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The Role of the World Wide Fund for Nature (WWF) Hong Kong in the Conservation of Mai Po in 2013–2018

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ABSTRACT

This study examines the role of the World Wide Fund for Nature (WWF) Hong Kong in the conservation of the Mai Po wetland area during the period of 2013–2018. Mai Po, part of the East Asian–Australasian Flyway and designated as a Ramsar site, faces significant threats from urbanization, climate change, and habitat degradation. WWF Hong Kong implemented an integrated, science-based, and participatory conservation approach, including adaptive habitat management, environmental education, community empowerment, and public policy advocacy. Through programs such as Wetland School, Nature with No Barriers, and Walk for Nature, WWF successfully raised public awareness and participation in environmental conservation. In addition, WWF played a key role as a facilitator of international cooperation for migratory bird conservation across East Asia. The study reveals that WWF's success lies not only in the technical management of ecosystems but also in its ability to build cross-sectoral partnerships for sustainable conservation. These findings provide valuable lessons for similar conservation efforts in other regions facing comparable challenges.

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INTRODUCTION

The Mai Po Nature Reserve, located in the northwestern part of the New Territories, Hong Kong, is one of the most important wetland areas in East Asia, particularly within the context of the East Asian–Australasian Flyway, which serves as a migration route for thousands of waterbirds each year. This area is not only a natural habitat for more than 400 bird species, but it also plays a crucial role in maintaining regional ecological balance, flood regulation, and serves as a source of environmental knowledge and education. Since the late twentieth century, the Mai Po area has faced significant pressure due to urbanization, land-use changes, declining water quality, and global climate change. Conservation efforts have therefore become an urgent necessity, and non-governmental organizations such as WWF Hong Kong have played an important role in maintaining, managing, and restoring the Mai Po ecosystem sustainably, particularly during the period of 2013 to 2018.

The period of 2013–2018 marked an important phase in WWF Hong Kong's conservation strategy because during this time the organization implemented various integrated programs focusing on wetland conservation, restoration of natural habitats, environmental education, and public policy advocacy. WWF Hong Kong applied a science-based and collaborative approach to bridge ecological and social interests by engaging local government, educational institutions, local communities, and global actors. During this period, WWF Hong Kong strengthened the biodiversity database in Mai Po, mapped critical areas for migratory bird species, and implemented digital environmental monitoring technologies to increase habitat monitoring efficiency. Restoration activities included planting native vegetation, restoring tidal flows, and managing fishponds ecologically, which became key milestones in sustaining the ecological integrity of the area (Prasetya & Anisia, 2021).

WWF Hong Kong did not only focus on the physical and ecological aspects of conservation but also emphasized the importance of community engagement and environmental education as inseparable components of Mai Po's preservation. Education programs launched during this period were designed not only for school students but also for the general public and policymakers. Educational programs such as the Wetland School and Eco-guided Tours fostered collective awareness of the importance of wetlands as part of Hong Kong's ecological identity. In this context, WWF Hong Kong developed environmental science-based teaching materials and integrated field experience with classroom learning, indirectly strengthening public participation in long-term conservation efforts.

On the other hand, WWF Hong Kong faced significant conservation challenges during this period. Economic development and infrastructure pressures in surrounding areas posed a real threat to habitat fragmentation and environmental degradation. Therefore, WWF Hong Kong actively engaged in policy advocacy with the Hong Kong government to promote land-use policies that support environmental conservation and designate Mai Po as a legally protected conservation priority area. At several points, WWF Hong Kong issued policy reports and scientific recommendations that served as important references for environmental regulations. They also built networks with scientists and international organizations to strengthen evidence-based conservation advocacy.

Aligned with global conservation approaches, WWF Hong Kong also applied the principles of adaptive management, enabling periodic evaluations of conservation effectiveness and dynamic strategic adjustments. This was carried out through transparent reporting systems, measurable success indicators, and multi-stakeholder participation in decision-making processes (Syahrin et al., 2021). WWF Hong Kong conducted ecological impact assessments on various conservation interventions and identified areas requiring further intervention. During the 2013–2018 period, several ecological parameters showed significant improvement, such as increases in populations of certain threatened waterbird species, improved water quality in some ponds, and expanded native vegetation that supports natural food chains within the ecosystem.

