are very dense, urbanized place, so not much green space. And then the side of Hong Kong, that is very dense green space”

Respondent 3 gave a similar answer as respondent 2 towards the usefulness and possible implementation of incentive zoning. They explain that the government of Hong Kong is really concerned with the scarce amount availability of usable land to build more housing apartments. They think that because of this pressing demand for buildable land the government does not even consider incentive zoning and rather than scarifying space for biophilia they think they should build higher regardless of whether developers implement biophilia yes or not. This statement underscores even more the concern of urban density impacting the presence of biophilia in Hong Kong.

“That is a hard question because as I mentioned, yeah, as I mentioned they are ah, really worried about the space. So instead of making green space they maybe believe, why don't you make one more room for the people?”

6.3 Policy

The code “Policy” has been applied 30 times in total across all the transcribed interviews. This code is almost three times as common as the code “Urban density”. This could imply that having adequate policies or the lack of policies has greater influence on understanding how urban planners interpret and think of implementing biophilic design elements into Hong Kong. The first important result is the code “Policy” only has been applied to the transcripts of respondents 2 and 3. This stands out because respondent 1 has been asked the same questions and topics as the other respondents. Respondent 2 was asked about the current challenges Hong Kong is facing in terms of policy. They gave the following statement.

“I mean because I don't want talk too much about the challenges. Then you can well read them from the newspaper. I think the probably innovation in the policy changes in terms of urban and that should be more reflective than what I thought. It's a very effective system, but when there need a change or reflection that the system does not reflect well that's. I think there's a challenge to cope. To cope. The possible changes is like the bus and the cars, especially the bus are oil based. I think this can easily be replaced to electricity, electric cars. I think that's. And this is something that you can do and some regulations that you may allow, more experiments, in the design, in the planning or in doing things. But I think the regulatory authorities become leader. I think that's something that, could. Could improve. Could it be improved?”

Here respondent 2 states that the urban planning policy of Hong Kong should be modernised to be more reflective. This signals that the current urban planning policies Hong Kong has do not allow for a flexible approach if needed. The respondent does however state that current policy system is very effective in what it does, but when change is needed it can take very long time to adept to this. They also state that regulations could be useful for a more experimental approach in policies that would allow for a different urban design. Then they state that regulatory authorities become leader when taking this approach. The research interprets this result that respondent 2 here states that the government already has, or should take a more active role in the process of making the policies more reflective.

When respondent 3 was asked if the reason for needing to build more houses to support the growing population of Hong Kong was the main reason the government focuses less on the implementation of green space they reported the following.

“So now is I'm actually planning to apply funding about is we have to make more green space in public housing states because the government is too much focus too is making more public housing. But they don't care about the public space inside of public housing. So they slowly start to make some garden stuff. But I, when I search it's very limited. Maybe I have something and yeah, there is only six public housing states. They have the garden. Besides all there is a difference. They don't have that much as clear policy or clear as a plan for the green space. So yeah, yeah”

The statement they give is very clear, according to them the government is blinded by the housing crisis and sees that as their most important task in the urban planning department. They do say however that the government is making slow progress towards implementing public gardens into housing developments. Also, that they do not care about public space in public housing developments, this is a bit confusing when compared to their statement earlier in the sentence. Their statement overall clearly points out that there are limited policies on the inclusion of biophilia in urban design and that the policies which are there are not clearly defined. When they were asked about what a reason for Hong Kong could be not being interested in the implementation of biophilia they said the following.

“They want to see Immediate effect. So maybe for them is more engineering part or technology they more interesting. Maybe medicine, I mean medication, right. Is something. If they want to solve the depression, they may be more interesting find the medication is maybe the perfect”

Respondent 3 observes that Hong Kong's policy prioritizes rapid implementation of developments. According to their interpretation, the government appears to deem biophilic design as unnecessary, suggesting that there is a lack of perceived need for additional biophilic elements in the city. When respondent 3 was asked about if the government does include more biophilia in areas that are being redeveloped they gave this statement.

“I believe they haven't decided, any policy about the green space yet. I haven't seen any policies so far”

The respondent reiterates their previous assertion that Hong Kong has minimal or no policies addressing the incorporation of biophilic design in the redevelopment of urban areas. When respondent 3 was asked whether any design principles of biophilic spatial design align with Hong Kong's broader sustainability and liveability goals, despite biophilia being considered an afterthought, they responded as follows.

“So I make the guideline for them, but here is nothing even. Yeah, they don't have. I haven't really searched, but, I haven't found any guideline”

In this statement, the respondent notes that they are responsible for designing guidelines for the implementation of biophilic elements in Hong Kong. However, they encounter difficulties due to the absence of established policies on biophilia implementation. It is important to highlight that Respondent 3 concludes by saying, "I haven't really searched, but, I haven't found any guidelines." This suggests that the respondent has not discovered existing guidelines to assist in creating a new one.

6.4 Awareness of the impact of biophilia

The awareness of biophilia's impact on urban design is assessed using the codes "Motivation" and "Health benefits". The code "Motivation" was applied 41 times, whereas "Health benefits" was used only 11 times. It is important to know that the code "Health benefits" did not appear in the transcript of respondent 2. Together, these codes provide insight into how respondents perceive the usefulness of implementing biophilic elements in Hong Kong. They help explain not only the respondents' own views on the topic but also their perceptions of how others might regard the inclusion of biophilia and its potential benefits. Collectively, these codes offer a sense of general feelings toward biophilia and indicate whether people are aware of the advantages it could bring to the city of Hong Kong. Respondent 1 was asked about the potential motivations for urban planners and policymakers to incorporate more biophilic elements into the city of Hong Kong. They provided the following statement.

