Shenzhen Bay Park is adjacent to two Ramsar sites, the Futian Mangrove Nature Reserve and Mai Po Nature Reserve (image by author, 2025).

LANDSCAPE
REVIEW

Redefining landscapes through the lens of the East Asian–Australasian Flyway

BENNI YU-LING PONG

Climate change and biodiversity loss have heightened global awareness of environmental design, unfolding paradigms of ecological design in landscape architecture. Concepts such as Nature-based Solutions, urban nature, biophilic design and sponge city have emerged and are increasingly being incorporated in landscape design projects. Yet many of the current landscape projects remain inherently fixed, bounded and site-based, limiting their capacity to address the escalating challenges of global ecology questions. Meanwhile, conservationists have embraced a transboundary perspective. The East Asian–Australasian Flyway Partnership, for instance, demonstrates how regional conservation efforts, by perceiving wetlands and habitats across the region as interconnected entities, can achieve significant outcomes to conserve migratory birds. Understanding the Asia Pacific region through the lens of migratory birds therefore involves blurring the boundaries of nations. It follows that, rather than being seen in isolated fragments, an archipelago is more constructively perceived as a vast, integrated ecosystem network crucial to global environmental issues. Against this background and with reflection on mainstream landscape architectural practice on ecological design in Australasia-Pacific, this paper contends that prevailing ecological frameworks in design have to be redefined epistemologically to advance a multi-scale ecology and adopt an ecological network approach.

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Introduction

In 2006, the documentary *An Inconvenient Truth* marked a pivotal moment in the trajectory of environmental conservation. The film vividly illustrated that climate change and biodiversity loss were global threats that one could no longer deny. Environmental awareness was subsequently mainstreamed, gaining significant public and media attention. That same year, the 8th Meeting of the Conference of the Parties to the Convention on Biological Diversity was held in Curitiba, Brazil, where a landmark decision was made to adopt a programme of work on island biodiversity. This programme not only recognised islands as 'self-contained ecosystems with well-defined geographical limits' but also emphasised the need to holistically address their 'close connectivity and vulnerability' and the influence of both 'upstream activities and downstream ecosystems', positioning islands as interconnected systems at the interface of marine and terrestrial ecology (Convention on Biological Diversity, 2006).

For many avifauna specialists, 2006 was also memorable for the establishment of the East Asian–Australasian Flyway Partnership (EAAFP), founded under the mission that 'migratory waterbirds and their habitats in East Asian–Australasian Flyway are recognised and conserved for the benefit of people and biodiversity'. The EAAFP conceptualises wetlands and habitats within a 'flyway-wide framework' – an ecological network that also operates as a platform for sharing research, information and data, while fostering collaboration among diverse stakeholders. These stakeholders range from governments and intergovernmental organisations to non-governmental organisations, academic institutions, private sector organisations and community groups (EAAFP, 2025a). Today, the EAAFP includes 42 partners across 22 countries and regions, including 18 national governments (EAAFP, no date). It further frames the flyway as an integrated socio-ecological system, foregrounding interdependencies among habitats, species and multi-scalar governance, with researchers and conservationists acting as key facilitators of transboundary knowledge exchanges.

KEY WORDS
landscape ecology; migratory flyway; ecological network; multi-scale framework

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Meanwhile, over the past two decades, landscape architecture has undergone a paradigm shift, shaped by heightened global awareness of environmental and ecological concerns to confront climate change and biodiversity loss. Concepts such as biophilic design (Kellert, 2018) and sponge city (Yu, Gies and Wood, 2025) have emerged and are increasingly incorporated into professional practices of landscape architects, architects, engineers and planners. Recent discussions have also turned towards integrating the standards and frameworks of the International Union for Conservation of Nature (IUCN) on Nature-based Solutions (IUCN, 2025) and Urban Nature Indexes (IUCN, 2023) into design and planning.

