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Research Article

Planning for Climate-Resilient Coastal and Natural Landscapes in South-West Asia: Australian Lessons for Local Governments

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Abstract: Coastal and green landscapes in South-West Asian cities face increasing development pressure, fragmented governance, and climate-related risks. Municipal planning systems in Iran and the UAE, as representative examples, often lack integrated statutory–strategic tools to address flooding, erosion, heat, and ecological degradation. Victoria (Australia) offers a contrasting model in which strategic policies and statutory tools operate through a unified, transparent planning framework. The study conducts a comparative analysis of planning systems in Iran, the UAE, and three small Victorian coastal cities—Warrnambool, Port Campbell, and Lorne. Selection criteria included (1) presence of sensitive coastal environments, (2) visible development pressure, (3) documented land-use conflicts, and (4) accessibility of statutory planning data. Data comprised field visits of Victorian cities conducted in 2023–2024, a review of 10 statutory maps/overlay schedules, analysis of three municipal planning schemes, and thematic coding of planning tools relating to environmental management. Findings indicate substantial governance fragmentation in Iran and the UAE, where municipal authorities lack statutory mechanisms to implement higher-level strategies such as Shoreline Management Plans. In contrast, Victorian municipalities operationalize overlays, zones, Development Contribution Plans (DCP), and Public Open Space Contributions (POSC) to integrate hazard management, landscape protection, and environmental values into everyday permit decisions. The Victorian Planning Provisions (VPP) demonstrates how integrated statutory–strategic systems improve transparency, inter-agency coordination, and environmental resilience. Lessons for Iran and the UAE include adopting map-based statutory tools, incorporating hazard overlays, strengthening local authority powers, and embedding interdisciplinary environmental data into municipal decisions. Future research should evaluate long-term ecological outcomes and consider governance constraints limiting transferability.

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1. Introduction

Visiting a coastal city during a holiday is among life's most enjoyable experiences. Observing the stunning seascape, walking along sandy shores, and witnessing children playing on the beach create unforgettable moments. This is an experience deeply shaped by its surrounding natural systems. Yet, managing and preserving this natural system—encompassing the sea, dune landscapes, rivers, and coastal vegetation—is complex and demands a coordinated, multidisciplinary approach and a sophisticated planning system.

The dune system requires protection from surges, rising sea levels, and erosion. Coastal vegetation and the pristine vistas of aquatic landscapes must be safeguarded against uncoordinated development and building heights, while careful vegetation management is crucial for mitigating bushfire risks. Rivers and riparian landscapes require active management to enhance

river health, purify runoff water, and prevent the infiltration of floodwaters and pollutants into coastal waters. The management and preservation of green open spaces and landscapes extend beyond their current conditions to ensure future provision and safeguarding of these ecological assets. This underscores the pivotal role of planning tools and mechanisms in integrating diverse disciplines such as landscape ecology, soil and water engineering, flora and fauna conservation, urban design, and architecture. Such integration is essential for sustaining resilient coastal environments in the face of climate-related pressures. This paper examines how South-West Asian municipalities address these challenges and what lessons can be derived from Victoria's more integrated planning system. It evaluates how planning systems in Iran and the United Arab Emirates respond to coastal overdevelopment pressures and identifies transferable statutory and strategic tools from comparative systems. In addition to planning tools as tangible outputs, contextual factors such as planning processes and governance regimes are also important; however, this paper focuses primarily on the former.

Urban open spaces and foreshore areas are integral components of modern cities, requiring a multifaceted approach to their study and management. This study evaluates planning capacities in selected Iranian and UAE municipalities, focusing on their ability to manage coastlines under increasing development pressure and climate-related risks. It highlights weak vertical coordination between national agencies and local governments, slow plan updates, and limited statutory tools within municipal systems. The paper then examines the Victorian Planning Provisions (VPP) and local planning schemes, along with associated tools such as strategies, policies, and zoning, in three small coastal cities in Victoria, Australia. The study highlights the importance of interdisciplinary collaboration among landscape architecture, urban planning, and engineering in optimizing natural environments, particularly in Victorian coastal cities, and demonstrates how these insights can inform South-West Asian contexts. These spaces facilitate movement and interaction within the city, foster citizen engagement, and maintain clean, livable urban areas. They also play a crucial role in preserving biodiversity and protecting coastal areas and urban rivers from erosion. By examining case studies, this paper highlights how planning schemes in the Victorian Planning System help facilitate coordinated efforts among various disciplines and enhance the sustainable management of natural environments in Victorian coastal cities.

1.1. Role of Urban Green Spaces in Coastal Planning and Management

Emphasizing the multifaceted role of landscapes, this paper argues that urban open and green spaces are vital in addressing ecological and environmental challenges such as flood management, bushfires, and pollution reduction, beyond fulfilling aesthetic preferences, especially in foreshore and coastal areas. In line with later findings, the section reinforces that coastal landscapes must be understood as ecological infrastructure that delivers critical services—erosion control, water filtration, hazard mitigation—particularly under accelerating climate pressures. The section also highlights the importance of strategic urban planning tools, such as structural plans, as well as statutory planning tools and regulatory frameworks, in predicting, preserving, and enhancing these spaces by embedding environmental data directly into day-to-day decision-making. The paper focuses on urban planning practices in coastal cities of Australia—particularly the Victorian Planning Provisions (VPP)—to illustrate how effective planning and management of natural environments and green spaces can mitigate climate crises and contribute to the overall well-being of urban residents. These examples are used not as direct comparators for Iran and the UAE but as analytical lenses demonstrating how statutory–strategic integration can operationalize environmental protection in coastal contexts. The paper aims to address two specific questions:

1. What planning tools are available in coastal cities' planning schemes to predict and preserve urban open and green spaces in coastal city development?
2. What role can these spaces play in managing and preparing cities for climate change challenges, such as floods, bushfire risks, and environmental degradation and pollution?

2. Methodology

The study employed a mixed-method approach, combining desktop research across all cases with field visits to the Victorian cities. The analysis and understanding of coastal-landscape planning and management in the selected cases were informed by both academic research and the authors' practical knowledge of planning systems in Australia and South-West Asia. Planning practice often relies on forms of professional judgment that cannot be fully captured through standard analytical devices such as comparative tables or spatial models. Following Polanyi's (2009) concept of tacit knowledge, practitioners frequently "know more than they can tell"; their expertise is grounded in embodied, experiential, and situation-specific forms of knowing. Schön (1991) similarly argues that professional practice operates through reflection-in-action, in which planners and designers make informed judgments while engaging directly with complex and evolving problems. This paper, therefore, draws upon both formal analytical methods and practice-based knowledge, recognising that each provides complementary epistemological insights.

2.1. Case Selection Criteria

- Coastal sensitivity (dune systems, estuaries, marine ecosystems).
- Evidence of development pressure documented in governmental or academic sources.
- Availability of statutory mapping layers (e.g., overlays, zones).
- Feasibility of fieldwork between 2023–2024 and access to relevant local authorities.

2.2. Data Sources

The study analysed ten statutory maps and overlay schedules, three Victorian planning schemes, two Iranian coastal management plans (the SMP and JICA plans), and key UAE strategic plans relevant to coastal development.

2.3. Fieldwork

Field visits were conducted in Warrnambool, Port Campbell, and Lorne in 2023–2024. Observations were recorded using a structured template capturing (1) landscape features, (2) evidence of hazard management, (3) visible effects of overlays, and (4) community–environment interactions to ensure consistency across sites.

2.4. Data Analysis

All materials were analyzed using a thematic coding framework, with categories including 'hazard management', 'ecological protection', 'statutory tools', 'development pressure', and 'municipal capacity'. Cross-case comparison identified recurring patterns and divergences that informed the synthesis presented in later sections.

3. Tools for Urban Planners to Predict, Plan, and Manage Urban Open Spaces and Coastal Areas

Urban open and green spaces, despite their numerous benefits, often face vulnerability in traditional planning systems, which are primary tools used by urban planners to forecast and guide future land use. Traditional instruments, such as Comprehensive and Detailed Plans, tend to treat green spaces as static land-use patches, limiting their potential as dynamic ecological infrastructure. These plans also struggle to adapt to the evolving urban conditions and frequently overlook the ecological functions of open spaces—such as flood mitigation, stormwater management, and habitat connectivity—while failing to incorporate innovative approaches like water-sensitive urban design and integrated green-blue planning.

This raises the question: What tools do different countries employ to maintain environmental quality in cities and to predict and secure the open and green spaces needed for citizen wellbeing,

recreation, and ecological resilience? To address this, the paper explores a spectrum of planning instruments—including strategic and structural plans, policies, green-space banks, development-linked contributions, and agreements with developers used in Victorian coastal cities. It also examines how zoning and overlays impose statutory controls on future development and protect various categories of green and coastal landscapes. The following sections outline these tools and demonstrate their application through international case studies, highlighting contrasts between South-West Asian practices and the integrated statutory framework used in Victoria.