“Yeah, I think, yeah, they do have the motivations to help more, biophilic design. I think these motivations can be the. Because there are so many, publications regarding the relationship between human health or wellbeing and the green area, green space. And it's a very important part of urban planning is the way to improve the quality of life from the perspective of urban planning. I think that's one perspective. The other perspective is I think climate change”

This citation indicates that the respondent has a thorough understanding of the health benefits that biophilia can bring to urban environments. They emphasize that urban planning can significantly

enhance the quality of life in cities by integrating biophilic elements. The respondent also notes that the motivation for incorporating more biophilia extends beyond health benefits, as it is also viewed through the lens of climate change mitigation. The implementation of biophilia is seen as advantageous for addressing both health and environmental challenges, highlighting its dual potential to improve urban living conditions and promote sustainability. A moment later in the transcript respondent 1 makes the following claim.

“Yeah, if think, yeah, natural. I think one concept I just learned natural-based, solution. I think natural based solution. And that can be another motivation for planners to provide more green spaces”

They share their thoughts on nature-based solutions, suggesting these could motivate urban planners to include more biophilia in the city. By adding natural elements, planners might tackle various urban challenges. Later in the interview, respondent 1 repeats this idea in the statement below, emphasizing how nature-based solutions can improve urban living and sustainability, reinforcing their earlier point in the preceding quote.

“I like green space and I feel relaxed, during my stay in this kind of places. I think it would be good for planners to realize the importance of biophilic design”

They express again how much they appreciate biophilia and its calming effects, noting that it helps them relax. They believe it would be smart for urban planners to recognize the importance of biophilic design. Integrating such elements into cities could significantly enhance well-being and improve the quality of life for residents according to the respondent. When respondent 3 was asked what they think about incentive zoning they gave the following answer. The question about incentive zoning has been discussed earlier in this chapter but the following quote has not been discussed yet and fits here to show the significance of the statement.

“I think so, yeah. Also they don't when I ask the people, they don't really think they need a green space”

Respondent 3 clearly states that, in their view, the people of Hong Kong do not care about biophilia in their city because they do not see its usefulness or benefits. This perception highlights a general lack of awareness or understanding among residents about how biophilic design can positively impact urban environments and quality of life. In conversation with respondent 2, the interviewer mentioned that the average accessible green space in Hong Kong is below 1 m² per citizen. After providing this context, the interviewer posed the question, “How would you see more greenery being implemented in a city like Hong Kong?”. They then gave the following statement below.

“I don't think it's fair to say that, the average, greening, that shouldn't be, in average way to evaluate Hong Kong. Because five minutes walking, you can access the mountain, five minutes walking, you can access the sea, in the linear corridor. I think it's reasonable to keep it built up instead of putting lots of parks into the city. So, the city is, the urban village of Hong Kong is quite different from European cities or other cities. We learn from the textbook. I don't think it's really necessary to put, the parks, pocket parks or very much greenery into the city, although it's pleasant, but, because of the local condition, I would say that it's very convenient to access the mountain. We're full of a green, green space and also the sea. Just five or ten minutes walking that you can access the sea. So I don't think that standard can apply to Hong Kong and I don't agree with the average counting. So average, that's not, representative for what is going on. Local condition”

In this detailed statement, respondent 2 shares their opinions on several points. They start by expressing disagreement with the average measurement of biophilia per citizen. They argue that

residents can easily access the nearby mountains, which they believe provide enough biophilic benefits. Consequently, they see no need for additional green spaces within the city itself. Furthermore, they suggest that maintaining high urban density is reasonable because of the local condition and that adding more biophilic spaces may not be necessary. According to respondent 2, the proximity of the mountains means that the city does not need extra biophilic elements, as the natural surroundings outside the urban area already fulfil residents needs for biophilia. This perspective supports prioritizing urban density over expanding green spaces within the city. After this answer respondent 2 was asked if the accessibility to the mountains and thus the biophilia depends on where citizens live in Hong Kong, they stated the following.

“It's just a walking, you don't need a transport walking like, University of Hong Kong. It's just, against the mountain. You look out from the window, you will see the mountain. If you walk there, you just go downstairs, five minutes walking. You can use the mountainous, so you don't need any public transport. This is almost all the places except some particular area with a relatively larger, ah, space dedicated to a bit of area like a cologne, but still there is very easy to access a greenery. Yeah”

Respondent 2 reiterates that the mountains are highly accessible and can be reached easily on foot. They acknowledge that some areas of Hong Kong might have more challenging access to the mountains but emphasize that, despite this, the mountains remain relatively easy to reach from those locations. This reinforces their earlier assertion about the accessibility of the mountains and their availability as a biophilic resource for residents. When respondent 3 was asked why the government of Hong Kong does not really have interest in implementing more biophilia the gave the following answer.

“So that is still very hard to convince people, especially the government people”

They explain that convincing residents, and particularly government officials, of the need for and benefits of biophilia in the city is a significant challenge. They then provide the following statement to elaborate on this difficulty.