Yet, in contrast to the transboundary perspective embraced by ecologists, many current landscape projects remain inherently fixed, bounded and site-based, reflecting the limited scope and boundaries of individual projects. One manifestation of this perspective is projects that narrowly interpret ecological concepts and oversimplify ecological complexity. For example, the holistic definition of Nature-based Solutions – encompassing protection, management and restoration of ecosystems and criteria to address multiple societal challenges – is often reduced to tree planting or a native-versus-exotic species binary.

These limitations in the current perspective raise critical questions. How might landscape design refine its ecological understanding and expand its capacity to respond to escalating global ecological crises? What lessons can be drawn from the EAAFP, which conceives wetlands and habitats across the region as interconnected entities and has achieved significant outcomes in the conservation of migratory birds?

The East Asian–Australasian Flyway

Stretching from the Russian Far East and Alaska through East Asia and Southeast Asia to Australia and New Zealand, the East Asian–Australasian Flyway (EAAF) supports 28 to 68 million migratory waterbirds from over 250 different populations, including 36 globally threatened species and 19 Near Threatened species (EAAFP, no date). EAAF is recognised as one of the most imperilled flyways out of the nine major flyways in the world, primarily due to the rapid development across the region (figure 1).

International collaborations on the conservation of migratory waterbirds can be traced back to 1996, when the Asia Pacific Migratory Waterbird Conservation Strategy was initiated by Wetlands International Asia and the International Waterfowl and Wetlands Research Bureau – Japan Committee. Implemented from 1996 to 2000, this strategy aimed to establish a preliminary framework for waterbird conservation (Wetlands International – Asia Pacific, 1996). It was subsequently renewed and further developed for 2001–2005 by the Asia-Pacific Migratory Waterbird Conservation Committee (Asia-Pacific Migratory Waterbird Conservation Committee, 2001). Building on these achievements, the East Asian–Australasian Flyway Partnership was launched in 2006, with its inaugural meeting in Bogor, Indonesia, hosted by the Directorate General of Forest Protection and Nature Conservation of the Ministry of Forestry, Government of Indonesia (EAAFP, 2006). Since then, its Implementation Strategy has been iteratively updated across successive periods of 2007–2011, 2012–2016 and 2019–2028 and translated into 15 languages.

Figure 1. The East Asian–Australasian Flyway (redrawn by the author with data permission from BirdLife DataZone, 2026).

As of November 2025, the Flyway Site Network comprised 159 internationally important sites for migratory birds, forming a transnational ecological network. Within this framework, governments and partners across the region have agreed on common objectives, indicators and working plans, all grounded in a 'flyway-wide approach' to strengthen and promote conservation efforts. Despite the positive nature of these initiatives, however, it is important to avoid romanticising them and to acknowledge the challenges inherent in their implementation. Conscious of this concern, at the recent EAAFP meeting in Cebu, Philippines, participants undertook an integrated analysis of progress, challenges and opportunities to inform future implementation plans (EAAFP, 2025b). Nevertheless, the flyway-wide approach provides valuable insight into how transboundary collaborations can shape regional landscapes and advance ecological resilience.

Migratory bird conservation is also integrated into broader forms of regional collaboration. In 2021, the Asian Development Bank, in partnership with BirdLife International and EAAFP, launched the Regional Flyway Initiative as a model of nature-positive investment grounded in Nature-based Solutions (Asian Development Bank, 2021). These high-level engagements within the political and economic frameworks of the region are premised on the recognition that ecology and conservation cannot operate in silos. Instead, they require cross-disciplinary and strategic approaches to inform decision-makers and strengthen conservation interventions.

Two contrasting stories

The stories of two bird species that migrate across the EAAF illustrate the critical role of multi-scale ecological approaches in guiding landscape design and planning for regional conservation initiatives.

Black-faced Spoonbill

Decades of international conservation efforts have successfully downlisted the Black-faced Spoonbill (*Platalea minor*) from Endangered status to Vulnerable status on the IUCN Red List (figure 2). The population of this species has shown a remarkable recovery, increasing

from approximately 400 individuals in 1995 to 7,081 in 2025. Historically, the species was assessed as Threatened in 1988, reclassified as Critically Endangered between 1994 and 1996, and listed as Endangered from 2000 onward (IUCN, no date).

