

# Towards a more-than-human waterscape: The affective role of otters on the Kinmen Islands

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## Abstract

On Taiwan's outlying Kinmen Islands, otters have become vibrant inhabitants of the islands' waterscape. As a critically endangered species found only in Kinmen within Taiwan's territories, otters have emerged as an affective actor in shaping policies and practices related to the islands' water environments. Yet, being a semiaquatic and nocturnal species that is not often seen by people, otters need to be made present to be affective. In this article, I engage with more-than-human political ecology to examine the role of otters in coproducing Kinmen's waterscape and investigate how this capacity has been fostered through increased alternative encounters. I trace the emergence of otters in public discourse and news media and examine how growing awareness of otters has led to the suspension of several development and water infrastructure projects, as well as the introduction of wildlife-friendly infrastructure and policies. I explore mechanisms that have rendered otters visible and affective, including otter celebrities, otter mascots and artworks, as well as monitoring and tracking efforts. I also identify several elements that contribute to cultivating otters' agency in the waterscape, such as otters' charisma, their endangered status and connection to Kinmen, and their embodiment within the waterscape. Through the case of Kinmen's otters, I suggest the importance of recognizing the affective capacities of nonhuman beings in the waterscape and the mechanisms that help develop these capacities. This consideration complicates our understanding of the politics surrounding the production of waterscapes and moves towards a more-than-human approach to the waterscape framework.

**Keywords:** otter, affection, waterscape, encounters, representation, nonhuman charisma, more-than-human

## Résumé

Sur les îles Kinmen, situées à l'extérieur de Taïwan, les loutres sont devenues des habitants dynamiques du paysage aquatique. Espèce en danger critique d'extinction, présente uniquement à

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Kinmen, sur le territoire taïwanais, la loutre est devenue un acteur important dans l'élaboration des politiques et des pratiques relatives aux milieux aquatiques des îles. Pourtant, espèce semi-aquatique et nocturne, peu visible, elle a besoin d'être présente pour être affective. Dans cet article, je m'intéresse à l'écologie politique au-delà de l'humain afin d'examiner le rôle des loutres dans la coproduction du paysage aquatique de Kinmen et d'étudier comment cette capacité a été favorisée par la multiplication des rencontres alternatives. Je retrace l'émergence des loutres dans le discours public et les médias, et j'examine comment la sensibilisation croissante à leur existence a conduit à la suspension de plusieurs projets de développement et d'infrastructures hydrauliques, ainsi qu'à la mise en place d'infrastructures et de politiques respectueuses de la faune sauvage. J'explore les mécanismes qui ont rendu les loutres visibles et affectives, notamment les célébrités, les mascottes et les œuvres d'art représentant des loutres, ainsi que les efforts de surveillance et de suivi. J'identifie également plusieurs éléments qui contribuent à cultiver l'agency des loutres dans le paysage aquatique, tels que leur charisme, leur statut d'espèce menacée et leur lien avec Kinmen, ainsi que leur incarnation dans le paysage aquatique. À travers le cas des loutres de Kinmen, je souligne l'importance de reconnaître les capacités affectives des êtres non humains dans le paysage aquatique et les mécanismes qui contribuent à leur développement. Cette considération complexifie notre compréhension des politiques entourant la production des paysages aquatiques et nous conduit vers une approche plus qu'humaine du cadre du paysage aquatique.

**Mots-clés:** loutre, affection, paysage aquatique, rencontres, représentation, charisme non humain, plus qu'humain

## Resumen

En las islas Kinmen, en la periferia de Taiwán, las nutrias se han convertido en habitantes vibrantes del paisaje acuático de las islas. Al ser una especie en peligro crítico de extinción que se encuentra únicamente en Kinmen, dentro del territorio taiwanés, las nutrias se han convertido en un actor afectivo en la definición de políticas y prácticas relacionadas con los entornos acuáticos de las islas. Sin embargo, al ser una especie semiacuática y nocturna que no suele ser vista por las personas, es necesario hacerlas presentes para que sean afectivas. En este artículo, me acerco a la ecología política más-que-humano para examinar el papel de las nutrias en la coproducción del paisaje acuático de Kinmen e investigo cómo esta capacidad se ha fomentado a través del aumento de encuentros alternativos. Rastreo la aparición de las nutrias en el discurso público y los medios de comunicación, y examino cómo la creciente concienciación sobre ellas ha llevado a la suspensión de varios proyectos de desarrollo e infraestructura hídrica, así como a la introducción de infraestructura y políticas respetuosas con la vida silvestre. Exploro los mecanismos que han hecho visibles y afectivas a las nutrias, incluyendo nutrias famosas, mascotas y obras de arte, así como iniciativas de monitoreo y seguimiento. También identifiqué varios elementos que contribuyen a cultivar la capacidad de acción de las nutrias en el paisaje acuático, como su carisma, su condición de especie en peligro de extinción y su conexión con Kinmen, así como su personificación en el paisaje acuático. A través del caso de las nutrias de Kinmen, sugiero la importancia de reconocer las capacidades afectivas de los seres no humanos en el paisaje acuático y los mecanismos que contribuyen a su desarrollo. Esta consideración profundiza nuestra comprensión de las políticas que rodean la producción de paisajes acuáticos y nos acerca a un enfoque más-que-humano en el marco del paisaje acuático.

**Palabras clave:** nutria, afecto, paisaje acuático, encuentros, representación, carisma no humano, más-que-humano

## 1. Introduction

In October 2023, under growing pressure from conservationists, the magistrate of Kinmen announced the suspension of the Jinsha Artificial Lake (JAL) project to protect the habitats of the critically endangered Eurasian otter (*Lutra lutra*, hereafter otter) (H.-Y. Yuan, 2023). This decision marked a major win for conservationists and environmental advocates. However, it was not the first time that the project had raised concerns. Residents had questioned the necessity and impact of the JAL project and its ability to store freshwater without contamination from seawater intrusion (Chen, 2019; Yang, 2021). Despite these concerns, it was the pressure of otter conservation that ultimately pushed the government to halt the project (H.-Y. Yuan, 2023; Water Resources Agency, 2024).