WWF Hong Kong played not only a technical but also a strategic and political role in conserving Mai Po. They served not only as site managers but also as agents of social and ecological transformation who sought to change public perception regarding environmental preservation amidst modernization pressures. Through synergy between conservation, education, research, and advocacy, WWF Hong Kong built a comprehensive and sustainable model of wetland management. Throughout these five years, they not only safeguarded the sustainability of the Mai Po ecosystem but also strengthened ecological awareness at both local and international levels regarding the importance of protecting bird migration routes and wetlands as global ecological heritage (Wahyuddin, 2023).

The role of WWF Hong Kong in the conservation of Mai Po during 2013–2018 stands as concrete evidence that non-governmental organizations can make significant contributions to biodiversity conservation and sustainable environmental management. Through a comprehensive, science-based, and collaborative approach, WWF Hong Kong demonstrated that conservation does not need to stand alone but can become an integral part of sustainable development. Therefore, examining their role during this period is important not only for documenting their achievements but also as a learning reference for similar conservation efforts globally. The approaches they implemented can be adapted and replicated by other conservation actors in protecting critical ecosystems that are vulnerable to anthropogenic pressures and climate change.

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METHOD

This study employs a qualitative research method using a literature-based or library research approach, which focuses on collecting, reviewing, and analyzing various written sources relevant to the research topic. The choice of this method is grounded in the nature of the study, which seeks to understand and interpret the role and contributions of environmental organizations particularly WWF through documentary evidence rather than through field observation or quantitative measurement. As such, this method allows the researcher to explore theoretical perspectives, policy frameworks, and empirical findings that have been previously documented by credible institutions and scholars.

The primary sources used in this research consist of official reports published by WWF Hong Kong, particularly the Annual Reviews from 2013 to 2018. These reports provide detailed information on conservation programs, community engagement activities, environmental education initiatives, and collaborative efforts between WWF and various stakeholders. Additionally, the study incorporates policy documents and international frameworks, such as the Ramsar Convention on Wetlands and the East Asian–Australasian Flyway Partnership (EAAFP), which serve as global guidelines for wetland conservation and migratory bird protection. These documents offer essential context for understanding WWF's environmental interventions within internationally recognized standards and conservation principles.

Secondary sources include scholarly journal articles, academic books, research publications, and digital resources that discuss themes related to environmental governance, NGO roles, biodiversity conservation, and sustainable ecosystem management. Works by scholars such as Yan, Lin, and Clarke (2018) form the theoretical basis for analyzing the strategic roles of non-governmental organizations in environmental protection.

Through these sources, the study develops a conceptual framework that guides the interpretation of WWF's actions within broader discussions in environmental studies and NGO governance.

Data collection was carried out using documentation techniques, involving the systematic identification, selection, and review of sources that are relevant, credible, and up-to-date. The collected materials were then examined through qualitative content analysis, which includes categorizing information, comparing findings across sources, identifying recurring patterns, and interpreting the meaning behind reported activities. This analytical approach enables the researcher to synthesize diverse forms of information into coherent findings about the organizational role of WWF.

Overall, the literature-based method provides a rigorous foundation for understanding the research problem, especially when direct field research is not required or feasible. It ensures that the study is grounded in validated knowledge while offering accurate, contextual, and comprehensive insights into WWF's role in environmental conservation.

RESULTS AND DISCUSSION

In 2013, WWF Hong Kong designed and implemented a five-year strategic plan entitled the Mai Po Nature Reserve Habitat Management, Monitoring and Research Plan 2013–2018. This document served not only as a technical guide but also as a science-based conservation framework that integrated habitat management, ecological monitoring, and research supporting data-driven decision-making. The overarching goal of the plan was to create a balance between biodiversity conservation and the sustainable use of wetlands.