3.1. Urban Planning in Coastal Cities: A brief review of some South-West Asian case studies

3.1.1. Urban Planning in Northern and Southern Coastal Cities in Iran

Iran has nearly 5,000 km of coastline along the Oman Sea and the Persian Gulf, and over 800 km along the Caspian Sea. Over the past three decades, these coastal regions have experienced rapid development, underscoring the urgent need for an integrated, comprehensive shoreline management strategy to optimize resource use and mitigate the negative impacts of development activities. According to Dibajnia et al. (2012), urban planning in Iran's coastal areas emphasizes Integrated Coastal Management (ICZM) strategies, such as the national Shoreline Management Plan (SMP), to address development pressures and promote sustainable resource use. This approach involves creating hazard maps, identifying ecosystem threats, and integrating social, economic, and environmental criteria into land-use decisions, thereby minimizing impacts on coastal zones along the Persian Gulf, Oman Sea, and Caspian Sea. A national SMP was developed for Iran's Ports and Maritime Organization (PMO) to address current coastal challenges and guide sustainable development policies. The SMP comprises two key components: Hazard Management and Ecosystem-based Development Management. As part of this framework, coastal hazard maps identify vulnerable areas and outline appropriate management responses. Additionally, the plan highlights both opportunities and risks along Iran's entire coastline to support informed decision-making and sustainable planning within the context of the Environmental Management Plan. One challenge in implementing the SMP is that the PMO remains the primary authority responsible for its execution. It remains unclear how local municipalities— particularly in northern coastal areas, which face greater development pressure due to favorable climate conditions—can effectively participate in or implement the plan.

A similar challenge persists across the southern coastal regions of Iran. For example, a study by Gharibreza et al (2022) examined how Bushehr's local government attempts to apply SMP concepts to the protection of physical space and land-use planning. It involved municipal bodies such as the Ports and Maritime of Bushehr Province and the Coastal and Port Engineering Department of Bushehr Province. The study analyzed environmental, infrastructural, and human factors across different management units (e.g., sedimentary cells). This suggests an emerging local implementation effort to align with SMP policies (especially in southern cities). There is a "Master Plan for Environmental Conservation and Management of Southern Coastal Areas of the I.R. Iran (Case Study Hormozgan)" developed with JICA (Japanese cooperation). The plan covers several municipalities/counties (Bandar Abbas, Bandar Lengeh, etc.), noting stakeholder involvement and mechanisms for implementation, monitoring, and evaluation (Islamic Republic of Iran, Department of Environment, 2020). The approach implies that local (municipal or county) governments are intended to be active participants, although actual implemented outcomes remain insufficiently documented.

The examples from the northern and southern coastal areas of Iran highlight a significant gap in the management of land use and the implementation of coastal plans through the planning system. Municipalities in Iran are often not equipped with adequate planning tools to effectively process development applications or land-use permits that could mitigate risks such as flooding, sea-level rise, bushfires, and pollution. Master Plans and Detailed Plans used by municipalities mainly focus on zoning, which leaves gaps in both policy and procedural perspectives when assessing

development applications or land rezoning and regulations. Planners cannot directly apply high-level strategic plans prepared by other authorities, such as the PMO, to local development decisions. Referrals to other responsible authorities often result in a fragmented and non-strategic approach, relying on reactive, short-term, non-transparent, and non-participatory processes that prioritize market interests over environmental protection. The following table summarizes some of the challenges faced by municipalities in several northern coastal cities of Iran (Table 1).

Table 1. Northern Coastal Cities in Iran – Municipal Challenges

City / Municipality (or Region)	Key Coastal / Urban-planning or Environmental Challenges
Bandar-e Anzali (and the surrounding wetland/lagoon)	Pollution and heavy-metal contamination of sediments (industrial/agricultural discharge), ecological risk to the wetland; pressure from urbanization, agriculture, industry on lagoon ecosystem (Pourang et al., 2025; Cheshmvahm et al., 2023)
Rasht (northern coastal city in Gilan)	Rapid urbanization & population growth leading to expansion into wetland/coastal hinterlands; weak municipal capacity to manage land use and protect wetlands (Sadeghi Pasvisheh et al., 2021)
Babolsar (coastal city in Mazandaran)	Unplanned coastal urban sprawl, linear or leap-frog expansion along transport corridors, low-density settlement growth, pressure on coastal lands, and the environment (Nikpour et al., 2022)
Nowshahr (Mazandaran)	Coastal redevelopment and port-district development converting natural coastal lands into residential/urban use; risk to natural habitats due to urban expansion (Dadashpoor & Hasankhani, 2022)
Coastal city-region of Mazandaran province (including Nowshahr, Babol, Amol, etc.)	Rapid land consumption and built-up area expansion between 1996–2016; conversion of forests, agricultural, and natural lands to urban lands; unsustainable spatial growth patterns; loss of natural/coastal/forest/agricultural lands (Dadashpoor & Salarian, 2020)

3.1.2. Urban Planning in the Coastal Areas of the UAE

While UAE masterplans—such as the Dubai Urban Master Plan 2040—promote sustainability, coastal development has historically prioritised real-estate value over ecological protection. Large-scale reclamation projects illustrate tensions between economic and environmental objectives. Advanced tools such as remote sensing and spatial mapping are now more widely employed to monitor habitats and guide development away from ecologically sensitive areas. Key strategies include creating ecological buffer zones, promoting universal accessibility, and establishing beachfront guidelines that account for economic, social, and environmental factors. Strategic frameworks such as the Dubai 2040 Urban Master Plan and regulations like the Abu Dhabi Beach Guideline provide guidance to enhance sustainability and optimize resource use in coastal zones (Dubai Municipality, 2022) (Fig. 1).

However, while these planning frameworks emphasize sustainability and ecosystem protection, actual development practices have often prioritized economic growth, tourism, and real estate value over environmental constraints. The UAE's rapid coastal urbanization— particularly in Dubai and Abu Dhabi—has been driven by efforts to diversify the economy beyond oil. Luxury coastal developments, including Palm Jumeirah, The World Islands, and Saadiyat Island, were designed to attract global investment and tourism, often resulting in significant environmental alterations. These projects have generated immense revenue but caused major ecological disruptions, including habitat loss for coral reefs, mangroves, and marine species. Most luxury developments are built on reclaimed land, created by dredging and reshaping the seabed. This process:

- Increases turbidity, harming coral and seagrass beds.
- Alters coastal currents and sedimentation patterns.

Leads to erosion and long-term instability of natural coastlines.

The UAE's policy language promotes sustainability, but economic imperatives—especially luxury real estate and tourism—have historically driven large-scale coastal alteration. However, recent initiatives indicate growing recognition of the ecological damage and a gradual move toward more balanced coastal management (Fig. 2).

Figure 1. The northern coasts of Iran have been occupied by semi-private (parastatal) entities. The image illustrates how urban development has aggressively encroached on coastal areas, putting the dune landscape and coastal ecosystem at risk from various forms of pollution and biodiversity loss. (Source: Islamic Republic News Agency, 2022).

Figure 2. Luxury coastal developments, including Palm Jumeirah, are designed to attract global investment and tourism, often resulting in significant environmental alterations (LCRE Dubai, 2025).

Dubai has implemented a Coastal Zone Monitoring Programme since 1997, beginning along the Jumeirah frontage and later expanding to cover the entire extent of the Dubai coast, from Al Mamzar Lagoon to the Jebel Ali coastline. The monitoring has recorded the impacts of coastal development, including the construction of two breakwaters, changes to dune landscapes, and sedimentation along the beaches (Messina Project, 2005) (Fig. 3).

The Dubai Urban Master Plan 2040, prepared by Dubai Municipality in 2022 and endorsed by the Vice President and Prime Minister of the UAE, projects a population of 5.8 million residents and 964,000 daily visitors by 2040. The plan aims to double the city's public park areas, establish a moratorium on additional offshore reclamation, limit the scale of future coastal and creek-side development, and strengthen open space connections along the shoreline and the creek (Dubai Municipality, 2022) (Fig. 4).