The JAL is just one example of the dominance of hard infrastructure planning on the Kinmen Islands. Over the past two decades, the islands have seen a boom in engineering and development projects, from stream bank concretization, road pavement and expansion to tourism and urban development. Although some residents have questioned the necessity of these projects and criticized that many of them were mainly driven by profits associated with local construction companies (conversations with residents, 2021-2022), these voices remained minor and had not been able to disrupt the trend of development.

In the face of development pressure, the growing care for otters and their habitats has shown potential to influence the islands' development-driven paradigm. Along with the suspension of the JAL project, otters have been playing a key role in various campaigns against development and engineering projects, including a series of hotel and resort development projects in 2014. Moreover, new initiatives promoting wastewater recharge, ecological monitoring, and wildlife-friendly infrastructure have emerged, partly driven by an increased awareness of the need to protect nonhuman species on the islands, with otters being the most important one. These efforts represent a shift toward more inclusive water and infrastructure planning, which acknowledges the waterscape as cohabited by nonhuman species like otters.

However, otters have not always been well-known or appreciated by locals. Although their habitats often overlap with villages and human activities due to the small size of the islands, otters are nocturnal and semiaquatic and thus not easily spotted. Public familiarity and affection for otters have developed largely due to increasing opportunities for alternative encounters. In particular, the creation of otter celebrities, otter-themed products and artworks, and monitoring and tracking programs, have made otters more visible and established connections between otters and the island(er)s. These efforts have also helped cultivate affection for otters beyond the islands, mobilizing support from actors crucial to policy changes. For example, the suspension of the JAL project was a case where concerns for otters from conservationists and legislators in Taiwan played a key role in influencing the decision of the central water planning agency, which ultimately led to the withdrawal of funding for the project.

In this article, I explore the growing presence of otters in public discourse alongside shifts in water and infrastructure planning, as well as identifying several mechanisms that have fostered people's affection toward otters and changing ideas of the waterscape. I do so through engaging with more-than-human political ecology, recognizing nonhumans' affective capacity in co-constituting waterscapes and the cultivation of such capacity. While political ecological research on water, particularly the waterscape approach, has suggested the hybrid nature of water and society and highlighted the social and ecological processes that constitute the waterscape (Budds & Hinojosa, 2012; Karpouzoglou & Vij, 2017; Swyngedouw, 1999), a notable gap remains in terms of the role of nonhumans in these processes (except for Hurst *et al.*, 2022). To address this lacuna, I engage with more-than-human studies to examine nonhumans' political capacity in shaping policy changes or conservation outcomes (Sundberg, 2011; Margulies & Bersaglio, 2018; Evans & Adams, 2018;

Casellas Connors *et al.*, 2024; Donfrancesco, 2024), as well as humans' mediation of such capacity (Jepson & Barua, 2015). Specifically, I argue that cultivating public affection for otters requires *making otters present*. As I will discuss later, these processes are crucial in this case given the difficulties of encountering wild otters. By showing the affective capacity of otters and the mechanisms that have made otters present and affective, I highlight the relational agency of otters in Kinmen's waterscape.

## 2. Nonhumans' affective capacity in co-shaping waterscape

Political ecological research has applied the idea of the waterscape to conceptualize hybrid watery socionatures (Budds & Hinojosa, 2012; Karpouzoglou & Vij, 2017; Swyngedouw, 1999). Budds and Hinojosa (2012) define waterscape as "a sociospatial configuration that is constituted by social and ecological processes" (125). This perspective emphasizes both the hydrosocial (or socio-ecological) processes, as well as the spatial outcomes of such processes. Applying this concept, studies have shown the roles of science and social order (Bouleau, 2014), water technologies and power relations (Sultana, 2013), and everyday practices (Kooy, 2014) in coproducing waterscapes in various spatial contexts. However, there has been limited exploration within waterscape research regarding the roles of nonhuman beings (for an exception, see Hurst *et al.*, 2022).<sup>2</sup> Animals in the waterscape have remained in the background in historical narratives (de Carvalho Cabral & Lähdesmäki, 2023). Moreover, while the concept of waterscape is commonly used to describe inequality and injustice in socio-spatial outcomes (Flaminio *et al.*, 2022), few have extended such concern towards nonhumans. In response to this gap, I attend to how nonhuman beings, particularly otters, coproduce the waterscape in Kinmen.

Research in the context of water environments has demonstrated nonhumans' roles in engineering ecosystems (Barua, 2021; Lorimer, 2024), the production of water (Acevedo-Guerrero, 2025), producing knowledge of water (Gramaglia & Sampaio da Silva, 2023; Hurst *et al.*, 2022; Scaramelli, 2013), or becoming part of water management infrastructure (Carse, 2012; Morita, 2017; Wakefield, 2020). For example, studies have shown how scientists and locals engage with herring, bacteria, plants, and mollusks to make sense of water quality (Gramaglia & Sampaio da Silva, 2023; Hurst *et al.*, 2022; Scaramelli, 2013). Otters similarly possess the agency to coproduce the knowledge of water with humans. They often serve as an indicator of healthy aquatic environments or waterbody connectivity (MacDonald & Mason, 1990; Van Looy *et al.*, 2014). Otter traces offer hints about the water environment and its associated ecosystems, which could then change how people understand and envision the waterscape.

Equally important is otters' affective agency that shapes the discourses and decisions around the planning and conservation of waterscapes. Hobson (2007) argues that animals are affective political subjects and should be taken seriously in considering the constitution of politics. This foregrounding of nonhumans has advanced the scope of political ecology, with studies exploring the political roles of nonhumans in shaping terrestrial landscapes (e.g., Sundberg, 2011; Margulies & Bersaglio, 2018; Evans & Adams, 2018; Casellas Connors *et al.*, 2024; Donfrancesco, 2024). For example, Casellas Connors *et al.* (2024) show how frequent and close encounters with deer can trigger both concerns and positive emotional responses from humans, leading to deer management or other actions. Yet, unlike the case with deer, encounters with a semiaquatic and nocturnal species like otters are relatively rare. Otters are active at night and in water, which makes it hard for humans to detect their bodies. Moreover, many residents of Kinmen lived through a militarized period from the late

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<sup>2</sup> Here I do not include research focusing on water itself or river as the nonhuman / more-than-human actor (e.g. Bourguignon *et al.*, 2023; Strang, 2024), as it is less relevant to the discussion of this study.