Extending beyond making an ecological statement, conservation efforts are embedded within political, socioeconomic and cultural perspectives. According to the IUCN Red List, the Black-faced Spoonbill has a geographic range spanning North and South Korea, the Russian Far East, parts of China, Taiwan, Hong Kong, Macau, the Philippines, Thailand and Vietnam. The species breeds at only 11 sites, including the Demilitarized Zone (DMZ) between the two Koreas — an accidentally 'pristine' ecological refuge, undisturbed by the human activities that threaten many natural environments.

As a migratory species, the Black-faced Spoonbill depends on multiple stopovers along its flyway. Yu Yat-tung, Director of the Hong Kong Bird Watching Society and Coordinator of the EAAFP's Black-faced Spoonbill Working Group, emphasised that each stopover is critical and likened bird migration to 'a battle for survival' (Hong Kong Bird Watching Society, 2025). For this bird species, various landscapes and habitats across the flyway serve distinct functions — for breeding, non-breeding passage, roosting or feeding. The precision that birds use to locate suitable stopover sites is vital to conserving energy. Failure to locate them can be fatal.

In this regard, any deterioration in the size or quality of conservation areas, or limitations on the expansion of new habitats, could act as a population check or create a 'bottleneck for growth'. Indeed, despite the overall increase in Black-faced Spoonbill numbers regionally, the population in Deep Bay, Hong Kong has remained stable, with an average peak of 433 individuals between 2018 to 2023 and no decline in numbers above 20 per cent in any given year.

The lack of a noticeable increase raises uncertainty as to whether carrying capacity has been reached in this particular site (Agriculture, Fisheries & Conservation Department, 2023). While minimising further disturbance from development and enhancing the wetland habitat restoration programme would certainly help the protected species, a holistic study of the Black-faced Spoonbill's current patterns of habitat selection in the region is needed to understand today's dynamics in the ecological network. In September 2025, EAAFP, the Economic and Social Commission for Asia and the Pacific and the North-East Asian Subregional Programme for Environmental Cooperation together organised a technical review meeting on the revision of the International Single Species Action Plan for the Black-faced Spoonbill, which was launched in 1995. The meeting re-examined the plan in relation to the period of 2026 to 2036, with the aim of providing further guidance for individual ecological nodes in formulating conservation and management strategies.

The story of the Black-faced Spoonbill may be one of the few successful examples of reversing the decline of a threatened species, though it remains under close monitoring. It followed the application of the IUCN Species Survival Commission's Species Conservation Cycle (SCC) – Assess, Plan, Act, Network and Communicate – and demonstrates a structured framework to guide conservation planning and action (Cano-Alonso et al, 2023). More importantly, this case illustrates that single-site approaches to design and planning are insufficient to address the ecological complexity of species conservation. Instead, what is required is long-term habitat management across multiple sites with distinctive cultural and environmental characteristics, based on a broader perspective of landscapes and habitats as interconnected networks.

Figure 2. Black-faced Spoonbills at Gei Wai in Mai Po Nature Reserve, Hong Kong (with permission from sakerpal, 2011).

Far Eastern Curlew

The story of the Far Eastern Curlew (*Numenius madagascariensis*) (figure 3) contrasts starkly with that of the Black-faced Spoonbill. The Far Eastern Curlew, the largest shorebird in the world, undertakes a remarkable migration for long-distance breeding in the northern hemisphere. Its migratory path extends from Siberia, Alaska and China to Southeast Asia and Australia (Minton et al, 2011) (figure 4).

Figure 3. Far Eastern Curlew at mudflats in Mai Po Nature Reserve, Hong Kong (with permission from Henry Lui, 2023).

Figure 4. Flyway of the Far Eastern Curlew (redrawn by the author with data permission from BirdLife DataZone, 2026).