“Because if I say we need more green space, they have to make the space for the public space. But they maybe, maybe they want to more make the space for living because it doesn't make sense for them. So it always hard this one. Yeah”

The motivations and thought process of the government are clearly outlined in this statement. Respondent 3 indicates that if the government were to incorporate more biophilia, it would require allocating public space for this purpose. However, they prefer to use such space for additional housing developments, as they do not see the value in increasing biophilia. This perspective underscores a lack of awareness regarding the potential benefits that biophilic design could offer to Hong Kong. The following statements below all originated from the interview with respondent 3, because they cover the same opinion, they have they are stated first and then their statements are reviewed together.

“Yeah. Because they said, oh, we can go to the mountain anytime. We can go to the park anytime. So, yeah, for me, it's not physically be there. The nature, we need to really connect each other. So something we have to do something inside of nature and then we can get some benefits. But they think we have a tree. That's it. Yeah, we have the. Yeah, we have the sea, so we have nature. So why we need more. So still, it's very hard to, convince people. Yeah. Also the school is. They try to go, yeah. I don't know. Is I feel is they need more education on the green space. Yeah, they needed to know green space, need more”

"I'm very struggle to convince people because they don't really know as why nature is important. Because they need a space more than green"

"They don't have any motivation as well. They don't believe the benefit of nature, I think"

The statements of respondent 3 provide valuable insight into the perception that both Hong Kong's citizens and government believe the city currently has sufficient biophilia. They suggest that increased education about the benefits of biophilia is necessary to improve understanding of the concept and its underlying principles. According to Respondent 3, these observations highlight a clear need for greater public education on biophilia to enhance awareness and appreciation of its potential benefits in the city.

6.5 Planning system

The final code and theme to be discussed is "Planning system." This code appears 42 times across all interview transcriptions. However, the statements from Respondent 1 associated with this code do not offer substantial insights and will therefore not be addressed further in this discussion. When respondent 2 was explained the concept of incentive zoning they provided the following statement that describes the planning system of Hong Kong.

"There are standards related, to the building that, want to make it more, sustainable. I think it might be possible to integrate, as a non-compulsory elements, the encounter building. To integrate, greenery, always with water design, into the building. But I don't think we should do it as a compulsory part of the building. It really depends on whether they think it is visible, whether it is, nice for the building"

"Singapore want to do something and Hong Kong is using a programmatic way to solve problems. If there's a real problem, Hong Kong always figure out a local solution. Instead of I want to build something as a slogan, as a branding for the city, for the architecture. That was not the gene, the DNA of the design. In Hong Kong there was many local good solutions, but it was not documented. And to solve problem when the problem is solve it, but actively put the green and the water into the buildings and put it everywhere. That's not, the design, the culture of Hong Kong"

This statement of respondent 2 marks a few interesting planning mechanics. The start with stating that is should not be compulsory for building developers to implement biophilia into their buildings. They support their claim by saying that the inclusion of biophilia should depend on factors like visibility and aesthetics. Their other statement explains the planning system of Hong Kong. The respondent indicates that Hong Kong employs a systematic approach to problem-solving. When a specific issue arises, the city aims to develop and implement solutions that are suited to its unique local context. Rather than relying on generic, one-size-fits-all solutions, Hong Kong prioritizes creating customized and effective responses that address the particular circumstances of each problem. When respondent 2 was asked about if they were familiar with OZPs they said the following.

"Outline zoning is a development, detailed development, controlled plan, I would say. This is implemented under the, master plan. Provide, parameters in the density, in the layout. And basically when you sell a piece of land, that you have to harm this, as a regulation. But Hong Kong is, in between discretionary and regulatory. So, it can be very flexible on the piece of land. So you can talk with the, planning board, revise things as long as it works well, but, regulatory that you have to follow, the general things for you to implement yeah"

Respondent 2 explains how the OZPs work under the master plan of Hong Kong. They describe how land use is regulated in regulations. They then make the claim that the planning system of Hong Kong is between discretionary and regulatory. Discretionary means that some decisions within the planning system are made based on judgment, flexibility, and case-by-case evaluation. Planners or officials, in this case the planning board, may have the authority to make decisions based on the specific context or needs of a situation. Regulatory implies that there are established rules, guidelines, or regulations that must be followed. These provide a structured framework within which planning decisions are made. How Hong Kong fits between discretionary and regulatory is not further elaborated on. Respondent 3 gave the following statement when asked about why it is important for citizens, urban planners and policymakers to be educated on the benefits of biophilia they gave a better description of the planning system of Hong Kong.

“Yeah. Because Hong Kong is more like top down, policy. So not from the bottom, but I think they still believe, they want to find something that's a very quick fixer. So they don't want to wait because normally the nature is needed time also maybe they have a lot of money to serve the climate change or some mental health. They want to see Immediate effect. So maybe for them is more engineering part or technology they more interesting. Maybe medicine, I mean medication, right. Is something. If they want to solve the depression, they may be more interesting find the medication is maybe the perfect”

This statement underscores that Hong Kong operates a top-down planning system. In this structure, the government plays a central role in establishing the rules, regulations, and standards that guide urban development. These directives are then passed down to regional planning departments, which are responsible for implementing them across various districts and, ultimately, to smaller municipalities. This hierarchical approach ensures consistency in urban planning and enables the city to address challenges efficiently and decisively. According to respondent 3, Hong Kong's planning system is designed to prioritize solutions that have been tested and proven effective. As a result, the city tends to invest in established methods rather than in newer, less certain approaches like biophilia. The effects of biophilic design are not yet fully understood or perceived as critical to the city's development needs. This perspective illustrates that Hong Kong's planning system is primarily focused on functionality, emphasizing practical, reliable outcomes over innovative or experimental approaches, even if they could potentially enhance the urban environment.