1940s to the 1990s, when civilians were prohibited from going out at night. In Lorimer's (2007) words, otters' "detectability" is low and their "space-time rhythms" do not intersect well with those of humans. The intersections of "space-time rhythms" between humans and otters are partly what constitute their ecological charisma. As such, for otters to become affective and informative, they first need to be made present to humans.

In Kinmen, otters' presence was not widely recognized until recent decades, with humans' efforts rendering them visible. I observe that this increased presence of otters can be attributed to three forms of alternative encounters: celebrity otters, otter mascots and artworks, as well as tracking and monitoring efforts. The importance of alternative encounters has been highlighted in existing research. For example, Bear (2011) and Doubleday (2017) attend to individual captive animals, examining how they complicate conservation agendas and can be used as entry points for public empathy. Hinchliffe *et al.* (2005) demonstrate that they follow water vole traces, or "water vole writing", to learn how urban wild things constitute politics. Other scholars focus on virtual encounters (Büscher, 2016; Fair & Schreer, 2025) or the use of moving images (Lorimer, 2010) to evoke people's emotion and influence conservation outcomes. These indirect forms of encounters are important in making otters present and developing their affective agency, given the difficulty of encountering wild otters. Moreover, virtual encounters have allowed otters' affective capacity to extend beyond the islands, mobilizing actions from other locations (Büscher, 2016; Fair & Schreer, 2025).

Another important question to ask is how species are represented and mobilized (see Probyn, 2017; Woods, 2000), as the processes of making otters present often involve more than just "re-presenting" but translation (Hinchliffe, 2008; Woods, 2000) and framing (Jepson & Barua, 2015). Jepson and Barua (2015) argue that a flagship species can be re-framed to bridge pre-existing framings, which enables it to influence conservation outcomes. In other words, species are often framed in a way to align with our understanding to serve conservation or political purposes. Woods (2000) shows that a fox can be represented as a cunning contestant, a pest, or a victim in hunting debates. When representing the fox as a victim, the fox is posited as a natural part of the countryside and as a sentient being that can feel pain, supported by photography and scientific representations. Goedeke and Rikoon (2008) demonstrate that after otter restoration, locals in Missouri re-enroll otters as a "harmful actor" that impacts fish populations. This narrative became favorable for the conservation department because controlling otters is easier than managing other complex ecosystem factors, such as habitat degradation. In this context, otters are framed differently than they are in the case of Kinmen, which highlights the importance of unpacking humans' translation and framing in the process of cultivating nonhuman agency.

In understanding how otters' emotional and political capacities are mobilized to influence Kinmen's waterscape, I argue that three elements are emphasized in particular – the charisma of otters, their endangered status in the region, and their embodiment within the water environment. First, charisma plays a vital role because charismatic animals like otters often possess more capacity to influence policies than other less charismatic species. Lorimer (2007) suggests that nonhumans' aesthetic charisma, namely their distinguishing appearance and behavior, can trigger human emotions, thus serving as 'catalysts' for conservation. This explains why otters—which are considered by the public as cute and playful, compared to other endangered species like turtles or fish—draw public attention and are mobilized in the policy realm. Second, the endangered status of otters, along with their exclusive presence in Kinmen, is another aspect frequently highlighted in their representation. This endangered status and exclusive presence has enhanced local residents' recognition of otters, as the islands are recognized as otters' remaining habitat in the region. Moreover, their endangered status has influenced the public in Taiwan in valuing Kinmen's role in otter conservations, which subsequently impacts environmental and conservation decisions related to Kinmen. Finally, a central

aspect of otters' relational agency in the waterscape is their connection to the watery environment of the islands. As explained earlier, otters' connection to, and embodiment of, the watery environment contributes to how people make sense and envision the waterscape, thus influencing the direction of waterscape policies. Such a connection is strengthened through monitoring footage of otter activities in riparian zones or water bodies, as well as the mapping of otter traces that enables a spatial representation of their distribution, which can be used to indicate the disconnection of water bodies.

By exploring otters' agency in the waterscape and humans' meditation of their affective capacity, this article aims to highlight the relational agency of nonhuman beings in waterscape and political ecology. It begins by examining the growing public interest in otters as reflected in the news media, alongside changes in policies and practices related to the water environment, to suggest the affective and political agency of otters. The article then examines how otters' affective capacity is cultivated by looking into three different forms of alternative encounters and elements highlighted in representing otters.

### 3. Methods

This research is based on semi-structured interviews, participant observation, document analysis, and media content analysis. During my twelve-month fieldwork in Kinmen between 2021 and 2023, my primary focus was on issues related to water resources and supply. However, I gradually noticed that the role of otters in influencing environmental and water planning decisions on the islands could not be ignored. To explore this further, I conducted interviews with conservationists (n=4), ecologists and scholars (n=4), government officials and staff (n=7), legislative assistants (n=2), and residents (n=7). I also participated in several ecological guided tours, workshops, and talks focusing on otters or on development issues, in which I learned about conservation efforts and the politics of conservation on the islands, and observed how otters are presented or discussed. In addition to interviews and participant observation, I reviewed available documents and reports related to otters and other conservation species in Kinmen. This includes ecological research and survey reports, conservation plans, congress proceedings, and reports of engineering projects that could impact otter habitats. These materials offer a comprehensive understanding of the status and climate of otter conservation in Kinmen.

Meanwhile, I conducted a media content analysis to trace the emergence of river otters in public consciousness and their potential influence on environmental planning. The content analysis served three purposes: First, it aimed to identify environmental policies or projects related to concerns about otters. While it is hard to prove causal relationships, these articles indicate that changes in environmental policies and values are linked to the growing interest in and concern for otters. Second, the analysis traced how public attention toward otters has changed over time. This included examining the changing frequency of otter-related news and topical shifts throughout the years. Finally, it analyzed how otters are presented in the articles and graphics, identifying the elements that help foster public affection for otters.