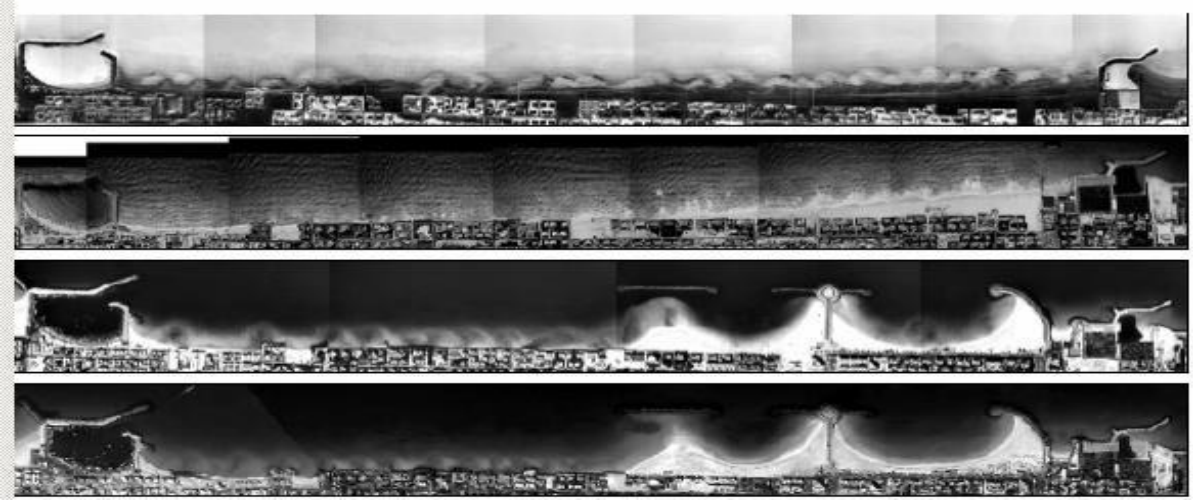

Figure 3. Aerial photographs showing changes in Jumeirah frontage for (left to right) 1981, 1991, 1996, and 2002 (Messina Project, 2005).

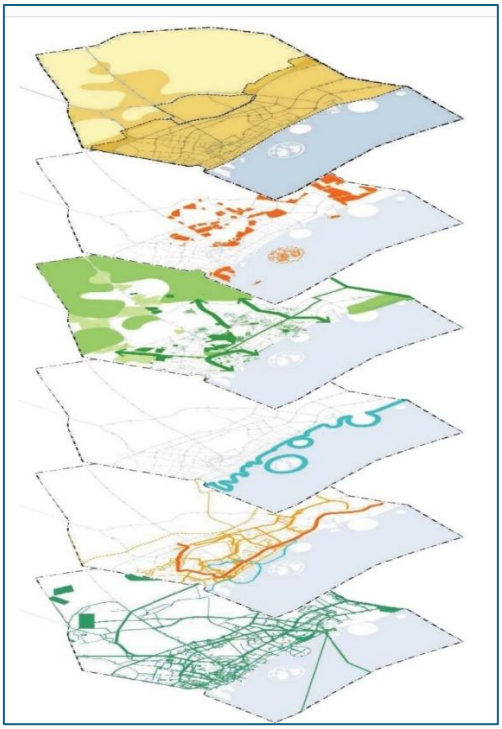

Figure 4. Dubai Structure Plan 2040 identifies a range of spatial policies, including land use and built form, housing, heritage, arts and culture, environment and open space, mobility and access, utilities, and governance. It also proposes the establishment of an integrated geospatial data platform Source: (Dubai Municipality, 2022).

Dubai's general beach planning and design guidelines (Dubai Municipality, 2023) outline the uses, minimum width, and setbacks for beaches and all waterfronts in Dubai's islands, mainland areas, and inland waterways (Fig. 5).

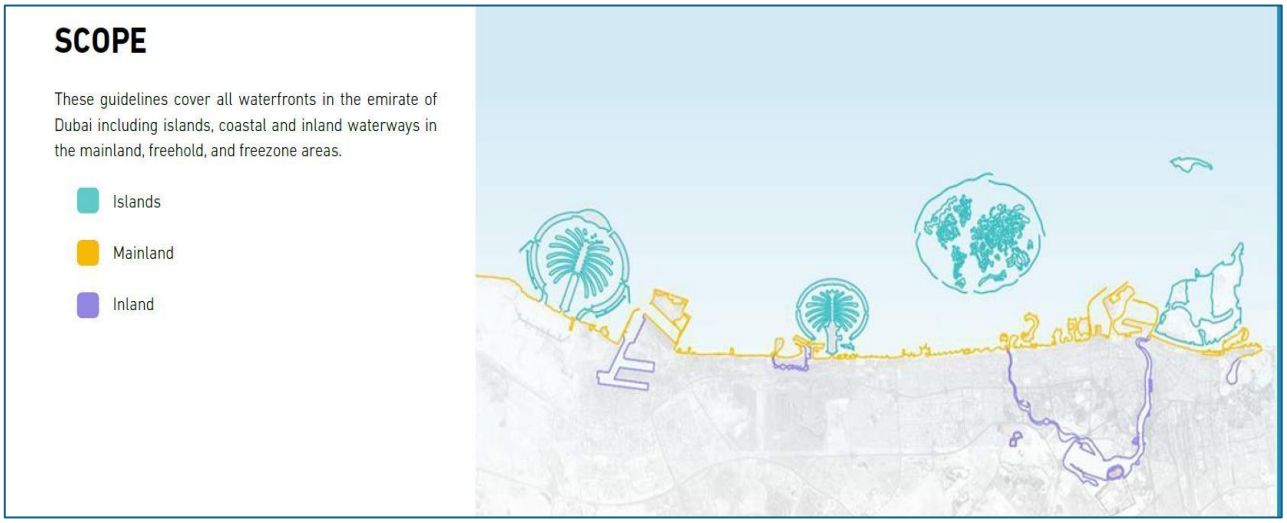

Figure 5. Map of Dubai's waterfronts based on typology. Note: Subject to update, based on information received up to January 2022 (Dubai Municipality, 2023).

These plans and guidelines are valuable documents that support more sustainable and environmentally sensitive planning and management of coastal areas by the municipality. However, because they exist as separate PDF documents, they can be difficult for planners to access, navigate, and interpret in their daily work. This fragmentation highlights the need to consider alternative approaches. While recent monitoring programs signal a growing institutional shift toward integrating ecological datasets, these efforts remain outside a unified statutory framework, limiting day-to-day enforcement. Victorian planning schemes address this challenge by integrating long-term strategic documents with the statutory provisions and regulations used in day-to-day decision-making. This integration, delivered through a web-based and publicly accessible system, has significantly advanced planning practice. The following sections of this article elaborate on how this model offers important lessons for coastal planning.

3.2. Comprehensive and Strategic Plans and Tools for Urban Open and Green-blue Spaces in Victoria

Some cities implement comprehensive or strategic plans specifically tailored for their urban green spaces. These plans play a crucial role in solidifying the position of urban open and green spaces, ensuring their independence and protection against easy conversion to other land uses. They encourage cities to view green spaces not merely as isolated patches but as interconnected networks and integral components of urban infrastructure, fostering a long-term perspective on their preservation and development. Such plans define the role of these spaces in urban expansion, emphasizing their significance as pedestrian and ecological networks. One exemplary case is the Beijing Green Space Master Plan in China. Covering an area of 16,807.8 square kilometers with a population of about 13.8 million people, Beijing Province has implemented a comprehensive master plan based on ecological landscape principles. This plan provides a holistic conceptual framework for developing urban green spaces across regional, urban, and neighborhood scales to ensure long-term sustainability (Feng Li et al., 2005; Sun et al., 2021).

At the regional level, the plan preserves natural and semi-natural forests in the northwest and establishes an ecological buffer belt in the southeast to maintain environmental quality and wildlife habitats. At the urban scale, a network of green spaces, including green wedges, parks, and corridors, is proposed. This network not only limits future urban development but also enhances

environmental quality and serves as wildlife habitats and migration routes. At the neighborhood level, greenways along rivers, roads, parks, and vertical green spaces are expanded and interconnected, providing recreational spaces near residential areas. This three-tiered approach creates a cohesive ecological network vital for Beijing's sustainable development. By integrating urban parks, forests, grasslands, water bodies, and infrastructure coherently, the plan aims to transform Beijing into an eco-city, aligning with the objectives of the "Green Olympic City 2008" initiative. Over the past decade, Beijing's urban area has expanded continuously, surpassing the developable area specified in the 1992 urban master plan and encroaching extensively on agricultural lands. Residential constructions around satellite towns between the city center and suburbs have been a primary driver. From 1992 to 2002, Beijing's residential area increased by 25%, while agricultural land decreased by 32%, significantly reducing green spaces and compromising ecosystem services.