The main objective of WWF Hong Kong in this plan was to protect threatened habitats and species within the Mai Po area. MPNR is part of the Mai Po and Inner Deep Bay Ramsar Site, which is recognized as a wetland of international importance under the Ramsar Convention. WWF Hong Kong declared its commitment to maintaining the ecological integrity of the area by preserving the continuity of natural ecosystems and ensuring that anthropogenic disturbances could be minimized. Key habitats such as gei wai (brackish shrimp ponds with sluice gates), rain-fed ponds, mangal (mangrove forests), and grassland as well as reedbeds (wetland areas with tall grasses) are considered highly important for the survival of various species of waterbirds, mammals, reptiles, and aquatic fauna. WWF Hong Kong actively identified habitats requiring special protection, such as nesting sites for egrets and feeding habitats for migratory birds, and designed specific conservation actions to ensure the sustainability of these areas. WWF Hong Kong managed various types of habitats within MPNR using an adaptive and science-based approach. The 2013–2018 plan established active management for four main habitat types:

1. Reedbed: WWF-HK conducted seasonal cutting of tall grasses to prevent ecological succession that could alter habitat structure. This was essential for maintaining the presence of certain bird species such as reed warblers.
2. Mangal: WWF-HK carefully regulated mangrove growth, removed invasive species such as Sonneratia spp., and controlled excessive vegetative cover that could reduce the ecological value of gei wai.
3. Gei Wai (Brackish Ponds): Management included regulating water depth, maintaining sluice gates, and rotating pond drying and refilling to support the growth of shrimp and other aquatic species that serve as food for birds.
4. Rain-fed Ponds: These ponds were managed without seawater inputs and functioned as alternative habitats with natural vegetation. Adjustments to water levels and control of aquatic plants were carried out to create optimal conditions for specific species.

The management of these habitats was based on zone management principles, dividing the area into several Biodiversity Management Zones (BMZs) and establishing specific management targets for each zone based on ecological characteristics and dominant species. One of WWF Hong Kong's innovative approaches in this plan was the integration of a monitoring system as a basis for managerial decision-making. WWF Hong Kong conducted intensive monitoring of habitat conditions (such as water quality, water depth, sedimentation levels, vegetation cover) and populations of key species, especially migratory waterbirds. Several indicators monitored included: the presence and populations of waterbirds such as the black-faced spoonbill, egrets, and other shorebirds; water quality in gei wai and rain-fed ponds measured through parameters such as pH, dissolved oxygen (DO), and nutrient concentrations; and habitat topography changes caused by sedimentation and salinity shifts. Results of this monitoring were used to adjust management practices adaptively, such as accelerating desilting schedules or modifying the opening and closing cycles of gei wai sluice gates.

WWF Hong Kong facilitated research to fill knowledge gaps regarding wetland ecology. The 2013–2018 plan encouraged studies on the ecological value of mangal within gei wai compared to intertidal mangroves; relationships between water management practices (such as pond flushing frequency) and habitat quality and biodiversity; and species-specific studies on key fauna such as fish, amphibians, and invertebrates as indicators of ecosystem health. These studies were conducted by WWF staff as well as through collaborations with universities, research institutions, and other NGOs. Findings from these studies were used as references for evaluating management success and developing long-term conservation policies.

In 2013, WWF Hong Kong marked its 30th year of involvement in managing the Mai Po Nature Reserve. Since 1983, WWF had played a key role as the organization responsible for preserving this area through habitat conservation, ecological research, and environmental education. In its annual report, WWF referred to this year as a "milestone" that reflected long-term success in establishing Mai Po as a regional conservation center. One of WWF Hong Kong's most notable conservation achievements in 2013 was the success in protecting the endangered black-faced spoonbill (Platalea minor). This species became a symbol of conservation success in the area. WWF noted that the global population of this species had increased nearly tenfold compared to two decades earlier. WWF Hong Kong and the Mai Po Management Committee received the BirdLife International Conservation Achievement Award in recognition of their efforts in safeguarding this species.

Throughout 2013, WWF Hong Kong organized various education and public visitation programs at Mai Po that reached more than 56,000 visitors, including students, teachers, volunteers, and the general public. Through interpretive tours and field activities at the Peter Scott Field Studies Centre, WWF not only provided knowledge about wetland ecosystems but also instilled the

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importance of conservation in daily life. One of WWF Hong Kong's flagship activities in that year was the annual "Walk for Nature," held in Mai Po and raising more than HK$2.3 million to support conservation and education programs. This event was attended by more than 3,000 participants from diverse backgrounds, including over 40 corporate teams. Through this activity, WWF introduced the significance of wetland ecosystems while raising funds to support ongoing conservation operations.