7. Discussion

7.1 Introduction

This chapter applies the trends and insights gathered from the previous chapter to address the main research question and its associated sub-questions. The chapter examines these findings in relation to existing literature, evaluating whether they align with established knowledge or reveal any contradictions. By doing so, it provides a comprehensive analysis that situates the research within the broader academic context, highlighting areas of agreement and potential areas of debate.

7.2 Perceived benefits of biophilic urban planning

It has been scientifically proven that the inclusion of biophilia in cities has multiple benefits (Kondo et al., 2018; Wilson, 2017). When referring back to the results it does not seem that the general public is familiar with the benefits biophilia could provide. In order to identify how urban planners view the inclusion of biophilia in the city of Hong Kong the following sub-question has been formulated: *“What are the perceived benefits of incorporating biophilic principles into urban planning regulations?”*. The assumption can be made that citizens of Hong Kong do not see the added benefits of including more biophilia in the city. This comes across through the interviews with the different respondents. The unawareness of the benefits might be rooted in the lack of education residents of Hong Kong have on the topic. However the unawareness of the benefits could also be disinterest in the need for more biophilia. This disinterest might be unconscious since the general consensus among respondents seems to be that the mountains where Hong Kong is situated in between provides the residents with enough access to nature, and thus biophilia in the city might be interpreted as overdue since the mountains are easily accessible.

When comparing the results to the literature is very clear that biophilia provides substantial benefits for urban areas. As stated by Kellert et al (2008) biophilic environments have a positive effect on the physical and mental health of people. It is remarkable that this is only noted by few respondents and that they describe that the citizens of Hong Kong do not care about this. Moreover due to the culture of Hong it would be beneficial to have more greenery since it reduces stress (Chan et al., 2021).

The answer to this sub-question reveals a clear gap in understanding: the perceived benefits of biophilic spatial planning remain largely unrecognized in Hong Kong. This lack of awareness is primarily due to residents limited perceived need for biophilic design, as well as the government's insufficient prioritization of biophilia, which may stem from either a lack of awareness of its benefits or a focus on other pressing issues. It is important to acknowledge that this answer is based on limited insights provided by the interview respondents. Consequently, it does not offer a comprehensive overview of the situation. A more detailed discussion of these limitations will be presented in the conclusion.

7.3 Barriers for implementation of biophilic urban planning

The other sub-question put emphasis on challenges of implementing more biophilic elements into zoning and planning regulations which urban planners and policymakers might come across: *“What challenges do urban planners and policymakers encounter when attempting to integrate biophilic design principles into zoning and planning regulations?”*. When it comes to identifying the challenges that might be present in Hong Kong, it is clear the implementation of more biophilia is hindered by the planning system and culture of Hong Kong. The constraint on available buildable land in Hong Kong, stemming from its island location and predominantly mountainous terrain, has resulted in exceptionally high urban density. This geographic limitation severely restricts the amount of land suitable for development, contributing to the crowded and densely populated urban environment characteristic of the city. This geographic limitation of available land proves to be a challenge for the government of Hong Kong, especially in the housing department. The government

of Hong Kong has a very grounded reason to prioritize housing developments with the projected population increase of the city (Government of Hong Kong, 2023a). The pressing demand for housing can sometimes be perceived as an overriding concern, causing the government to overlook other critical issues such as the lack of biophilic spaces in the city. This narrow focus on immediate housing needs may result in the neglect of potential problems that could become increasingly difficult to address once all available land has been fully developed. Such an approach risks worsening long-term challenges and complicates the resolution of emerging issues in the future. The urban density of Hong Kong makes it hard to implement bigger scale biophilic features such as large parks or green plazas. The biophilic implementation needs to be adopted on a smaller scale such as pocket parks and biophilic features on buildings such as green roofs and green facades.

Another factor hindering the implementation of biophilic design principles in Hong Kong is the prevailing planning culture. This culture is characterized by a reactive approach to urban challenges, focusing on addressing issues only as they arise rather than proactively anticipating and mitigating potential problems. Consequently, this reactive mindset is at odds with the proactive nature of biophilic spatial planning, which requires long-term investment and foresight. Biophilic design, which emphasizes integrating nature into urban environments, does not align with the current priorities of Hong Kong's planning system. The government tends to favour projects with immediate, measurable outcomes over those requiring longer periods to demonstrate their benefits. As a result, initiatives that involve greening the city through biophilic principles are often sidelined in favour of projects that promise more immediate returns. This misalignment with the focus of the government of short-term results further hinders the implementation of biophilic spatial planning. Incentive zoning as a tool to increase biophilia in the city is not seen as a possible solution to implement more biophilia. The reason for this is that buildings are very tall and it would be hard to build even higher whilst also reducing the footprint of the building. However the implementation might not have been clearly communicated to the respondents because biophilia can still be implemented on roofs and facades without needing to make the footprint of the structure compacter.