Given these challenges, cities are increasingly adopting separate comprehensive and strategic plans to better manage and protect their vital urban open and green spaces. These areas are among the most fragile yet essential in urban planning. An example of such a strategic green space plan is the Central Melbourne Green Space Strategy. Victorian planning schemes integrate strategic policies (MPS, PPF) with statutory controls (zones, overlays) in a single online format (Victoria, Department of Transport and Planning, 2025a). This structure enhances transparency, supports continuous updates, and enables direct alignment between long-term strategies and daily permit decisions. In Victorian cities, planning schemes serve as regulatory frameworks under the Planning and Environment Act 1987, tailored to each local government area's unique needs and characteristics. These schemes integrate strategic goals and directions with policies, combining elements traditionally found in comprehensive plans such as zones and structure plans. This integrated approach provides a cohesive framework where long-term objectives align with specific policies, systematically guiding land use and development. Planning schemes are available online and follow the same structure and template for all Victorian cities, as defined under Ministerial Directions in the Forms and Content guidelines. This makes them very easy to review, update, and ensures the process is efficient and transparent. Key purposes of Victorian planning schemes include:

1. **Zoning and Land Use Controls:** Dividing land into zones (e.g., residential, commercial, industrial) with specific permitted uses and development controls to manage urban growth and protect sensitive environments.
2. **Development Standards:** Setting standards for building heights, setbacks, open space requirements, and design elements to ensure new developments integrate with existing landscapes.
3. **Environmental Protections:** Incorporating overlays and controls to protect natural features like waterways, wetlands, vegetation, and biodiversity. These measures restrict development in sensitive areas and promote sustainable land use.
4. **Heritage and Cultural Preservation:** Including overlays to conserve historic buildings, landscapes, and areas of cultural significance, ensuring development respects and enhances heritage values.
5. **Infrastructure Planning:** Integrating provisions for essential infrastructure such as transport networks, utilities, parks, and community facilities to support new developments.
6. **Community Engagement:** Outlining processes for community consultation and participation in planning decisions to ensure residents and stakeholders contribute to shaping their neighborhoods.

In summary, Victorian planning schemes provide a comprehensive set of tools for managing land use, protecting the environment, conserving heritage, planning infrastructure, and engaging communities in the planning process. These instruments are crucial for promoting sustainable development and enhancing the quality of life across Victorian cities. This paper examines how these combined structural and strategic frameworks integrate environmental values through overlays, zones, and additional mechanisms such as Development Contribution Plans (DCPs) and Public Open Space Contributions (POSCs). Each planning scheme incorporates a Municipal Planning Strategy (MPS) and a Planning Policy Framework, which set out high-level directions, strategies, and policies to guide environmental and landscape management, natural resource protection, and risk mitigation within each municipality. Environmental and landscape values encompass various types of open spaces and landscapes, including marine and coastal environments, water bodies and wetlands, alpine areas, and other significant landscapes and environments (Fig. 6 & Fig. 7).

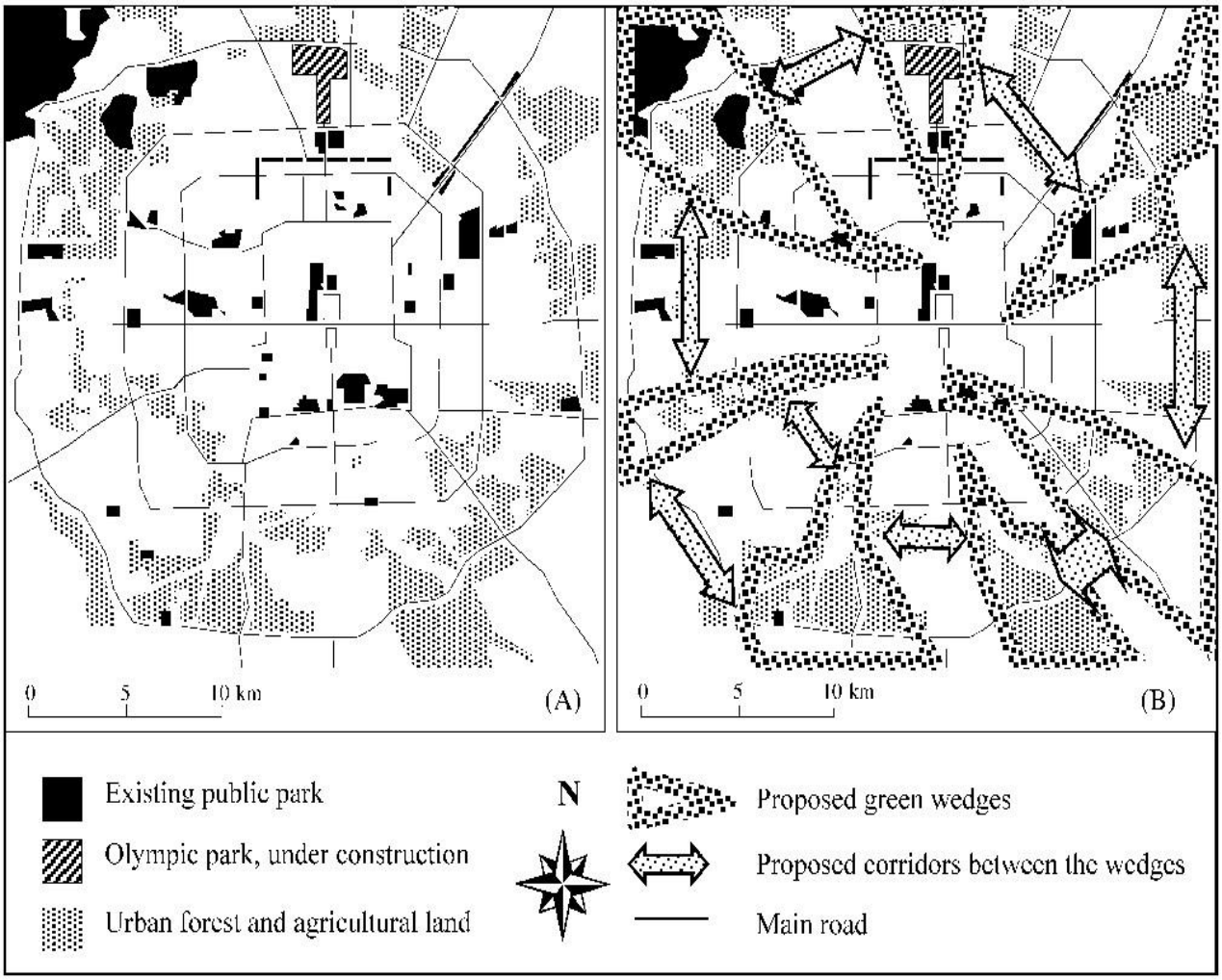

Figure 6. The existing greenspace vis-à-vis greenspace planning at the city and the neighborhood scale of Beijing: (A) the existing greenspace; (B) proposed green wedges and green corridors based on landscape ecological principles for the future development of Beijing (Feng et al., 2005).

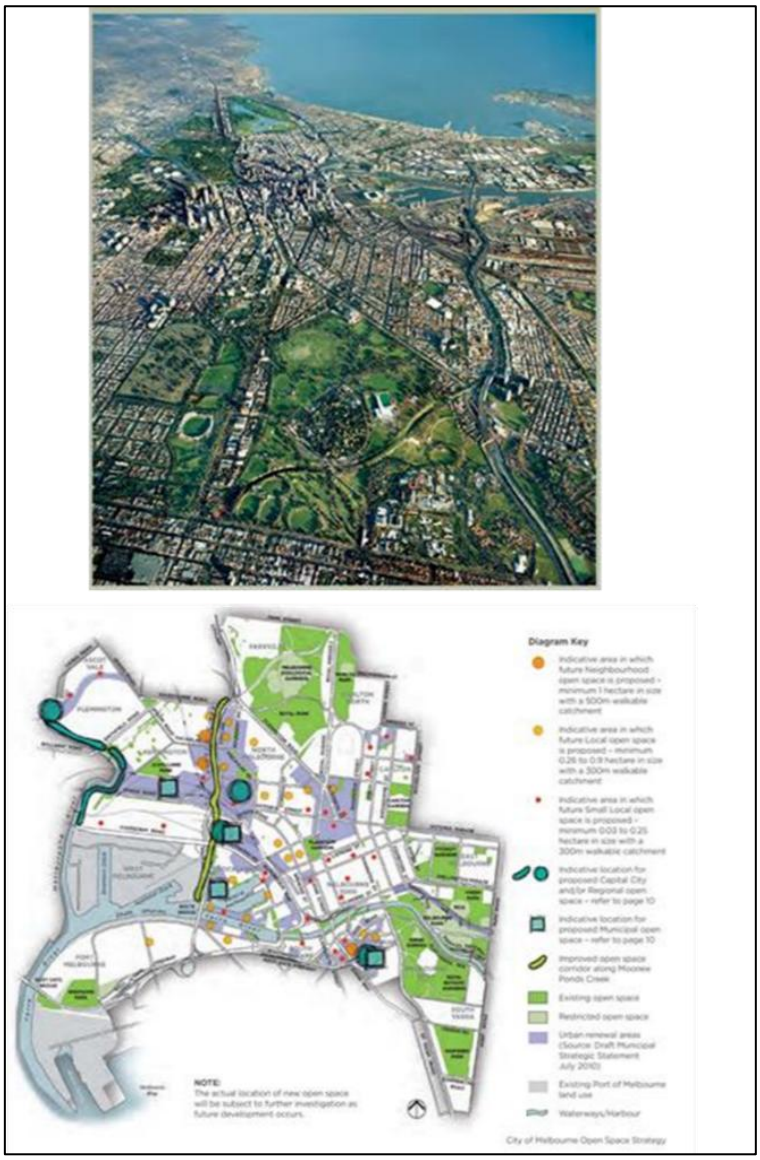

Figure 7. The strategic plan for green spaces in the central part of Melbourne, Australia (City of Melbourne, 2012)