Until 2009, the IUCN Red List assessed the status of this species as Least Concern. Yet, following a rapid population decline, its status was progressively downgraded and became Endangered in 2015. In the same year, the Far Eastern Curlew Task Force was formed within EAAFP, following a proposal by Australia at the Eighth Meeting of Partners in Kushiro, Hokkaido, Japan. According to the Victoria Wader Study Group Far Eastern Curlew Project, the endangered species is one of the 'most acute declines of any Australian shorebird species'. Its worldwide population may fall to 10 per cent of its 1993 level by 2035 if this trend continues (Wader Quest, no date).

The Far Eastern Curlew is one of the 22 bird species listed as priority species under the Australian government's *Threatened Species Action Plan 2022–2023* (Department of Climate Change, Energy, the Environment and Water, 2022). The Threatened Species Recovery Fund also supports research on habitat restoration and strategic planning for the protection of this curlew (Lileyman et al, 2021). Yet site-based conservation for migratory birds in Oceania alone may not be sufficient to save the species given that the primary threat it faces is the ongoing destruction of tidal mudflats along its migratory routes, particularly in the Yellow Sea bordered by China, the Republic of Korea and the Democratic People's Republic of Korea (EAAFP, 2017). The rapid economic growth in the region over this time prioritised development, often at the expense of the environment and natural resources. Giglio, Rillo and Stroebel (2025) argue that biodiversity loss and economic activities have a close relationship in the Asia Pacific region, particularly in Southeast Asia.

The extensive migration patterns and wide range of breeding grounds, stopover sites and non-breeding habitats present significant challenges for conserving the Far Eastern Curlew. For migratory birds, the availability of suitable habitats for feeding and roosting along their routes is essential to completing these long journeys. The critical question, therefore, is how conservation can effectively safeguard such diverse landscapes across nations and regions that differ in their socioeconomic and cultural contexts.

Although the EAAFP has formulated a Single Species Action Plan to conserve the Far Eastern Curlew, and the species was included in China's List of State Key Protected Wild Animals in 2021, the conservation task remains complex and daunting. Moreover, it has

been argued that species-specific conservation approaches may not always be the most cost-effective use of resources, particularly given they are directed toward a single species (Lloyd et al, 2023). This raises broader considerations about how conservation strategies might balance targeted interventions with ecosystem-wide approaches that address the interconnectedness of habitats and species.

Ecological network approach

Due to substantial landscape changes along the EAAF in recent years, bird distributions have been significantly affected by the gains, losses and fragmentation of habitats. These trends raise the risk of network collapse, as the loss of certain individual sites may undermine the integrity of the entire flyway and even lead to the collapse of the network (Xu et al, 2020). Beyond these visible changes, less apparent shifts may also impact the ecological network. For instance, increasing contact between migratory birds and poultry or livestock driven by land-use change and habitat loss may heighten the risk that the avian influenza virus may be transmitted and evolve (Yin et al, 2025). Site-based approaches or individual projects are no way to address such risks; in these circumstances, a broader, integrated ecological network approach is essential.

The term 'ecological network' was first developed in the 1970s in the European context and in 1996 was recognised in the IUCN World Conservation Congress (IUCN, 1996). Bennett and Wit (2001) define an ecological network as:

> A coherent system of natural and/or semi-natural landscape elements that is configurated and managed with the objective of maintaining or restoring ecological functions as a means to conserve biodiversity while also providing appropriate opportunities for the sustainable use of natural resources.

This concept is core to avoiding habitat fragmentation and establishing connectivity. Extending beyond individual structural components such as patches, buffers and corridors, an ecological network encompasses the dynamic interactions and functional connectivity inherent in the system as a whole (Jongman, Külvik and Kristiansen, 2004). It is also a concept that extends beyond land. To migratory birds, islands are not isolated fragments but part of a vast, integrated ecosystem network. In a comprehensive scientific study identifying priority wetland sites across the EAAF, Crosby and colleagues (2025) recognise the necessity of a flyway-wide perspective, emphasising that conservation strategies must account for ecological connectivity, transboundary collaboration and the cumulative pressures facing migratory species.

Further, Xu and colleagues (2022) propose a three-step scientific and quantitative approach to inform and prioritise the conservation of networks along flyways.