I searched in three online news databases: *Taiwan News Smart Web*, *Liberty Times Net*, and *Kinmen Daily News*, with the terms "otters" (水獭 in Mandarin) and "Kinmen" (金門 in Mandarin) from 2003 to 2023. This time range spans from the first news of otters in Kinmen was available online, to the year when a comprehensive news dataset was available. The three databases cover four newspapers, including three major daily newspapers in Taiwan – *United Daily News*, *China Times*, and *Liberty Times*, and one local newspaper on the islands – *Kinmen Daily News*. While *Kinmen Daily News* offers more extensive coverage on local events, policy discussions, and otter-related research, its narratives sometimes reflect the official stance since the newspaper is owned and supervised by the Kinmen County Government (KCG). The inclusion of the three national-wide newspapers helped

balance the narrative and highlighted which events receive attention beyond Kinmen. For example, the national-wide newspapers reported the suspension of the JAL project, while the *Kinmen Daily News* surprisingly did not, likely because this episode was not favored by the KCG.

A total of 344 newspaper articles were analyzed, with sources only referring to river otters in marginal ways (such as being discussed as one of the species or souvenir products) being excluded from the selection. I categorized the articles into one of the five major themes: *otter incident or encounter*, *habitat destruction*, *otter celebrity*, *otter merchandise*, and *otter-related programs, policies and research*. Figure 1 shows that there has been a significant increase in otter-related news since 2014, both in local and national outlets. Figure 2 indicates that the rise of news in 2014 came from the reporting of celebrity otters, a high number of otter incidents, and discussions related to habitat destruction. It also demonstrates a general increase in otter merchandise and artworks, as well as discussions of otter-related programs, policies and research after 2014.



Figure 1: Published news on river otters by news media.

#### 4. Otters in Kinmen

Eurasian otters (*Lutra lutra*) are semiaquatic carnivores and are often considered an indicator species for healthy aquatic environments (MacDonald & Mason, 1990). They were once commonly found throughout Europe and Asia, but their populations have significantly declined, particularly in East Asia, due to habitat destruction, hunting, and pollution (MacDonald & Mason, 1990; Conroy *et al.*, 1998). The species is listed as Near Threatened on the IUCN Red List (Loy *et al.*, 2020) and Critically Endangered on Taiwan's Red List (Cheng *et al.*, 2017). Within Taiwan, the Kinmen Islands are the only location where a stable population of otters can be observed. The current number of otters in Kinmen is estimated to be fewer than 200 (Jang-Liaw, 2023; S.-L. Yuan, 2022), which is relatively high given only 150 km<sup>2</sup> area of the Kinmen Islands. On the main island of Taiwan, the last recorded sighting of otters was around the 1980s (Chang *et al.*, 2019; Jang-Liaw, 2023). The stable population of otters in Kinmen can be partly attributed to the islands' previous militarization status. From 1956 to 1992, Kinmen was a militarized frontline, during which development and civilian activities were restricted (the islands are located very close to the People's Republic of China). Unlike Taiwan, which experienced rapid urbanization during this period, Kinmen's restricted development led to the

preservation of better habitats and wildlife (Interview with local conservationist, May 2022; Jang-Liaw, 2023). In the past decade, however, Kinmen otters have also been facing increasing pressure from habitat destruction. Signs of otter activity have decreased, and the distribution of otters has become fragmented (Lee, 2013; S.-L. Yuan, 2022). A survey in 2003 indicated that eighty percent of the water bodies in Kinmen had shown signs of otter activities (Chen & Lee, 2003, pp. 47–49). Yet in the early 2010s, otter tracks were no longer found in some of the previous habitats (Lee, 2013). These have become disconnected, especially those on the western islands (Lin, 2016). One previous otter hotspot on the western islands – Gugang Lake, normally considered a suitable habitat due to its abundance of fish and little human interference – has seen no otters in recent years due to the lack of connecting pathways to other habitats (Lin, 2016; Taipei Zoological Foundation, 2018).

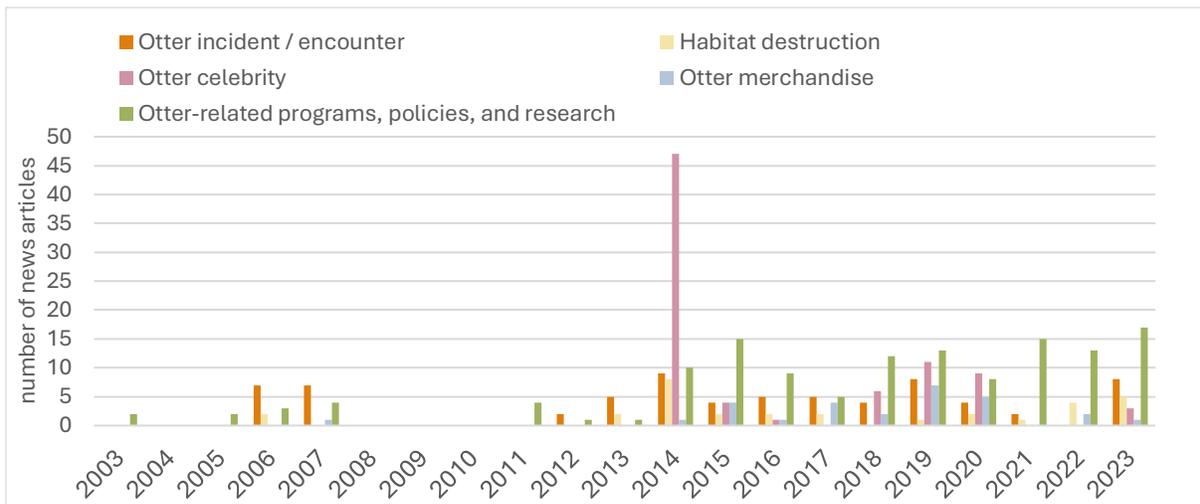


Figure 2: Published news articles on otters by types of news. Note that this chart excludes articles that only marginally mention otters, as their inclusion would skew the data. Therefore, the representation of merchandise-related news appears undercounted in this graph compared to the actual volume