The planning culture in Hong Kong is heavily influenced by the city's policies. At present, Hong Kong has very few, if any, policies that promote the inclusion of green spaces in urban development. This lack of policy support for biophilia has led to a planning culture where green spaces are often treated as an afterthought and seen as unimportant. The focus of the government on housing development, driven by the need to accommodate a growing population and support economic growth, further contributes to the neglect of green space policies. This priority on housing, aimed at meeting the demand for more residential buildings, unintentionally sidelines the development of policies that could encourage the integration of natural spaces into the city. As a result, the limited emphasis on green spaces reflects and reinforces a planning culture in Hong Kong that undervalues the role of nature in urban settings.

Zooming out, it becomes evident that implementing known zoning tools in Hong Kong is far more challenging than initially anticipated (Brown & Fink, 2022). The Hong Kong government's steadfast adherence to traditional planning standards, often rooted in a reluctance to embrace new approaches, significantly hinders the adoption of innovative techniques. This resistance is particularly evident in their treatment of biophilia, which they tend to dismiss as unimportant. Given the high urban density of Hong Kong, it is surprising that overlay zoning has not been more widely utilized. Overlay zoning is a method that allows cities to maintain their traditional planning frameworks while integrating new elements, such as biophilia, by applying additional regulations to existing zones with minimal disruption (Brown & Fink, 2022). This approach would enable the city to incorporate green spaces and natural elements without overhauling its entire planning system.

Moreover, overlay zoning is particularly well-suited to Hong Kong's complex urban environment, where space is limited and every square meter must be used efficiently. By layering new rules over existing zones, the city could encourage the development of biophilic designs, such as green roofs, vertical gardens, and urban forests, which would enhance the quality of life for residents without compromising the city's architectural identity. Similarly, mixed-use zoning offers another promising solution. This approach enables the development of multi-functional buildings that combine residential, commercial, and recreational spaces within a single structure, facilitating the integration of biophilia into everyday life (Mandelker, 2023). By adopting these zoning tools, Hong Kong could create a more sustainable and liveable urban environment while preserving its unique character.

To address this sub-question, it can be summarized that Hong Kong faces significant challenges in the implementation of biophilic design. These challenges stem from the city's planning system, which is primarily oriented towards meeting housing demands. This housing-centric focus results in a one-dimensional approach to urban planning, which does not adequately consider the integration of green spaces and biophilic elements. Consequently, this planning paradigm is likely to create future difficulties in ensuring that all residents have sufficient access to green spaces. As the city continues to grow, the lack of a balanced approach that incorporates biophilic principles could hinder the development of a more sustainable and liveable urban environment.

7.4 Incorporating biophilic urban planning in Hong Kong

With the sub-questions addressed, we can now answer the main research question: "How do urban planners and policymakers interpret and integrate principles of biophilic design within zoning ordinances and land-use regulations in the city of Hong Kong?" The views of urban planners and policymakers in Hong Kong on biophilic design are somewhat mixed. However, it seems that the general belief is that biophilic design is not a priority in Hong Kong, as the government focuses more on providing housing. This attitude might be because the people living in Hong Kong are not well informed about the benefits of biophilic design. These benefits include better mental health, more aesthetically pleasing surroundings, and increased biodiversity. Furthermore, the study shows that there are no existing policies in Hong Kong that support or promote the use of biophilic design. This lack of policy could be because biophilic design is still a new idea in the world of urban planning.

Biophilic design is an innovative approach that tries to bring together city development and nature, but it has not yet become popular or widely used in Hong Kong. The limited understanding and awareness among policymakers and the public are likely reasons for this. Until there is a change in both awareness and policy focus, the use of biophilic principles in Hong Kong's zoning and land-use plans will remain limited.

The planning system in Hong Kong is distinct from other urban planning models, particularly due to its reliance on Outline Zoning Plans (OZPs), which are unique in their approach and do not incorporate elements of traditional zoning methods commonly seen in other cities (Brown, 2016). This uniqueness, while innovative, also presents significant challenges, especially when attempting to integrate contemporary urban design concepts such as biophilic planning. The biophilic scale, which emphasizes incorporating natural elements into urban spaces to promote a connection between people and nature, is difficult to implement in Hong Kong due to the lack of clear policies and guidelines. This absence of regulatory frameworks creates uncertainty and ambiguity about what is permissible in various areas of the city, making it challenging for planners to adopt and apply biophilic principles effectively (Reeve et al., 2015).

Hong Kong exemplifies the difficulties inherent in integrating biophilic elements into urban environments, particularly in dense, rapidly urbanizing cities with limited green space. The city does not have a comprehensive strategy for implementing biophilia, which further complicates efforts to

create a more nature-integrated urban environment (Jim & Chan, 2016). The existing planning framework in Hong Kong, which is heavily reliant on OZPs, lacks the flexibility and adaptability needed to incorporate biophilic elements into urban development projects. This limitation is exacerbated by the absence of a coherent policy framework that could guide the implementation of biophilic principles on a city-wide scale.

Theoretical attempts to combine various zoning tools with biophilic design concepts have been proposed as a potential solution to address these challenges. For instance, Brown (2016) suggested that integrating different zoning tools could help overcome some of the limitations posed by the current planning system. However, the lack of supporting policies has prevented these theoretical solutions from being thoroughly explored or practically applied. Without a clear policy direction and a commitment to integrating biophilia into the urban planning process, it remains difficult to envision how Hong Kong can successfully incorporate more natural elements into its urban fabric. The need for a more flexible and adaptive planning system that can accommodate innovative approaches like biophilic design is evident, but it requires substantial policy reforms and strategic planning to become a reality.