3.2.1. Structural Plans, Development Contribution Plans (DCP), and Public Open Space Contributions (POSC)

In addition to comprehensive and strategic plans, urban areas rely on sectional plans like structural plans to guide and manage future development. These documents outline the framework for specific areas—be it residential zones, commercial centers, or tourist districts—often supplementing the city's comprehensive plan or Planning Scheme in Victoria, Australia. Structural plans include provisions for green spaces as integral components of development. They ensure developers adhere to designated land use policies and regulations, integrating green spaces from the outset to preserve their ecological, social, and aesthetic values. Development Contribution Plans (DCPs) and Public Open Space Contributions (POSC) are crucial tools in urban planning (City of Melbourne, 2012). They mandate developers to enhance public infrastructure, including green spaces, as part of development approvals. DCPs specify financial contributions to fund necessary infrastructure, supporting urban growth with adequate amenities (Victoria, Department of Transport and Planning, 2025a). POSC requires a portion of developed land to be allocated for public open spaces or mandates financial contributions for their creation and maintenance elsewhere in the city. This ensures urban expansion meets community needs for recreation and environmental conservation. By integrating structural plans, DCPs, and POSC into urban planning, cities can effectively manage and safeguard their green spaces. These tools promote sustainable and livable urban environments where green spaces are prioritized as essential infrastructure.

1. **Needs Analysis:** Initially, the needs and priorities for urban open and green spaces are identified. This may include public gatherings, recreational areas, parks, squares, etc.
2. **Design and Planning:** After accurately understanding the needs, open and green spaces are designed. This design includes zoning areas, types of plants, recreational equipment, urban furniture, and other components related to open spaces.
3. **Resource Allocation:** The DCP is created to secure financial resources for various project implementations. Resources may cover construction costs, equipment, maintenance, and management.
4. **Forecasting:** Based on the created plans and maps, various forecasts are made, such as area alignment, environmental impacts, population density, traffic, etc.
5. **Implementation and Follow-up:** After resource allocation and forecasting, the process of implementing open and green space projects begins. This may involve constructing and installing equipment, planting vegetation, building pathways, etc. Continuous monitoring and follow-up are also crucial to ensure the objectives are met and the spaces are used effectively.
6. **Evaluation and Improvement:** Over time, urban needs and conditions may change. Therefore, DCPs and open space projects require ongoing evaluation to make necessary improvements and adapt to urban changes.

DCPs play a crucial role in urban planning by creating and preserving open and green spaces, contributing to a beautiful, healthy, and recreational environment for city residents. Another effective tool for planning and implementing green spaces in residential areas is the Public Open Space Contribution (POSC). Under this framework, developers preparing and subdividing land are required to allocate 5% of the land area or its equivalent value to the urban management authority. These financial contributions are earmarked for creating or enhancing public open spaces such as parks, squares, walking paths, and recreational areas within the locality. POSC ensures that urban development mitigates its environmental impacts and supports community wellbeing, aligning with regional urban development plans and regulations (Fig. 8).

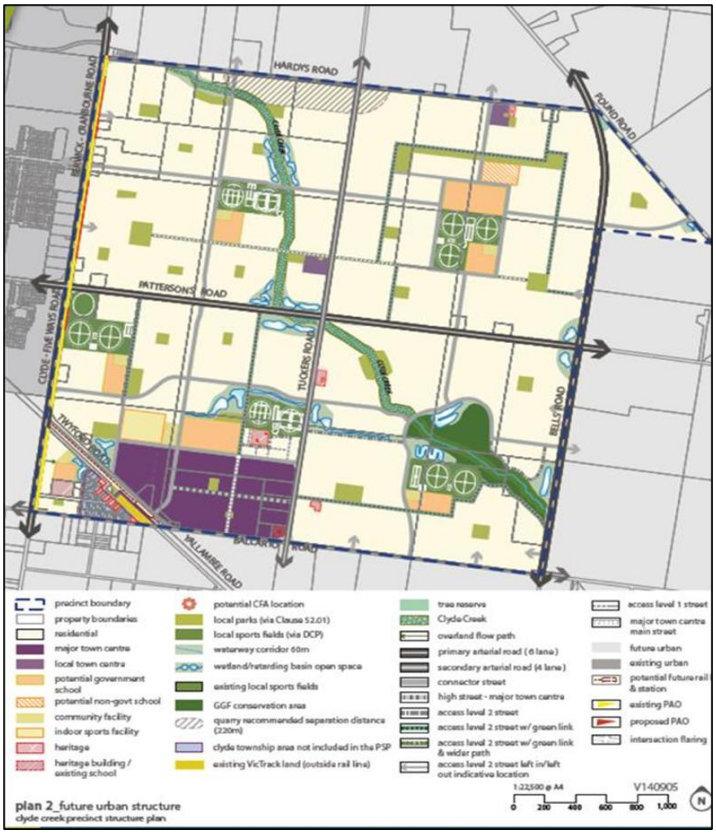

Figure 8. Clyde Creek Precinct Structure Plan. In this plan, green spaces have established their position as the primary framework, not an additional or overlooked element in the city structure (Victorian Planning Authority, 2015).

3.2.2. Utilizing Zones and Overlays as Statutory Planning Tools for Managing Open Spaces and Coastal Landscapes

Open and green spaces in urban areas serve multiple functions beyond social and recreational roles. They can prioritize the conservation of native plant species and ecological integrity over purely aesthetic or leisure values. These environmental and ecological aspects often transcend conventional green space categories on urban maps. To address these diverse roles, urban planning in Victoria, Australia, employs supplementary tools such as zones and overlays within planning schemes. These overlays are specifically applied to open space areas like parks, foreshores, and riverbanks to highlight their unique attributes. These may include scientific research significance, ecological importance, historical value, or aesthetic appeal (Victoria, Department of Transport and Planning, 2025a). For example, areas with historically significant trees might be protected by a Heritage Overlay, ensuring their preservation alongside other environmental considerations. These zoning and overlay tools are essential in managing and protecting Victoria's open and green spaces effectively. Some of the zones and overlays used in urban planning for open and green spaces in Victoria include:

- **Environmental Significance Overlay (ESO):** Applied to green spaces with environmental and ecological value, such as wetlands and coastal green spaces, or
- green areas that play a role in soil stabilization.
- **Public Park and Recreation Zone (PPRZ):** Emphasizes the recreational and leisure features of parks and green spaces. For example, the Shah Goli Park in Tabriz is considered an open and green space of this type.
- **Significant Landscape Overlay (SLO):** Focuses on important aesthetic, cultural, or historical features of a landscape. Historical gardens or natural landscapes like the Ein Ali Mountains are examples of such open spaces.
- **Urban Floodway Zone (UFZ):** Defines areas prone to flooding during heavy rainfall seasons, identifying them for specific management to mitigate flood risks.
- **Biodiversity Conservation Zone (BCZ):** Identifies green spaces with biological significance and endangered species. These areas might include native plants that are more resilient to the local climate or create suitable ecosystems for local wildlife, such as specific flowers that endangered butterflies rely on for their habitat.

The use of zones and overlays in urban planning allows planners to preserve and manage green spaces based on their distinctive characteristics and values. This approach integrates ecological, historical, and recreational considerations into urban development, fostering sustainable city planning. The following section illustrates how these overlays have been applied in three coastal cities in Victoria to protect their natural environments and foreshores. This initiative aims to balance aesthetic, social, and ecological attributes while ensuring the ecological functions of urban open and green spaces and managing flood risks. The cities are selected here because the author has visited all of them and, therefore, their review is not solely based on desktop research but also relies on lived experience. They are smaller in size and population than the South-Asian cases discussed earlier, but the goal is not to compare them directly. Rather, they serve as concrete examples demonstrating how statutory tools—particularly zones and overlays—function in practice to shape, protect, and manage coastal landscapes and can offer transferable insights applicable to the South-West Asian cases.

4. Victorian Case Studies: Warrnambool, Port Campbell, Lorne – Using overlays to manage complex environmental and landscape challenges

The three Victorian cities studied operate under different landscape conditions yet use similar overlay tools—ESO, SLO, BMO, LSIO—to manage environmental and landscape risk. Table 2 summarizes key features. Field evidence confirms that these tools shape vegetation management, development setbacks, dune protection, and hazard mitigation. Located along the iconic Great Ocean Road—one of Australia’s most scenic coastal corridors—these settlements provide a clear

view of how statutory planning tools operate within complex, high-value coastal landscapes. Their shared geography allows the study to trace how overlays respond to different environmental pressures while maintaining consistent regulatory intent across municipalities (Fig. 9).