The destruction of otter habitat can be attributed to several factors: development projects, deteriorated water quality, and increased extraction of surface water coupled with intensified drought conditions. First, development projects have gradually altered Kinmen's landscape and waterscape (Lee, 2013; Lin, 2016). Specifically, soil and vegetated slopes have been turned into concretized embankments with vegetation cleared, making it challenging for otters to move and find shelter (Lee, 2013; Tseng, 2017). Infrastructure like small irrigation dams have led to disconnected streams, creating barriers that impede the movement of otters and other aquatic species (Lin, 2019; Tseng, 2017). Increased road density combined with fragmented habitats have resulted in a rise in otter roadkill incidents (Lin, 2016; S.-L. Yuan, 2022). Moreover, the quality of the remaining habitats has worsened due to water pollution (Chen & Lee, 2003; Lee, 2013; Lin, 2019), blocked waterways and culverts caused by water hyacinth (Lin, 2016), and intensified extraction of surface water for irrigation (Lin, 2019). These activities have resulted in the direct loss of habitat and a reduction in food availability, making it increasingly difficult for otters to survive on the islands.

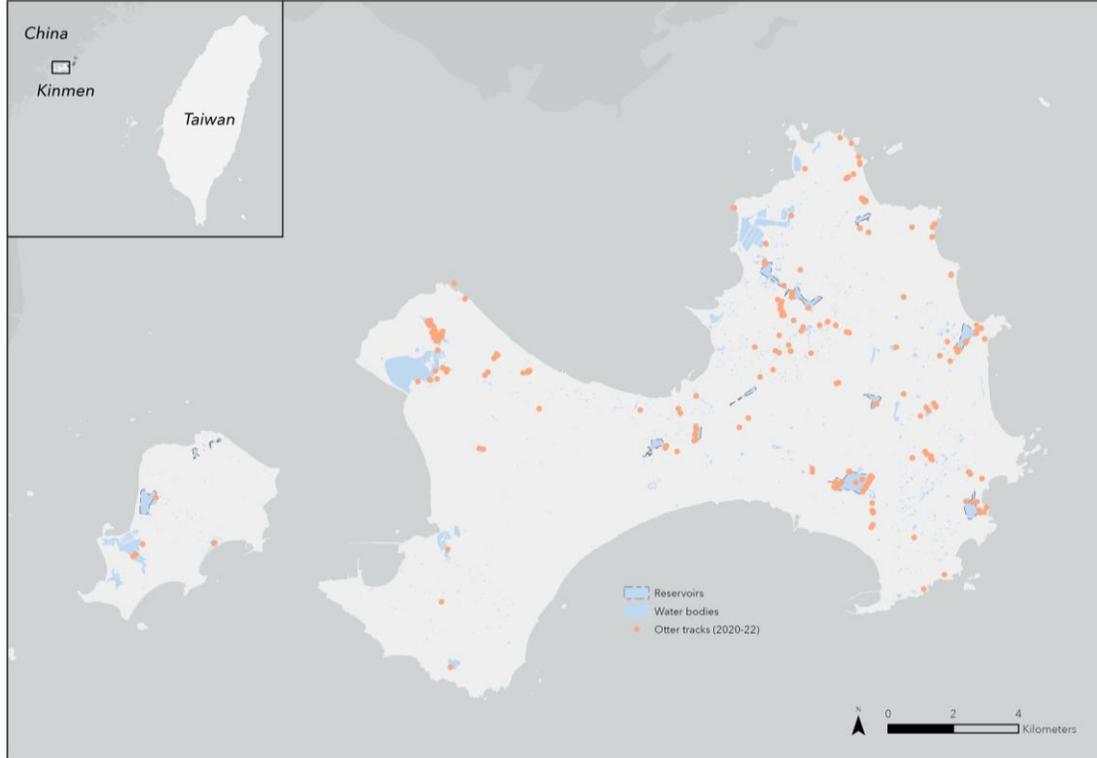


Figure 3: Locations of water bodies and otter tracks (2020-2022) on Kinmen Islands.

In recent years, several policies and initiatives have been introduced to address conservation concerns in Kinmen. These efforts include the installation of wildlife-friendly infrastructure, monitoring and cleanup activities, the establishment of a wildlife rescue center, and increased consideration for avoiding habitat destruction during construction projects. While these measures have yet to significantly improve the otters' living environment, they have helped slow down habitat destruction and challenge the development-oriented mindset on the islands. One key factor driving these changes has been the public's increased affection for otters and awareness of otter conservation. In the next section, I explore the growing presence of otters in news media, and how this exposure has contributed to shifts in environmental and water planning and practices.

### 5. The emergence of otters in the news media and policy changes

Otters were not always visible in the news media. Their presence grew gradually, from no coverage or sporadic mention to a more regular subject with about a dozen articles appearing each year (refer to Figure 1). This increasing visibility can be attributed to several key incidents, starting with a peak in roadkill accidents in 2014, followed by the rise of otter celebrities and a surge in otter-related products, artworks, and events. With this growing attention to otters, discussions and decisions regarding development projects and environmental policies on the islands have also undergone

changes. I categorized these developments into three periods based on trends identified through the content analysis:

1. Pre-2014: Limited attention to and conservation efforts for otters;
2. 2014-2019: Increased reports of otter accidents, the emergence of otter celebrities, an anti-BOT movement, and minor environmental improvements;
3. (3) 2020-present: Enhanced discussions about the impacts of development on otter habitats and related policies.

*Pre-2014: Limited attention and conservation efforts*

In the 2000s, there was little news coverage or conservation initiatives for otters in Kinmen and Taiwan. The first peak of otter news was around 2006, with 24 otter-related news pieces published in 2006 and 2007. This increase was related to an accident, in which an otter was found to be heavily injured and later transferred to the Taipei Zoo due to the lack of otter rescue facilities and resources in Kinmen. While a couple of other accidents occurred in the same year, this was the only one that generated attention from both local and major newspapers. Subsequently, several newspaper articles on raising public awareness, policy discussions, otter encounters, and otter marketing events were published. However, the public's attention on otters lasted for only a short period, with no otter-related news in the following three years.