WWF Hong Kong relied heavily on community support in conserving Mai Po. In 2013, more than 17,000 volunteer and internship hours were recorded, contributing to education programs and habitat management. These activities included guiding educational tours, bird monitoring, and habitat restoration efforts such as mangrove planting and reedbed trimming. The year 2014 strengthened Mai Po's role as a center for conservation and environmental education. WWF recorded more than 66,000 participants in educational programs at various WWF centers, including Mai Po. Through field visits, workshops, and interpretive tours, WWF provided direct understanding to students, teachers, residents, and tourists about the ecological value of wetlands. At Mai Po, participants observed waterbird habitats, mangroves, and gei wai, and learned about the complex ecological cycles that sustain them. These educational activities aimed to create a younger generation that is environmentally conscious and aware of biodiversity conservation.

A major highlight in 2014 was the East Asian–Australasian Flyway (EAAF) Migratory Shorebird Workshop, a three-day event that brought together scientists, bird conservationists, and policymakers from various countries to discuss declining populations of migratory shorebirds and develop joint conservation action plans. WWF hosted and served as a key initiator of the event, strengthening Mai Po's position as an important hub for regional cooperation in migratory bird conservation. This demonstrated that Mai Po's conservation value extends beyond local significance, playing a major role in safeguarding species that migrate across borders annually.

Another flagship program in 2014 was the annual Walk for Nature, which entered its 23rd edition that year. Held at Mai Po with the theme "Preserving Mai Po: Hong Kong's Ecological Asset," the event attracted more than 2,200 participants, including students and corporate teams, and successfully raised HK$1,720,296 to support conservation and education programs. This event served not only as a fundraising initiative but also as a public outreach effort to raise awareness about the importance of wetlands. WWF Hong Kong also engaged in broader environmental advocacy, participating in the Save Our Country Parks Alliance and campaigning against development threats to protected park enclaves. This demonstrated that WWF's conservation approach extended beyond Mai Po, aiming to protect ecological connectivity across Hong Kong's wider landscape. During 2014, WWF received more than 14,000 volunteer hours and support from more than 271,000 donors, including individuals and corporations.

A major milestone in 2015 was the launch of the Mai Po Improvement Scheme, a large infrastructure development project funded by the Hong Kong Jockey Club Charities Trust. The project aimed to transform Mai Po into a Regional Wetland Centre of Excellence by enhancing research, interpretation, and visitor facilities, and improving habitat management systems. This initiative prepared Mai Po to face future conservation challenges amid urbanization pressures, climate change, and global biodiversity decline.

More than 69,000 people participated in WWF's environmental education programs across Hong Kong in 2015, including at Mai Po. In Mai Po, participants engaged directly with brackish ponds, mangroves, and reedbeds, learning about migratory birds and sustainable wetland management. One of WWF's major programs that year was the Discovering Biodiversity in Hong Kong Wetlands project, involving more than 450 citizen scientists who contributed over 2,600 hours to biodiversity data collection. This strengthened community involvement in science-based conservation. WWF developed Mai Po as a training center for wetland managers across Asia. In 2015, WWF held seven eight-day training sessions and 22 short courses attended by more than 300 participants from China and other countries. These programs focused on habitat management, species monitoring, and wetland restoration, reinforcing Mai Po's role as a regional knowledge hub for science-based conservation.

Walk for Nature returned in 2015, drawing more than 2,000 participants and raising nearly HK$1 million. Volunteer contributions exceeded 21,000 hours for conservation and education programs. In 2016, WWF Hong Kong celebrated its 35th anniversary. WWF launched the Mai Po Improvement Scheme as part of its long-term vision to develop Mai Po into a Regional Wetland Centre of Excellence. The enhancement project included renovation of the field studies center, public facilities, interpretive trails, and an upgraded habitat management system.