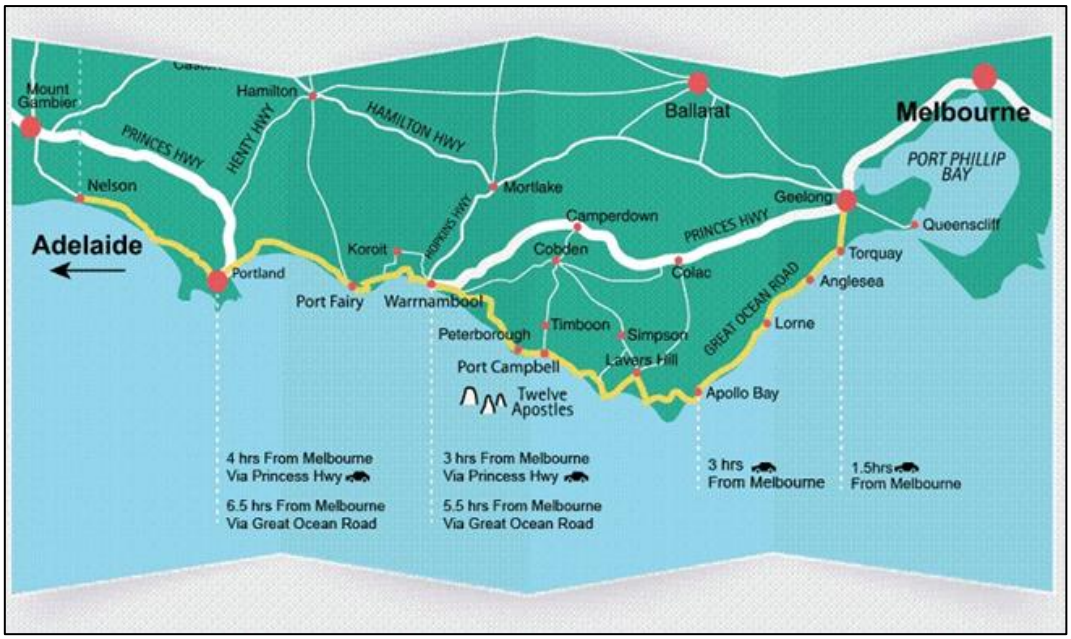

Figure 9. Warrnambool, Port Campbell, and Lorne, three coastal cities along the Great Ocean Road in Victoria, Australia (Joogo Style, n.d.).

Three cities along this corridor, including Warrnambool, Port Campbell, and Lorne, are selected for a detailed examination of their coastal landscapes and the application of overlays and Victorian Planning Provisions (VPP) tools for their management. The information and data for these cities are collected from their planning schemes and overlay maps, which are publicly available through the Department of Transport and Planning website: https://www.planning.vic.gov.au/planning-schemes

A site visit to each city, particularly to their coastal landscapes, was also undertaken between 2023 and 2024.

Located on Victoria's southwest coast, Warrnambool is home to approximately 35,000 residents. It's known for its rich maritime heritage, highlighted at Flagstaff Hill Maritime Village. The city attracts tourists with its scenic Lady Bay, popular for whale watching and beach activities. Tower Hill Wildlife Reserve offers opportunities to explore volcanic landscapes and spot native wildlife like koalas and emus (Victoria, Department of Transport and Planning, 2025b). Port Campbell is a quaint coastal town with around 400 residents, which is famed as the gateway to the Twelve Apostles. Tourists flock here to witness these iconic limestone stacks, along with other natural wonders like Loch Ard Gorge and the rugged cliffs of Port Campbell National Park. The town offers a quiet base for exploring the dramatic coastal scenery of the Great Ocean Road (Victoria, Department of Transport and Planning, 2025c).

Lorne is a vibrant seaside town with about 1,200 inhabitants located in the Surf Coast Council. It's a popular beach destination renowned for its surf culture, annual Pier to Pub swim race, and scenic attractions. Visitors enjoy the Great Otway National Park's lush rainforests and waterfalls, such as Erskine Falls, as well as panoramic views from Teddy's Lookout over the rugged coastline and Great Ocean Road (Victoria, Department of Transport and Planning, 2025d).

Table 2 summarizes the landscape features of these three cities and the relevant overlays used to control and manage their environmental values, excluding considerations of flooding, integrated water management (IWM), and water pollution, as these primarily affect off-site coastal areas, rivers, catchment areas, and city drainage networks. Urban open and green spaces serve a crucial yet often overlooked role in urban flood management. Cities face persistent challenges with

flooding, exacerbated by impermeable surfaces like asphalt and waterproofed rooftops that prevent natural water absorption. In contrast, the concept of a "sponge city" and Water Sensitive Urban Design promotes urban areas designed to absorb rainfall, reducing surface runoff and filtering pollutants such as phosphorus, nitrogen, and fine metal particles. This approach not only mitigates flooding but also purifies stormwater, facilitating water recycling and conservation. However, the aspect of purifying and filtering stormwater before it enters urban rivers, lakes, and wetlands receives less attention from urban planners, designers, and landscape architects. While water-sensitive urban design has gained recognition for flood control, water retention, and aesthetic improvements, its focus often neglects water purification and recycling. Urban green spaces are pivotal in managing water pollution by absorbing harmful substances, particularly nitrogen. Without filtration and purification before directing surface water into urban drainage networks, it poses risks to landscapes and coastal environments. To resolve this, several methods have been invented in Australian cities. These include using sand filters for sediment capture, rain gardens, infiltration trenches, detention basins, and other techniques to delay water movement, allowing it to gradually seep into lower layers before being directed into the urban drainage system. All these methods fall under Integrated Water Management (IWM), a policy attached to Planning Schemes in the state of Victoria, Australia. Urban planners and designers are required to consider this approach in controlling and guiding urban development (Fig. 10).

Figure 10. illustrates various water-sensitive urban design strategies for managing surface water retention and flood control through the use of green spaces and permeable surfaces (Wong et al., 2020).

Table 2. Three Victorian Coastal Cities, the landscape features, and overlays used to manage them

City	Coastal Landscape	Relevant Overlays and VPP Tools	
Warrnambool	Warrnambool features rugged cliffs, sandy beaches like Lady Bay, and natural reserves such as the Merri Marine Sanctuary and Tower Hill Wildlife Reserve.	▪ Environmental Significance Overlay (ESO): Protects areas of environmental significance, including coastal and marine ecosystems. ▪ Design and Development Overlay (DDO): Ensures that development respects the coastal landscape character. ▪ Significant Landscape Overlay (SLO): The overlay aims to preserve the visual and environmental qualities of landscapes deemed important for their aesthetic, cultural, ecological, or recreational attributes.	Victoria, Department of Transport and Planning, 2025b
Port Cambell	Known for dramatic limestone formations like the Twelve Apostles, Loch Ard Gorge, and the cliffs of Port Campbell National Park.	▪ Significant Landscape Overlay (SLO): Protects the scenic and environmental values of the coastal landscape. ▪ Heritage Overlay (HO): Conserves sites of historical and cultural significance along the coast. ▪ Design and Development Overlay (DDO): Ensures that development respects the coastal landscape character.	Victoria, Department of Transport and Planning, 2025c
Lorne	Features beautiful beaches, lush rainforests, and waterfalls in the Great Otway National Park, with panoramic coastal views from locations like Teddy's Lookout.	▪ Land Subject to Inundation Overlay (LSIO): To identify areas prone to flooding and inundation. ▪ Bushfire Management Overlay (BMO): Manages bushfire risks, especially relevant in the forested areas near the coast. ▪ Public Conservation and Resource Zone (PCRZ): Protects public land with significant conservation values.	Victoria, Department of Transport and Planning, 2025d

4.1. Warrnambool, a city by the ocean

Warrnambool, celebrated for its stunning ocean vistas, expansive sandy beaches, and scenic trails, has been actively revegetated by the Department of Environment, Energy, and Climate Action (DEECA) to safeguard its dune system from erosion. These dune systems—especially those around Lady Bay and the Merri Marine Sanctuary—function as critical natural infrastructure that buffers the coast from storm surges, maintains beach stability, and supports ecological diversity (Fig. 11).