At this time, otters were not yet a concern for the Kinmen County Government (KCG) or for most residents of the islands. The major actor involved in otter conservation was Kinmen National Park (KNP), along with some scholars and local conservationists (Interview with KCG staff, April 2022), who conducted several environmental and ecological surveys on the islands. However, the KNP's main focus was on preserving cultural heritage in Kinmen. Moreover, KNP's role has been marginal on the islands, with many residents expressing a desire to dismantle it due to its restrictions on land development (conversations with KCG staff, April 2022; conservationist, May 2022; KNP staff, July 2023). Since KNP was the only institutional actor, efforts toward otter conservation remained insignificant during this period.

*2014-2019: Otter accidents, otter celebrities, anti-BOT movement, and small-scale habitat improvements*

2014 was a critical year for otters – they made big news both locally and nationally, arguably leading to greater public awareness and government attention on otter conservation. A total of 75 otter-related news stories were published that year for multiple reasons: a relatively high number of accidents involving otters, the emergence of celebrity otters, and an anti-development movement. There were eight otter accidents in 2014, compared to an average of three incidents per year over the previous decade (Lee, 2015, p. 48). This amplified their seriousness, as reflected in headlines such as "Two otters killed in one week; another Kinmen otter dies in a road accident" (Z.-T. Wu, 2014). Injuries also drew attention from national news when three otters were rescued in Kinmen and transferred to the Taipei Zoo on the main island of Taiwan. These three then became celebrities in the media, thanks to ongoing reports on their recovery and public naming events. After this, some Kinmen residents suggested that they should be returned to the islands, yet there were no facilities or sufficient resources in Kinmen to care for them (C.-S. Li, 2015). Meanwhile, a series of Build-Operate-Transfer

(BOT)<sup>3</sup> projects in Kinmen raised public awareness about habitat destruction. A critical otter habitat was discovered in one project development site. This discovery, along with concerns over several other BOT projects and the high number of otter accidents in the same year, fueled an anti-development movement that gained significant public attention (interview with government official, March 2022; conservationist, July 2023).

The otter accidents and the anti-development movement also triggered attention toward otter conservation in several government institutions. A cross-sectoral meeting gathered local and central institutions, including the KCG, the KNP, the Forestry and Nature Conservation Agency of Taiwan, and three academic and local organizations that had conducted otter-related studies, to discuss otter conservation strategies on the islands. This meeting concluded that more efforts should be directed toward waterway connection, constructing animal-friendly infrastructure, and establishing a wildlife rescue center (Weng, 2014). In the following years, several island-wide systematic otter surveys and monitoring projects were conducted (e.g., Lin, 2016, 2019). Some small-scale environmental improvements were carried out, including wildlife crossings (Figure 4), wildlife warning reflectors, and wastewater recharge into desiccated streams (Lin, 2016, 2018; Tseng, 2017). While improving the living environment for otters, some ecologists criticized these projects for being only friendly to that species (Interview with ecologists, February and April 2022). At the same time, the KCG began heavily marketing otters as the islands' mascots and promoting otter-themed merchandise and public artworks, which have faced criticism from conservationists and residents, who argued that "if the KCG cannot provide a safe environment for otters, we cannot talk about conservation or eco-tourism" (C.-S. Li, 2015).



Figure 4: Wildlife crossings in Kinmen.

#### *2020-present: The Rotten Apple Award and the suspension of Jinsha Artificial Lake*

In the 2020s, conflicts between infrastructure development and otter habitats in Kinmen became more pronounced, which was particularly highlighted by the "Golden and Rotten Apple

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<sup>3</sup> Public-private partnerships, with infrastructure or buildings constructed by a commercial entity and run by one for a period of time, before ownership is transferred to the state. The state does not therefore have to fund upfront costs, and corporations make money.

Award" campaign. This 'Award' was organized by a civilian organization called Taiwan Rivers Network (TRN), with the aim to identify problematic water infrastructure projects as well as to encourage the good ones. The 'Award' evaluates the newly constructed water improvement projects under Taiwan's "National Plan for Water Environments Improvement" and selects the best ones to be "Golden Apples" and the worst as "Rotten Apples". In 2020, out of 48 evaluated projects, three were selected as "Rotten Apples", two of which were in Kinmen.

These two "Rotten Apple" projects – the Jinsha Stream improvement project and the Lieyu Qingyuan Lake improvement project – were criticized for their negative impact on local species habitats, each scoring -9.3 out of 10 on "species habitat improvement" (Taiwan Rivers Network, 2020). They were both found to significantly disturb the aquatic habitat and transform naturally vegetated stream banks into steep, concretized embankments (Tsou, 2020). In particular, the Jinsha Stream was a hotspot for otters and another of Taiwan's endangered species *Metzia mesembrinum*, a freshwater fish. During the planning phase, despite conservationists and ecologists advocating for environment-friendly designs, such as preserving hiding spaces and creating animal corridors (Kinmen County Government, 2017), the final construction did not end up matching these visions.

This episode reflects the gaps between environmental considerations and actual practices, as well as the mainstream preference for development and concrete solutions on the islands. In fact, at the time of the planning of the Jinsha Stream around 2018, the KCG had already implemented the "Ecological Check" (EC), which mandates that infrastructure projects include ecological and environmental surveys to help mitigate their impact on the environment. However, the effectiveness of EC has been very limited. To begin with, there has been a lack of involvement by ecologists, and knowledge gaps exist between engineers, ecologists, and construction companies (Interview with ecologist, February 2022; KCG official, March 2022). In practice, the funding and time allotted for ecological surveys are often insufficient. The timelines of the projects are also often too tight to allow for thorough environmental assessments or the implementation of environment-friendly designs (ibid). Moreover, some construction companies tend to ignore environment-friendly guidelines due to the extra time and resources they require (ibid). The EC lacks compulsory power and is only applicable to projects that receive more than half of their funding from the central government, leaving many small-scale projects unregulated.

A significant proportion of Kinmen's population still values development over conservation and favors traditional construction techniques using concrete over ecologically-friendly infrastructure (Interview with KCG official and staff, March 2022, conservationist, May 2022). During public consultations on water infrastructure projects, residents often advocate for the use of concrete to line waterways and drainages (Interview with KCG staff, March 2022; KCG official, April 2022; Chong Jun Engineering Consultant, 2018). In the Kinmen County Council, a few congresspersons expressed that development projects should not be paused "just for a few otters" (Kinmen County Council, 2019, 2023). Additionally, some people who have begun to care about otters choose not to voice their opinions publicly because they consider it futile to challenge the pro-development stance (Interview with conservationist, May 2022).