8. Conclusion

Biophilic spatial planning is a relatively new concept in urban design that involves incorporating nature into city spaces. While the idea of biophilia, or the close connections between humans and nature, is well-covered in academic research, combining it with urban planning is still not explored enough. This research looked at how frameworks can be used to apply biophilic elements in cities, although these frameworks need more work to be practical. Currently, they don't provide clear steps for implementation. This study aimed to create a framework that could help integrate nature into urban planning more effectively. However, the process turned out to be more complicated than expected, and the resulting model wasn't as useful as hoped. While the individual parts of the model might have some value, they don't work well together in the broader context of city planning. This highlights the need for future research to develop a comprehensive framework that guides the inclusion of biophilic principles in urban environments. To develop such a framework, it should start with a detailed analysis of current urban policies. This involves looking at the existing rules and regulations for city planning, using cities like Hong Kong as examples to understand how local differences impact biophilic integration. The framework should also cover different zoning types that can support the inclusion of nature in urban areas, such as overlay zoning and incentive zoning, which were discussed in this research as possible strategies. A major conclusion from this research is the difficulty of creating a universal framework for biophilic spatial planning. Different countries have unique rules for city planning, making a one-size-fits-all approach impractical. Instead, the focus should be on creating guidelines that help local governments incorporate nature into their urban areas in ways that fit their specific contexts. Furthermore, the reasons driving urban planning differ from place to place, influenced by factors such as economics, culture, environment, and society. These motivations shape how cities develop and must be considered when planning to integrate nature. Therefore, urban planning should be flexible enough to adapt to these local priorities and needs. Given these complexities, creating a universally applicable framework for biophilic spatial planning is a challenging task. A more realistic approach is to develop adaptable guidelines that can be tailored to different situations. These guidelines could serve as a roadmap for governments, helping them include natural elements in ways that match their local policies, zoning rules, and development goals.

To advance biophilic spatial planning, future research should focus on several important areas. First, it should look at successful examples of biophilic urban design to understand what worked well and how these strategies can be applied in other places. Case studies provide valuable insights into practical applications of biophilic principles and serve as models for urban planners and

policymakers. Second, collaboration across different fields is crucial for developing effective biophilic spatial planning frameworks. Urban planners, environmental psychologists, architects, policymakers, and community members should work together to find innovative ways to integrate nature into urban spaces. By combining diverse expertise and perspectives, the resulting frameworks are more likely to be effective and comprehensive. Moreover, ongoing research and testing are needed to refine proposed frameworks and guidelines. Pilot projects and experimental designs can test biophilic spatial planning concepts, providing data on their success and impact. This process of testing and refinement is essential for developing practical strategies that can be adapted to various urban contexts. Lastly, public engagement and education are vital for successfully implementing biophilic spatial planning. Raising awareness of the benefits of integrating nature into cities and encouraging community support for these designs can increase public involvement and acceptance. Involving the public in the planning process ensures that biophilic interventions align with community values and preferences, enhancing their chances of long-term success and sustainability.

In summary, biophilic spatial planning is a promising yet complex field that needs further research and development. While creating a universal framework is challenging, focusing on adaptable guidelines and encouraging interdisciplinary collaboration can help successfully integrate nature into urban areas. By addressing policy, zoning, motivations, and public involvement, future research can contribute to building vibrant, nature-rich cities that benefit both people and the environment.

9. Reflection

Upon reflecting on this thesis, it is clear that there are several aspects I would approach differently if given the opportunity to start anew. One of the primary changes I would make is the selection of a topic with a broader foundation of existing research. While choosing a niche topic can be a great motivation and offer unique contributions to the field, it also presented significant challenges during the research process. The specific combination of biophilia and the urban context of Hong Kong proved to be particularly difficult, primarily due to the limited availability of relevant literature and the complex process of identifying suitable respondents for interviews. The difficulty in locating respondents considerably delayed the process of starting with the interviews, ultimately leading to a very tight schedule that impacted the overall timeline of the thesis.

My initial vision for this thesis was ambitious, but the final outcome did not meet my expectations. I believe that my perfectionist character traits played a significant role in this outcome. The constant need to meet self-imposed high standards made the writing process particularly hard. Often, I found myself struggling to write because I was overly critical of my work, perceiving it as bad no matter how much effort I invested. In retrospect, I realize that I should have prioritized producing more content, even if it was not perfect, in order to progress more steadily. My fixation on perfection led to procrastination, which in turn created a time crunch toward the end of the project.

One of the key challenges I faced was beginning the interviews while my theoretical framework was still underdeveloped. This approach proved to be problematic, as I eventually had to discard approximately 2,000 words from the theoretical framework. While this revision resulted in a slightly improved framework, it also left me short of the required word count, which really frustrates me. I struggled between wanting to reach the required word count and not wanting to add unnecessary content just to make it longer. This dilemma underscored the importance of early and consistent feedback implementation, a lesson I have learned through this process.

I now realize that my thesis would have been much better if I had more often and quickly used the feedback from my supervisor. However, I often focused on adding new content rather than improving what was already written. This focus on adding more instead of making sure it was good may have hurt the clarity and depth of my thesis. I have learned that it's important to revise and improve

earlier sections instead of just pushing ahead with new material without taking the time to reflect and refine.