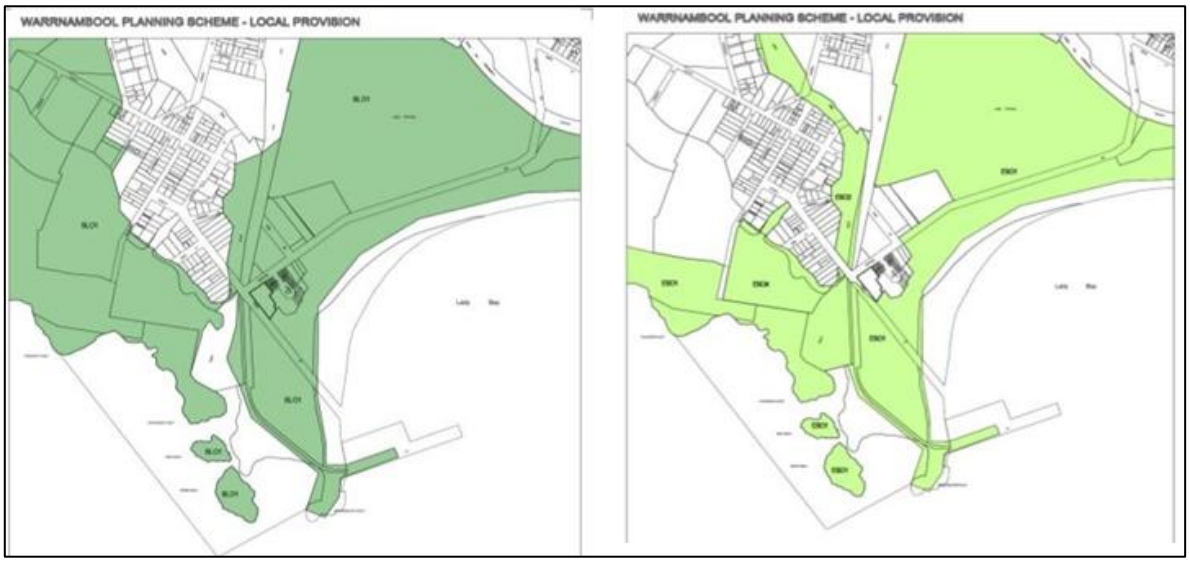

Figure 11. ESO and SLO are used to protect the coastal landscape in Warrnambool, covering areas along Lady Bay Beach from Breakwater to Logans Beach (Victoria, Department of Transport and Planning, 2025b).

Adjacent to Warrnambool Foreshore, Lake Pertobe serves as a recreational and ecological green space covered by the Environmental Significance Overlay (ESO). It plays a crucial role in Integrated Water Management (IWM), purifying collected and filtered runoff water from the city's drainage system. This dual function supports the lake as a habitat for numerous species while also preventing pollutants and floodwaters from entering the sea. Nonetheless, the coastal landscape remains a contested space, utilized by various groups for different purposes. Surfers and swimmers relish the water, horse riders wash their steeds in the sea, and some residents often view the newly vegetated landscape as an obstruction to their oceanic views, occasionally advocating for the removal of parts of this picturesque environment. This underscores the inherent complexity of managing such a multifaceted setting, necessitating a delicate balance between ecological preservation and accommodating the community's diverse interests. Warrnambool, known for its attractive ocean views, large sandy beaches, and trails, has been revegetated by the DEECA to protect the dune system from erosion. The dune system, particularly around Lady Bay and the Merri Marine Sanctuary, plays a critical role in coastal protection and biodiversity. These dunes act as natural barriers against coastal erosion and storm surges, safeguarding inland areas and maintaining beach stability (Warrnambool City Council, 2024) (Fig. 12).

Figure 12. (Left) Revegetation of the Warrnambool foreshore by DEECA, aimed at safeguarding its dune system from erosion. (Right) Lake Pertobe, a scenic tourist attraction in Warrnambool, also functions as a component of integrated water and flood management (Victoria, Department of Transport and Planning, 2025c).

4.2. Port Campbell City and Landscape Management

The Port Campbell coastal landscape faces a distinct set of environmental pressures, most notably elevated bushfire risk and the fragility of its dramatic limestone terrain. These challenges are managed through the planning scheme via extensive vegetation areas covered by a Bushfire Management Overlay, which stipulates requirements for minimizing bushfire impacts. The interplay between its iconic coastal formations and the surrounding vegetated hinterland makes Port Campbell a landscape where hazard management and conservation must operate simultaneously (Fig. 13).

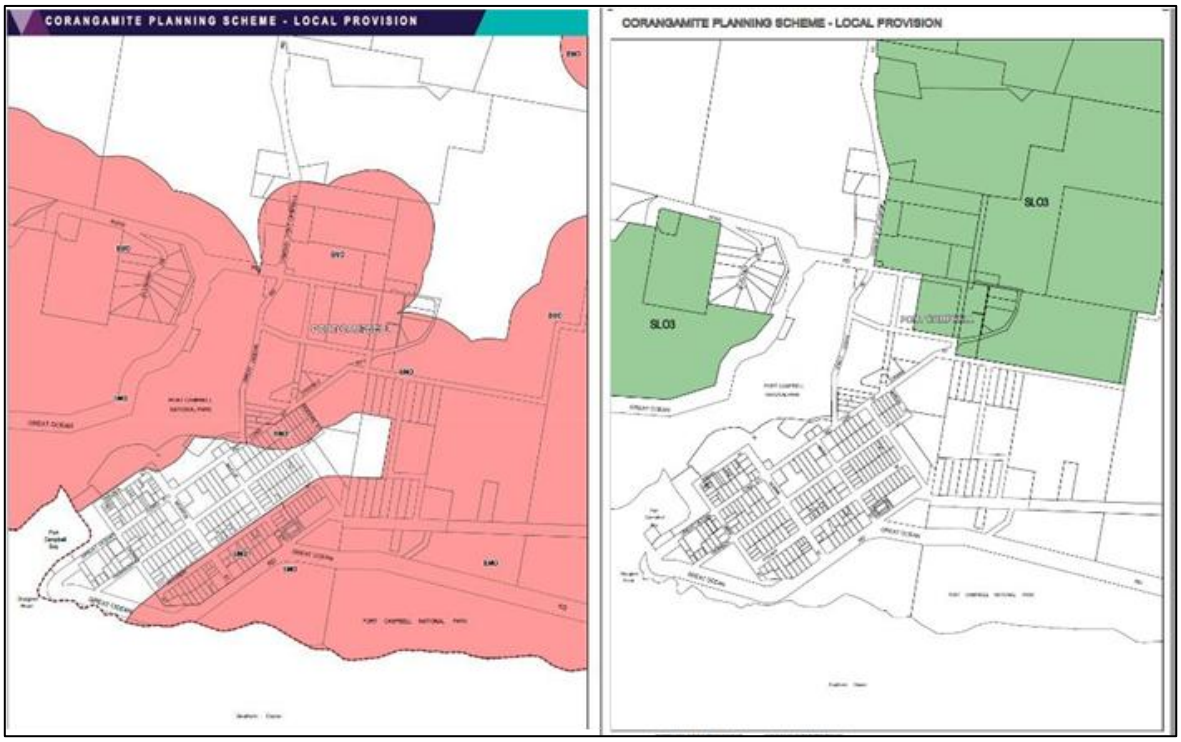

Figure 13. depicts the Bushfire Management Overlay (BMO) and Significant Landscape Overlay (SLO), crucial overlays implemented across the landscape surrounding Port Campbell's coastal areas. These overlays are essential for safeguarding and managing the landscape amidst climatic challenges. (Victoria, Department of Transport and Planning, 2025c).

4.3. City of Lorne and Landscape management via planning scheme

The City of Lorne is characterized by its strategically positioned built environment, nestled within a natural green backdrop that overlooks the sea. The buildings follow the natural contours, seamlessly blending into the landscape. Most relevant to this paper are the overlays applied to the city, including the Environmental Significance Overlay (ESO), which covers rivers, and the Significant Landscape Overlay (SLO), which encompasses most of the bushland. Sited along steep forested slopes and a narrow coastal edge, Lorne presents a complex planning context where environmental sensitivities, scenic values, and development pressures converge.

In the Surf Coast Municipality, areas outside of Lorne are subject to the Salinity Management Overlay (SMO). This overlay is implemented to address salinity issues in specific regions, ensuring that land use and development practices mitigate potential environmental impacts and safeguard agricultural productivity. The overlay tool helps planners incorporate issues that might typically be handled by other disciplines, such as soil engineers or environmentalists, directly into the planning scheme. This integration adds a layer of control over these issues, ensuring they are systematically addressed and managed within the broader framework of land use planning and development (Fig. 14).

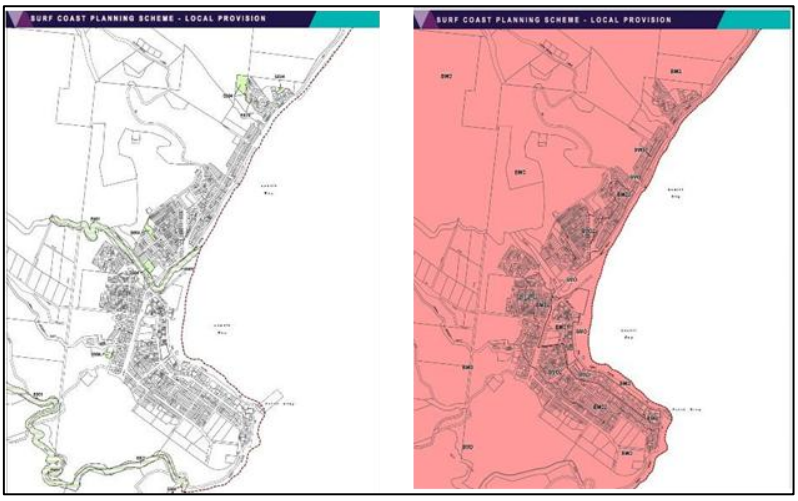

Figure 14. The Environmental Significant Overlay (ESO) covers the riparian landscape, while the Bushfire Management Overlay (BMO) extends over most of the surrounding vegetation near the city of Lorne (Victoria, Department of Transport and Planning, 2025d).