Given the prevailing development-oriented mindset and political climate in Kinmen, it has been challenging to promote impactful conservation policies. Such policies are likely to affect stakeholders who benefit from construction projects and agricultural production (Conversations with residents and conservationists, 2021-2022). As a result, the KCG's strategies have primarily focused on promoting otters for tourism and making minor improvements rather than substantial interventions. The KCG does not have a direct budget for otter conservation, as this could draw heavy scrutiny from local congress members (Interview with KCG staff, April 2022). The current conservation efforts for otters

on the islands are mainly under broader national conservation programs, which allow the KCG to avoid directly confronting local political and economic interests.

Despite the challenges, I contend that increased affection for otters has generated momentum for change, and has mobilized actors and efforts beyond Kinmen, which has in turn impacted environmental planning decisions. In November 2023, the "Jinsha Artificial Lake" (JAL) project was suspended amid growing concerns over its impact on river otters and other species. Originally proposed in 2016 to augment freshwater storage on the islands, the project had been questioned by residents and the township representative council for its high risk of salination due to its proximity to the ocean, as well as its potential impact on aquaculture (Chen, 2019; Yang, 2021). However, these opinions never managed to stop the project as the KCG was determined to proceed (Interview with residents, November 2021; government official, March 2022). It was not until late 2023, when conservationists and scholars from both Taiwan and Kinmen held a press conference to highlight the project's negative effects on otters and bird populations on the islands, that the Water Resources Agency (WRA) – the central water planning authority of Taiwan, decided to suspend the project (H.-Y. Yuan, 2023). By late 2024, the project was eventually canceled because "local opinions and NGOs expressed concerns about its impact on Eurasian otters, and no consensus has been reached despite multiple rounds of communication" (Water Resources Agency, 2024).

The suspension of the JAL project has two implications: First, while other concerns, such as the risk of salination and impacts on aquaculture failed to stop the project, the campaign for otter conservation succeeded. This success underscores the political capacity of animals (Hobson, 2007), and their agency in co-shaping the waterscape and the environment (Hurst *et al.*, 2022; Donfrancesco, 2024). This agency is linked to the growing affection for and understanding of otters, which has fostered a different vision for the islands' waterscape, one that is beyond human usage and is shared by more-than-human beings. Second, as conservation voices in Kinmen are marginalized under the pro-development climate, external actions can be crucial. Such actions would not have been possible without the efforts to make otters present, especially given their disappearance from the main island of Taiwan. This suggests the importance of alternative encounters, such as those with the celebrity otters in the Taipei Zoo and monitoring videos circulated online. In the following section, I explore the mechanisms that have made otters present, and fostered their affective capacity.

## 6. Cultivating otters' affective capacity

As nocturnal animals, otters are not commonly spotted by people. Moreover, for residents of Kinmen who lived through the militarized period, when they were forbidden to go out at night, otters were absent in their daily lives. Often, residents' first and only encounters with otters were "when they had accidents" (Interview with residents, March 2022; Pai, 2015). As such, making otters visible is crucial in cultivating their affective and political capacities. I identify three types of indirect encounters: (1) celebrity otters; (2) otter mascot, merchandise, and artworks; (3) monitoring and tracking of otters. I discuss how they have helped enhance otters' visibility, foster public affection, and change how people make sense of the waterscape.

### *Celebrity otters*

Celebrity otters, in contrast with wild otters, are individual otters that are known to the public and are captive in zoos. Given the disappearance of otter populations on the main island of Taiwan, celebrity otters are typically those that had accidents in Kinmen as noted above, and were subsequently rescued and transferred to the Taipei Zoo, as well as their offspring that were born and raised in the zoo. The first celebrity otters emerged in 2014. As mentioned, the number of otter

accidents peaked in that year, and the rescued otters gained public visibility through increased media coverage in both local and national newspapers, with a total of 47 news articles on them. This exposure was important, especially since most residents in Kinmen and Taiwan had never seen otters in person. The narratives and photos presented in the news reports, accompanied by the naming of individual otters, helped personify them, enhancing public familiarity with otters, and establishing connections between otters and Kinmen.

News articles covering the condition of the rescued otter babies have helped establish stories and cultivate empathy for the species. They are often accompanied by pictures, videos, and anthropomorphic descriptions of their behaviors. For example, a news piece describes the rescued otters as "not only outgoing, but also very smart. After swimming they would even run to the towels and lay to dry their bodies" (C.-T. Hsu, 2014). Here, the playfulness of otters, or their anthropomorphic cuddly charisma (Lorimer, 2007), are vital for triggering public emotions. Compared to otters, other conservation species on the islands, such as the Chinese pond turtle, pythons, or the endangered freshwater fish *Metzia mesembrinum*, do not receive comparable attention. As a government official pointed out, "Otters get so much attention because they look cute, but pythons are unlucky since snakes generally give people a bad impression" (Interview with government official, March 2022). Another ecologist made a similar comment, "We [as ecologists] think that this fish is cute and precious, but who cares about fish [as compared to otters]?" (Interview with ecologists, April 2022).

Naming otters further helps individualize them. When referring to otters, respondents quickly brought up the names of the three well-known celebrity otters: "*Da-jin*" (大金), "*Xiao-jin*" (小金), and "*Jin-sha*" (金沙). The names not only make the otters more memorable for the public but also help establish their individual personhood (Milton, 2003). For example, a news article describes how "the younger sister *Jin-sha* prefers staying in the water, while *Da-jin* and *Xiao-jin* move between land and water. When *Jin-sha* is fully engaged in play and her brothers attempt to climb onto the shore, she always grabs them and pulls them back into the water" (Z.-T. Wu, 2014). The names help maintain the public's continuing attention to these individual otters. In the following years, news continued to cover *Jin-sha's* newborn babies, keeping the public updated with the stories of the otter family (C.-C. Li, 2019; Y.-H. Tsai, 2020).