Furthermore, I found the research process itself to be particularly challenging. Although I have experience in conducting research and writing, as evidenced by a previous internship during which I wrote a mini thesis of 15,000 words, the experience with this thesis was very different. During my internship, I felt mentally more robust and generally enjoyed the process more. In contrast, this thesis felt more like a struggle, and the final product does not, in my view, adequately reflect my capabilities. This comparison highlights the variability in the research experience and the impact of one's mental state on the quality of work produced.

On a positive note, I did find genuine enjoyment in exploring my chosen topic. My struggles with the thesis were never due to a lack of interest in the subject matter. The concept of biophilic spatial planning was fascinating and very fun to work with, and it was this motivation and interest that sustained me through the more difficult phases of the writing process. The challenges arose more from the process itself such as the difficulty in finding relevant literature and the learning curve associated with mastering certain academic writing conventions than from the topic. The topic was compelling enough to keep me motivated, even when other aspects of the project were less enjoyable.

There are parts of the thesis that I am genuinely proud of, such as the section on the conceptual model. This section stands out as an example of where my work aligns with the standards, I set for myself. However, I do wish that I had managed my time more effectively throughout the process so that the entire thesis could have reflected this level of quality. The time constraints toward the end of the project forced me to make compromises that I would have preferred to avoid, and these compromises have left me with a final product that does not fully showcase my abilities.

In conclusion, this thesis has been a learning experience in many ways. It has taught me the importance of topic selection, time management, and the iterative process of writing and revising. It has also highlighted the challenges of working within the constraints of a tight timeline and the pressures of meeting both external and internal expectations. While the final thesis may not fully reflect what I am capable of, it has provided valuable lessons that I will carry forward into future academic and professional experiences. The experience has underscored the need for balance between ambition and practicality, and the importance of maintaining a steady, consistent approach to research and writing. Despite the challenges, I am grateful for the opportunity to explore a topic that genuinely interests me, and I hope that the insights gained through this process will contribute to my ongoing development as a researcher and writer.

10. Literature

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11. Annex

10.1 Interview guide

Interpretation of biophilic design

1. How do you define biophilic design in the context of urban planning?
2. In what ways do you believe biophilic design principles contribute to the overall urban environment and quality of life?
3. How familiar are you with the biophilic design principles outlined in contemporary urban planning literature?

Benefits of biophilic design

4. What are the primary benefits you perceive from integrating biophilic design into urban planning regulations?
5. How do biophilic design principles align with the broader sustainability and liveability goals of your city?

Integration into zoning ordinances and land-use regulations

6. Can you describe the current zoning ordinances and land-use regulations in your city that support or incorporate biophilic design principles?
7. What strategies have been most effective in incorporating biophilic design into zoning and land-use regulations in your city?
 - 7.5. Are there specific policies or programs that have been particularly successful?
8. How do you balance the incorporation of biophilic elements with other urban planning priorities, such as housing density, economic development, and transportation?
- 8.5. What is your biggest challenge? Policy, economics etc.

Policy and implementations

9. What roles do governmental policies and incentives play in promoting biophilic design within urban planning?
 - 9.5. Can you provide examples of effective policies or incentives?
10. How do you measure the success or impact of biophilic design initiatives in your city?

Comparative questions

11. How does the approach to biophilic design in your city compare with other cities known for their biophilic initiatives?
 - 11.5. What lessons or best practices have you adopted from other cities?
12. In your experience, what unique challenges does your city face in integrating biophilic design compared to other global cities?

10.2 Code descriptions

Code:	Definition:
Accessibility	Applied to quotes that reference any form of accessibility, this code is employed when respondents discuss topics related to access to biophilia, public spaces, or any other forms of movement or travel as articulated by the respondents.
Biophilic	Applied to quotes that reference biophilia, this code encompasses any statements made by respondents regarding elements such as parks, trees, plants, greenery, forests, or any other indicators related to biophilia. It excludes citations and quotes in which respondents discuss the need for more or less biophilia. For such instances (See code: More/Less biophilia).
Climate change/environment	Applied to quotes that reference climate change or any related topics, this code captures respondents' mentions of issues directly or indirectly associated with climate change. This includes discussions about environmental conditions and phenomena such as changes in seasons, variations in temperature, and patterns of precipitation. The code is applied to any statements that address these aspects of the environment, reflecting respondents' awareness or perceptions of the impact and implications of climate change. Through this coding, insights into respondents' understanding of environmental dynamics and their interconnectedness with climate change are systematically categorized and analysed.
Community participation	Applied to quotes that reference communities or social groups outside the direct control of government organizations, this code identifies instances where respondents discuss the roles, activities, or characteristics of such non-governmental collectives. It encompasses descriptions of grassroots organizations, community-based initiatives, informal networks, and other forms of social groups that operate independently of official government oversight. This code allows for an exploration of the dynamics, influences, and contributions of these communities to broader societal contexts, highlighting their significance in fostering social cohesion, resilience, and innovation. Through this analysis, the interactions and impacts of these groups on societal issues and developments are systematically examined.