1. Construct a bird movement network.
2. Measure the connectivity of the movement network.
3. Determine the importance of nodes and their contribution to the connectivity of the movement network.

With its focus on identifying key sites and prioritising conservation resources, this strategy is particularly suitable to birds with long-distance migratory paths. It also aligns with the United Nations Environment Programme's Convention on Migratory Species, which recognises the importance of designing and implementing ecological networks and area-based connectivity in migratory birds conservation (United Nations Environment Programme, 2020).

Through the lens of migratory birds

When we conceive of landscape through the lens of migratory birds, we may gain a different understanding of the role of design. A waterfowl, after all, does not recognise

administrative boundaries. Conservation discourse often assumes the existence of a 'pristine' nature, idealised as intact and untouched by human influence. Even setting aside the controversy over whether 'nature' or 'first nature' still exists, it is important to acknowledge that many remnants of nature depend on cultural practices and human management to sustain ecosystems.

For instance, the Mai Po Ramsar site in Hong Kong continues to maintain the traditional Gei Wai practice, an intertidal shrimp pond operation technique from South China (Cha, Young and Wong, 1997) (figure 5). Shrimp farming was once economically profitable in Hong Kong and this practice also provided essential food sources for migratory birds.

Similarly, the coastal wetlands of Balanga, a critical site along the EAAF, are integral not only to migratory birds but also to the fisheries, tourism and economic sectors of Bataan Province in the Philippines. The nature–culture relationship is intertwined with ecological, economic and social aspects.

As such interconnections suggest, while human activities often contribute to environmental degradation, they can also play a constructive role in sustaining and enhancing ecological value. Indeed, left unmanaged, many habitats can experience ecological decline over time, or be developed and converted into brownfields.

Figure 5. Mai Po Nature Reserve in Hong Kong (image by author, 2024).

In this regard, the design and management of these cultural landscapes are inseparable from habitat conservation yet they remain overlooked. As Nassauer (1995) argues:

> Equating design with deceit leaves no room to acknowledge how design is necessary to represent and maintain ecological functions. Finally, we might assume that people know how to see ecological function, that ecosystems speak for themselves. Consequently, we might live in the landscape without knowledge of critical but invisible ecological function. In fact, invisible ecological function must be actively represented for human experience if human beings are to maintain ecological quality.

The migratory paths of waterfowl, such as the Far Eastern Curlew, span nearly the entire Asia Pacific region, extending far beyond the perceived scale and scope of most individual landscape projects. To understand the region from the perspective of migratory birds, it is necessary to blur the boundaries of nations. Far from being a series of isolated pockets, the archipelago is unveiled as a massive ecosystem. This transboundary viewpoint is crucial to addressing global environmental issues.

In searching for a definition of the Asian landscape, Rahmann and Walliss (2021) state:

> Within this framework, a region is defined as a social construction, which is constantly remade through social, economic, political, cultural interactions and interdependence, while regionalism is viewed as the 'deliberate act of forging a common platform, such as intergovernmental and transnational objectives to deal with common issues and advance a common identity' … Instead of adopting landscape as a loan word, is it not possible to develop a landscape 'inclination' that comes from Asian perspectives of nature, space and time?

From landscape ecology to multi-scale ecology

Landscape ecology emerged in the design field during the 1980s, with Forman's classical illustrations providing a structured spatial analysis to understand landscape dynamics and integrate ecological principles into design practice (Forman and Godron, 1986). The later discourse of landscape urbanism is intended to proclaim a new understanding that 'landscape has become both the lens through which the contemporary city is represented and the medium through which it is constructed' (Waldheim, 2006). Particularly significant is its emphasis on conceiving landscape and ecosystems as processes rather than static forms (Belanger, 2009).

These concepts have since been incorporated into mainstream design pedagogy and practice. Despite acknowledging the need to challenge boundaries and engage with regional scales, the paradigm of ecological design has increasingly gravitated toward city-based frameworks. *The Endless City* articulated global challenges as fundamentally urban questions (Burdett and Sudjic, 2010). The position taken in this paper is not to underestimate the importance of the urban age issues centred on cities, but rather to contend that focusing exclusively on the scale of the city risks obscuring a more effective understanding of ecology at the regional scale.