WWF noted that Mai Po and Inner Deep Bay support more than 50 million migratory birds following the EAAF. WWF's conservation efforts contributed significantly to increasing the population of the endangered Black-faced Spoonbill, which rose from 288 individuals in 1990 to nearly 3,400 in 2016. This population growth reflected successful scientific habitat management, including gei wai water control, mangrove restoration, and reedbed trimming. Throughout 2016, more than 23,971 people participated in environmental education programs at Mai Po, learning through field visits, interpretive tours, and hands-on ecological observation activities. Citizen science projects continued, with 450 volunteers collecting biodiversity data at Mai Po. WWF recorded successful natural breeding of more than 100 pairs of egrets in mangrove-filled gei wai, indicating healthy ecological conditions.

WWF also strengthened regional conservation cooperation through partnerships with the East Asian–Australasian Flyway Partnership (EAAFP) and international organizations. Mai Po served as a training ground for wetland managers from across Asia. In 2017, WWF completed the Discovering Biodiversity in Hong Kong Wetlands project, recording more than 2,050 wildlife species at Mai Po. The return of two Siberian cranes after 14 years further demonstrated successful habitat conservation. WWF expanded inclusive access through the Nature with No Barriers project, offering more than 100 specially designed tours for visitors with disabilities.

WWF conducted more than 500 eco-tours and 341 school visits in 2017, engaging more than 24,000 participants. Mai Po continued to serve as a regional training center with 133 participants joining habitat and ecosystem management programs. In 2017, WWF received support from the Hong Kong Jockey Club to develop "Nature's 21st Century Classroom," an initiative to upgrade educational facilities for researchers, students, and the general public. In 2018, WWF implemented conservation projects along the EAAF through funding from the Asian Waterbird Conservation Fund (AWCF), focusing on the great knot (Calidris tenuirostris). WWF supported field surveys and monitoring equipment purchases in key sites in Hong Kong, China, and Korea. Mai Po served as a training hub for wetland managers from across Asia, with WWF providing courses in Mai Po and Dongtan, Shanghai, and supporting conservation planning in Hebei's Nanpu wetlands.

A major milestone in this period was the large-scale transformation of Mai Po's educational facilities, supported by a HK$347.86 million grant from the Hong Kong Jockey Club Charities Trust. The project included renovations of the Education Centre, construction of the Peter Scott Field Studies Centre, two observation towers, and a one-kilometer accessible pathway. The Nature with No Barriers initiative expanded accessibility through 225 tours designed for people with disabilities, featuring wheelchair-accessible bird hides, braille information panels, 3D bird models, and digital portable telescopes. WWF organized various educational programs including Wetland Detective, introducing students to wetlands through sensory exploration and direct observation. Walk for Nature in 2017 involved 2,000 participants in a 5 km educational trail emphasizing biodiversity and sustainable living.

WWF also worked to strengthen protection of key sites along the EAAF through agreements with conservation authorities in China, ensuring sustainable management of critical habitats such as Nanpu and Yalujiang. This cross-border approach highlighted WWF's vision for transboundary conservation. WWF Hong Kong played a strategic and comprehensive role in conserving the Mai Po wetlands from 2013 to 2018, integrating science, education, advocacy, and community empowerment. As one of East Asia's most important wetlands, Mai Po serves as a crucial habitat for migratory waterbirds. WWF actively protected and restored the ecosystem amid pressures from urbanization, pollution, and climate change. WWF's integrated, science-based conservation programs ensured that management remained proactive and adaptive.

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Environmental education was a key component of WWF's strategy, facilitated through the Nature Education Centre. WWF offered field visits, workshops, and interactive programs to build environmental literacy and nurture young conservation-minded leaders (Winarni, 2020). WWF was also active in public policy advocacy, urging the government to adopt stricter regulations against harmful development. WWF promoted broader conservation zones and sustainable resource management. Through multi-stakeholder dialogues involving government, private sector, academia, and local communities, WWF strengthened legal protections for Mai Po and gained wider support.

Community empowerment was another central focus. WWF implemented programs involving local residents in conservation practices such as eco-friendly fishpond management, mangrove restoration, and participatory habitat monitoring. These programs strengthened local ownership and provided socio-economic benefits through ecotourism and sustainable livelihoods. WWF also expanded its influence through cross-sector and international partnerships, actively participating in the East Asian–Australasian Flyway Partnership (EAAFP) and collaborating with donors and CSR initiatives to strengthen conservation funding.