Demographics	Applied to quotes that reference population, population density, or any mention of people, this code captures respondents' discussions concerning demographic characteristics and distributions. It includes references to the size, growth, or density of populations in various contexts. This code enables an analysis of how respondents perceive, and articulate issues related to human settlement patterns and their implications for social, economic, and environmental systems. By systematically categorizing these mentions, insights into respondents' awareness of population dynamics and their associated challenges and opportunities can be explored and understood.
Geography	Applied to quotes that reference any location, geographic location, or cities, this code captures discussions related to spatial contexts and environments. It includes references to urban and rural settings, specific geographic regions, and natural features such as the sea or land. This coding facilitates an understanding of how respondents perceive and describe different locales, highlighting the importance of place in shaping social, economic, and environmental interactions. By systematically categorizing these references, insights into respondents' spatial awareness and the significance they attribute to various geographic entities can be thoroughly analysed.
Government	Applied to quotes that reference the government, governing style, or related contexts, this code encompasses discussions concerning governmental structures, and administrative practices. It includes references to the nature of governance, decision-making processes, and the roles of various governmental bodies. This coding facilitates an analysis of how respondents perceive and critique governmental actions and styles, providing insights into their views on political influence and public administration. By categorizing these references, a deeper understanding of respondents' attitudes toward governance and its impact on societal issues can be achieved.
Health benefits	Applied to quotes that reference the health benefits associated with the influence of biophilia on human health, this code identifies discussions concerning how biophilic elements contribute to physical and psychological well-

	being. It includes mentions of specific health outcomes or improvements attributed to biophilic design and natural environments. This coding facilitates an examination of respondents' perceptions regarding the impact of biophilia on health, highlighting the intersection between environmental features and wellness.
Land use	Applied to quotes that reference land use, this code pertains to discussions about the designated purposes of land, such as for housing, infrastructure, biophilia, or general building developments and projects. It captures how respondents describe and evaluate the allocation and utilization of land for various functions. Excluded from this code are references to redevelopment activities, which are addressed separately (see code: Redevelopment). This categorization aids in analysing perspectives on land allocation and its implications for urban planning and development.
Living conditions	Applied to quotes that reference the quality of living, this code encompasses discussions about aspects such as life satisfaction, overall well-being, and the conditions affecting daily life. It includes mentions of enjoying life, experiencing a good life, or evaluations of living conditions. This coding facilitates an analysis of how respondents perceive and articulate factors contributing to or detracting from the quality of life, providing insights into their views on well-being and life standards.
More/less biophilia	Applied to quotes that reference the inclusion or exclusion of biophilia, this code captures discussions related to the desire for or scepticism about biophilic elements. It includes mentions of advocating for more parks or green spaces, as well as expressions of doubt regarding the benefits or practicality of integrating biophilia. This coding allows for an analysis of varying attitudes toward the incorporation of biophilic design, highlighting both support and reservations about its implementation.
Motivation	Applied to quotes that reference the motivations and opinions of respondents, including their perceptions of motivations and opinions held by other groups or individuals. This analysis involves references to beliefs about the effectiveness of certain actions and

	includes examples illustrating why the government might not recognize the importance of biophilia. It further extends to respondents' explanations of governmental motivations or reasons for not implementing biophilic strategies more extensively.
Planning issue	Applied to quotes that reference planning issues, this code addresses discussions about competing demands in land use. It includes examples such as the tension between the need for increased housing and the consequent reduction in available space for biophilia. This coding facilitates an examination of how respondents perceive and articulate conflicts in urban planning priorities, revealing insights into the trade-offs and challenges inherent in balancing various planning objectives.
Planning system	Applied to quotes that reference the planning system, this code captures discussions about the mechanisms and effectiveness of spatial planning and management. It includes examples such as the methods employed by Hong Kong to address spatial challenges, thereby illustrating the functioning of their planning system. This coding allows for an analysis of how various planning approaches and solutions are perceived, providing insights into the operational aspects and efficacy of different planning frameworks.
Policy	Applied to quotes that reference policies, this code includes discussions about all types of policies, extending beyond spatial planning to encompass legislation and organizational guidelines. It captures any references to formal rules or directives that influence practices and decision-making, offering a comprehensive view of regulatory frameworks and their impact.
Redevelopment	Applied to quotes that reference the redevelopment of an area, this code includes discussions about initiatives or actions aimed at transforming or revitalizing specific locales. It captures mentions of projects or processes indicative of redevelopment efforts, providing insight into how such activities are perceived and their implications for the affected areas.
Scale	Applied to quotes that reference scale, this code includes discussions about the relative size of elements such as large parks, small planters, or any other indicators of scale. It captures how respondents describe and evaluate spatial

	dimensions and magnitudes, providing insights into their perceptions of size and its impact on various contexts.
Urban density	Applied to quotes that reference urban density, this code encompasses discussions about the proximity of buildings to one another and their potential height. It includes any mentions of the spatial arrangement and vertical dimensions within urban environments, providing insights into perceptions of density and its implications for city planning and development.
Urban design	Applied to quotes that reference urban design, this code includes discussions about the arrangement and integration of design elements within urban spaces. This encompasses mentions of the placement of trees alongside roads or the incorporation of green design features in buildings, providing insights into how respondents perceive and evaluate elements of urban design and their impact on the built environment.
Zoning	Applied to quotes that reference zoning, this code includes discussions about zoning plans, types of zoning, and related issues. It specifically addresses mentions of zoning regulations or problems, such as restrictions on zoning within certain areas, distinguishing these from broader planning issues. This code facilitates analysis of perceptions and concerns regarding zoning practices and their implications for land use.