In the context of planetary environmental crises, ecology is no longer confined to designated conservation areas. Rather, it is increasingly understood as a global concern that permeates all parts of the world. International, transboundary scientific collaborations and cross-border conservation programmes such as avifauna studies have revealed the global constellation of ecological interconnections. Avifauna ecologists demonstrate that while conservation remains largely site-based, adopting a regional perspective enables ecological advocacy to be realised on a global scale.

Spatial scale and pattern constitute fundamental quests in landscape ecology. Establishing theoretical foundations and appropriate quantitative modelling methodologies to evaluate ecological interactions and landscape effects has long posed a challenge (Levin, 1992; Miguet et al, 2016; Newman et al, 2019; Peterman, 2026). Recent developments in landscape ecology have advanced beyond single-scale approaches toward multi-level frameworks in ecological networks, linking conservation across scales and emphasising a

holistic understanding of ecosystem interactions (DeLuca et al, 2023; Moracho, Normand and Ordonez, 2025). In a study of avifauna in particular, Xing, Qian and Ma (2025) introduced scale response models and habitat selection models to examine the decision-making processes of the Oriental Stork (*Ciconia boyciana*) across multiple scales.

These findings suggest that at broader scales, habitat connectivity and landscape quality are prioritised under a 'benefit-tendency' strategy, whereas at finer scales, a 'risk-avoidance' strategy dominates to mitigate disturbance and other environmental pressures affecting survival. Such research is crucial in bridging theory and practice, informing applications that range from regional landscape planning to site-specific project implementation.

In landscape architecture, there is increasing recognition of the need to integrate ecological principles and frameworks into design and planning (Hersperger et al, 2021; Steiner, 2012). Nevertheless, traditional professional approaches often rely heavily on established standards and readily available knowledge, revealing a persistent gap between disciplines (Ahern, Cilliers and Niemelä, 2014). Ecological design in landscape projects is frequently limited to analysing proximate ecological baselines and enhancing landscape quality within defined boundaries, thereby neglecting the broader vision of landscapes as interconnected systems. A multi-scale ecological perspective underscores the necessity of transcending site-based approaches and adopting a new paradigm of ecological design – one that connects and amplifies the contributions of numerous smaller projects to create transboundary and scalable interventions. Landscape designers must therefore cultivate a heightened awareness of the ecological implications of their work within larger spatial and systemic contexts.

Conclusions

If ecological design and planning are emerging as a paradigm shift in landscape architecture, then a new understanding must be articulated. The successful experience of the East Asian–Australasian Flyway Partnership, despite its ongoing challenges, demonstrates how having an ecological agenda amid substantial landscape change requires clear strategies, actionable priorities and achievable goals (Mundkur, 2006).

Viewing archipelagos and regions as interconnected networks rather than isolated sites is an idea often acknowledged, yet rarely practised in daily design work. Admittedly, planetary frameworks can appear highly theoretical and detached from practical intervention: a growing dialogue suggests that design pedagogy and practice should focus on scales perceived as more 'manageable'. Yet while gardens, parks and urban greenery represent the majority of commissions landscape architects receive from clients, it is equally important to embed a larger-scale ecological understanding from an epistemological perspective. Designers must recognise that their actions influence not only the character of landscapes within their site boundary but also the functioning of bigger ecosystems. The ecological contribution of any site depends not only on its intrinsic quality but also on its connectivity and its role within the broader network.

If the call to landscape architects of this generation is to restore landscapes as functional ecosystems in harmony with human development, then answering that call requires a fundamental shift in mindset. Ecological design cannot be simplified or constrained by prevailing frameworks that remain bound to site-based or single-scale approaches that are defined by fixed project boundaries. While valuable, in the face of global challenges these approaches are insufficient to address the complexity of ecological systems such as those of flyways. To envision a future of landscape ecology, we need to redefine design from an epistemological perspective, advancing a multi-scale landscape ecology that transcends local boundaries and embraces interconnectedness.

About the author

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