WWF Hong Kong's conservation approach combined scientific research, education, advocacy, and community engagement, ensuring long-term sustainability. Mai Po became a model for wetland conservation in Asia, demonstrating that collaborative, science-based approaches can protect biodiversity effectively. In the global context, Mai Po's role within the Ramsar Convention and EAAF emphasizes its international importance. WWF Hong Kong linked global commitments with local implementation. Mai Po's conservation contributes to SDGs 13, 14, 15, and 17, strengthening global biodiversity protection. WWF's global initiatives such as the Living Planet Report and Earth Hour further demonstrate the organization's commitment to addressing biodiversity crises. WWF Hong Kong's work at Mai Po illustrates how local action contributes to global environmental solutions.

However, despite WWF Hong Kong's positive achievements, several challenges persisted. Urbanization and land conversion posed major threats. Infrastructure expansion and property development around Mai Po risked ecological connectivity and caused habitat fragmentation, especially for migratory birds. WWF had to defend conservation boundaries against aggressive development. Conflicts with local economic interests also emerged. Traditional fishpond operations remained crucial livelihoods, and some WWF programs were perceived as restrictive, causing social resistance. Without participatory communication, conservation efforts risk generating distrust. Policy limitations also hindered conservation. Not all zones surrounding Mai Po enjoyed strong legal protection. As an NGO, WWF lacked regulatory authority and relied on advocacy. Political shifts or weak governmental commitment threatened long-term conservation. Funding dependency on donors and CSR programs created financial instability for monitoring, education, and restoration programs requiring long-term investment.

Alternative perspectives also emerged. Some local groups criticized WWF's technocratic approach, claiming insufficient consideration of socio-economic realities. Community involvement was sometimes viewed as symbolic rather than true empowerment. Skeptical views toward global NGOs like WWF argued that international conservation models may overshadow local narratives and traditional ecological knowledge. Such external approaches might not suit local socio-cultural contexts, potentially creating imbalances in conservation decision-making. Some pro-development groups viewed conservation as an obstacle to economic growth. In land-scarce regions, conservation often conflicts with development agendas. WWF thus faced a dilemma between ecological integrity and development pressures, demonstrating that conservation operates within contested socio-political landscapes rather than in isolation.

CONCLUSION

Based on the literature review, it can be concluded that learning and instruction are two closely related components that cannot be separated in the educational process, particularly at the elementary level. Learning is understood as a complex process involving changes in behavior, knowledge, skills, attitudes, and values through experience and social interaction. These changes are relatively permanent and meaningful, emphasizing that learning does not only occur cognitively but also through emotiosdnal, social, and physical engagement. Understanding the nature of learning is essential in designing effective instruction, especially because elementary students are in the concrete operational stage requiring real and contextual learning experiences.

Instruction, on the other hand, is a systematically planned process designed by educators to facilitate learning. Instruction is not merely teaching but involves interaction among teachers, learners, and learning resources within a conducive environment. As 21st-century education evolves, instruction must be learner-centered and capable of developing critical thinking, creativity, collaboration, communication, and digital literacy. Teachers' roles have shifted from information transmitters to facilitators, guides, motivators, and learning companions. Effective instruction must integrate child development needs, curriculum demands, and technological advancements.

Furthermore, the findings reveal that the quality of basic education is highly influenced by how well teachers understand the nature of learning and instruction and apply this understanding in practice. Instruction that does not consider learner characteristics or use appropriate strategies will produce suboptimal educational outcomes. Therefore, understanding the nature of learning and instruction should become a primary focus in curriculum development, instructional design, and teaching implementation.

Overall, this study confirms that improving the quality of elementary education must begin with a deep understanding of learning, instruction, and the teacher's role. Instruction aligned with child development and 21st-century demands will produce learners who are not only academically competent but also socially, emotionally, and morally developed. Thus, this study provides an important theoretical foundation for efforts to enhance basic education that is relevant, humanistic, and sustainable.

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