A Land Subject to Inundation Overlay (LSIO) covering the mouth of the river and a Heritage Overlay (HO) are additional overlays that play crucial roles in coastal land use planning and development management in Lorne. These overlays are essential in regulating development near flood-prone areas and preserving historical and cultural heritage sites. They ensure that urban planning in coastal regions like Lorne considers both environmental resilience and cultural conservation, further enhancing the sustainable management of urban open and green spaces. Figure 15 underscores the landscape as an integrated system comprising rivers, vegetation, buildings, and roads. To sustainably manage and control this complex system, it is essential to employ tools that address all these elements comprehensively, rather than treating them in isolation. Notably, the overlay maps are linked to a suite of schedules that provide regulations and provisions, which statutory planners use to assess land use and development applications in order to issue permits. Therefore, they are not solely maps but are combined with accompanying textual documents. This enables councils (municipalities) to include and update relevant data—such as updated sea level rise projections, flood maps, bushfire risk changes, or advice from fire authorities—into their planning schemes, ensuring these issues are actively addressed daily rather than remaining as high-level management plans that gather dust.

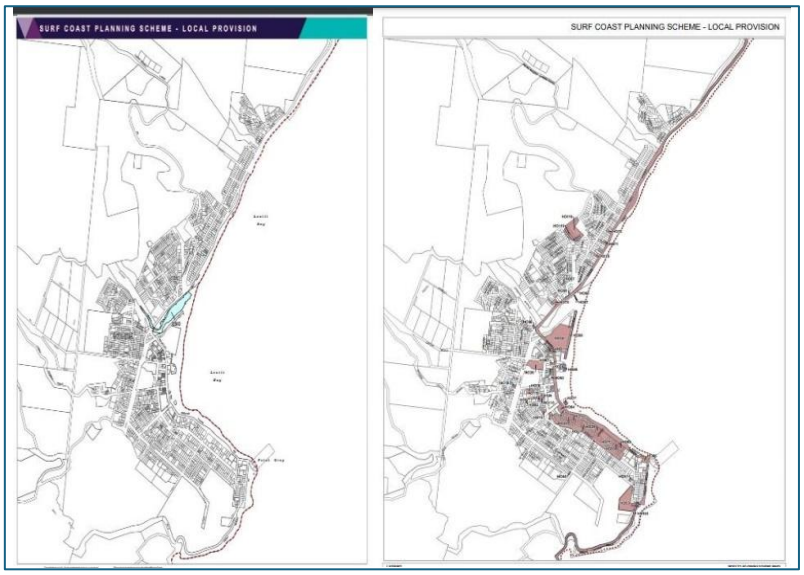

Figure 15. A Land Subject to Inundation Overlay (LSIO) covering the mouth of the river and a Heritage Overlay (HO) extending along the coast covering both the built environment and native trees and roads in Lorne. Landscape as an integrated system (Victoria, Department of Transport and Planning, 2025d).

5. Discussion

Findings confirm that the VPP model illustrates how statutory–strategic integration operationalises environmental protection. Overlays convert ecological data into enforceable regulations, enabling municipal planners to evaluate applications against flood, bushfire, biodiversity, and landscape risks. In doing so, Victoria demonstrates that environmental protection becomes effective not simply through aspirational strategies but through their translation into binding, spatially-precise statutory instruments. Theoretical alignment:

– Integrative planning theory (Healey, 1997) supports linking environmental data with statutory decision-making.

– Adaptive governance literature emphasizes decentralised, data-driven local authority roles.

– Landscape planning theory underscores the importance of ecological networks and hazard mitigation.

Together, these frameworks reinforce the argument that environmental outcomes depend on institutional capacity to embed ecological knowledge within day-to-day regulatory processes, rather than treating it as an external or advisory layer.

Barriers to localisation in Iran/UAE:

- Centralised hierarchy restricts municipal authority to issue binding controls.
- Lack of digital spatial data limits overlay-style tools.
- Fragmented governance leads to inconsistent implementation.
- Economic imperatives dominate approvals, reducing environmental leverage.

These constraints highlight a structural gap: while strategic visions in Iran and the UAE increasingly reference sustainability and resilience, municipalities lack the statutory, digital, and institutional mechanisms required to operationalise these goals. The Victorian model illustrates not a one-to-one template, but a transferable principle: environmental protection depends on integrating scientific data within the legal and spatial fabric of planning schemes.

Urban open and green spaces, particularly in coastal landscapes, encompass a wide range of values, including social, cultural, civic, and aesthetic dimensions. However, their critical role in addressing environmental challenges, such as flooding, erosion, bushfires, and pollution, has often been underemphasized. This paper demonstrates that coastal landscapes, particularly in West Asian countries such as Iran and the UAE, function as essential ecological infrastructure, delivering services that are increasingly indispensable under climate change. Their management, therefore, cannot be confined to beautification or tourism agendas.

Local municipalities, as the authorities directly responsible for land use and development management of coastal areas, require sophisticated tools to link their daily application assessments with broader strategic plans and policies. The Victorian examples show that overlays create this missing bridge: hazard and ecological data become embedded within permit triggers, referral processes, and development conditions, ensuring that climate risks are addressed consistently and transparently.

Particularly from a climate change perspective, they need to integrate environmental hazards—such as bushfire, flooding, sea level rise, pollution, and land erosion—into their comprehensive and detailed plans. This integration is often lacking in the reviewed cities in the selected South Asian cases. Multiple authorities, hierarchical government gaps, non-participatory approaches, and fragmented planning all pose challenges for integrated coastal management and planning. These challenges highlight the need to explore alternative tools and approaches that have been examined and tested elsewhere under similar conditions. With this mindset, three Victorian cities and their planning schemes have been selected for review.

The examination of urban planning tools and methods in Victoria, including comprehensive and structural plans, Development Contribution Plans (DCPs), Public Open Space Contributions (POSC), and the use of zoning and overlays, highlights that effective management and protection of these spaces require an integrated, coordinated, and interdisciplinary approach. Applying environmental, heritage, and ecological overlays, alongside strategic policies, enables planners to

safeguard ecological, cultural, and social values while preventing uncoordinated or piecemeal development. Crucially, the case studies from Warrnambool, Lorne, and Port Campbell demonstrate that environmental overlays only function effectively when aligned with ecological monitoring, engineering advice, heritage assessment, and landscape planning expertise.

To effectively address future challenges—sea-level rise, climate change impacts, pollution, and development pressures—municipalities must invest in specialists in environmental studies, urban ecology, and water-sensitive urban design. These professional capabilities are essential to maintain the ecological functions of coastal landscapes and to ensure that statutory tools evolve in response to new data and climate projections.

Finally, this study emphasizes the value of learning from international experiences, particularly the lessons from Victoria, for West Asian countries facing accelerated coastal transformation. Employing integrated planning tools, interdisciplinary approaches, and community engagement can ensure that green and coastal landscapes are preserved as natural and social assets for future generations while simultaneously maximizing economic, social, and environmental benefits. The centralized planning system in Iran, along with weak or fragmented strategic planning and siloed operations, presents challenges for the adaptation of these tools; however, the Victorian framework demonstrates that statutory flexibility can coexist with central oversight if clear spatial data, transparent schedules, and predictable regulations are put in place.

6. Conclusion

This study concludes that coastal cities require integrated statutory–strategic planning frameworks to address escalating climate risks. Victoria demonstrates that overlays, zones, and contribution mechanisms operationalise environmental protection by embedding ecological data directly into permit systems, transforming broad sustainability goals into enforceable development controls.

Limitations

- Fieldwork limited to three Victorian cities, small in population scale.
- Iran/UAE analysis relies partly on secondary literature due to restrictions on access and transparency.
- The study does not assess long-term ecological outcomes of overlays.

These limitations suggest caution in generalising findings but do not undermine the broader relevance of statutory–strategic integration as a conceptual model for coastal governance.

Future Research

- Ecological monitoring of overlay effectiveness (ESO, SLO, BMO longitudinal studies).
- Governance reform pathways for Iran/UAE municipalities.
- Testing hybrid statutory tools suitable for centralised systems.

Advancing these areas will help clarify how integrated planning frameworks can be adapted to diverse political and institutional contexts, particularly those where municipalities have limited autonomy but still bear the burden of managing climate and development pressures.

Conflict of Interest

The authors report no conflict of interest.

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Access to Materials and Data

The data of this research will be accessible through correspondence with the authors.

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