Additionally, these names have strengthened the connection between otters and Kinmen. The names were chosen by the public from hundreds of proposals, with each selected name including the word "*Jin* (or *Kin*, in pinyin)", which is the first word for Kinmen (金門, *Jin-men*). Subsequent rescued otters were also named using the word "*Jin*", or local place names in Kinmen, reinforcing their ties to the islands. Even an otter baby born in the Taipei Zoo had its name "determined" by the city god of Kinmen through the casting of divination blocks (Z.-T. Wu, 2019). This place connection has especially influenced the sentiment in Kinmen. The *Kinmen Daily News* began referring to the otters in the Taipei Zoo as "Kinmen otter" or "the Kinmen-born otter" (C.-C. Li, 2019) to remind people that these otters originally came from the islands. These news articles frequently highlight the endangered status of otters in the region and Kinmen's role as their critical and only habitat (e.g., C.-K. Hsu, 2019; C.-S. Li, 2015). Residents of Kinmen began expressing a desire to bring the otters back (C.-S. Li, 2015). While otters have long lived on the islands, their visibility and connection to Kinmen were made more explicit in Taipei.





by conservationists to represent victims or fighters against development projects, including the anti-casino campaign in 2017, and the suspension of the Jinsha Artificial Lake project in 2023.

### *Monitoring and tracking of otters*

Over the past decade, enhanced monitoring and tracking efforts have offered new ways of understanding and representing otters. In Kinmen, tracking and monitoring started in the late 1990s through surveying projects funded by the national park, yet these early initiatives were not continuous and often did not cover the entire islands. Additionally, the data collected during this time was relatively inaccessible to the public. In the late 2010s, the KCG became involved in otter tracking and monitoring efforts. These programs have become more thorough and continuous, with broader coverage by infrared cameras and systematic surveys. They are also more publicly available, with many videos shared on social media. Moreover, there is a growing civic participation component in recording otter tracks, monitoring, and habitat patrolling, which has fostered the public's affection and caring relationship with otters and the waterscape.

Tracking otters involves searching and collecting otter droppings, as well as capturing their occurrences with infrared cameras. These efforts enable researchers to map their distribution and numbers (e.g. Lee, 1996; Hung *et al.*, 2004; S.-L. Yuan, 2022), study their eating habits (Jang-Liaw, 2021), and evaluate the quality of their habitat and anthropogenic disturbances (Van Looy *et al.*, 2014; S.-L. Yuan, 2022). These results offer a strong rationale for waterscape conservation. Researchers have utilized these findings to propose policy suggestions, such as the implementation of Ecological Checks, managing water extraction and pollution, and recharging wastewater into desiccated streams (S.-L. Yuan, 2022). Here, an enhanced understanding of otter behavior and changes in their distribution have prompted a reconsideration of the changing quality and functioning of water environments. The visualization of overlaps between otter movement and development projects has been utilized to campaign for otters as well as for landscape and waterscape conservation (such as Figure 6).

There has also been a growing public participation in searching for otters and otter tracks. An otter reporting platform was established in 2020, allowing individuals to record sightings and their footprints or droppings. Finding otters and their droppings has also become a key component of ecological tours organized by KNP, KCG, local NGOs, and private businesses. While spotting wild otters during these tours is not guaranteed, discovering otter droppings and footprints provides an indirect form of encounter with them. Through this process, participants gain new ways of looking at the environment and "learn to be affected" (Hinchliffe *et al.*, 2005).

On the other hand, the release of monitoring footage offers close observation of otters in their natural habitats, triggering the public's curiosity, awe, and sentimentality (Lorimer, 2010). Videos of otters carrying or eating fish, swimming, playing, pooping, and taking care of their babies, effectively showcase their lively and playful nature (e.g., Eurasian Otter in Kinmen, 2021; Eurasian Otter in Kinmen Island, 2022a). Additionally, some recordings accidentally capture the richness of Kinmen's wildlife, including turtles, snakes, birds, and herons, highlighting the importance of its environment as a critical habitat for various species and fostering audiences' interest in other species. For instance, one video unexpectedly featured a large python, which drew significant attention from viewers, with one comment noting that their "originally favorite otter became second place [after python]" (Eurasian Otter in Kinmen Islands, 2022b). These videos often stimulate discussions about animal behavior, evoke memories of wildlife sightings, and enhance awareness of habitat preservation. In sum, monitoring otters has not only satisfied public curiosity about otters but also broadened their understanding of the islands' biodiversity and cultivated a different envisioning of the waterscape.

Recent community monitoring initiatives have further fostered a sense of care for otters. These programs were launched as part of Taiwan's "Endangered Species and Critical Habitat Payments for Ecosystem Services Program" to encourage community-led habitat and species monitoring and protection for several endangered species, including the leopard cat, eastern grass owl, pheasant-tailed jacana, and Eurasian otter (Ministry of Agriculture, 2023). In 2023, twenty communities in Kinmen participated in the program, through which they engaged in activities such as monthly habitat patrols, cleanups, infrared camera monitoring, educational training, and the production of documentaries about otters (Wild Bird Society of Kinmen, 2023). Many participants are middle-aged or elderly, a demographic often associated with pro-development views.

Through these programs, participants have begun to develop their care for otters and the riparian environment, even reconsidering their perspectives on development. For instance, some participants reported discovering habitat destruction during their patrols, which was caused by a new development project (*ibid*). This project was subsequently suspended due to concerns about otters and their habitat (Yu, 2023). One participant reflected on how their view towards otters has shifted: "We didn't get to be exposed to this [before participating in the program], and if you are not involved, you of course do not think about them" (Interview with resident, April 2022). Their affection for otters has grown through exposure to knowledge and images about otters, as well as through taking care of their living environment. In Singh's (2013) words, the participants developed 'embodied relationships' with otters and the environment. This change is particularly important, as it has the potential to influence practices and perspectives on development and conservation in Kinmen.

## 7. Conclusion

In this article, I first demonstrate the growing public attention toward otters alongside the changes in waterscape-related policies and practices in Kinmen to suggest otters' capacity for influencing the waterscape. These changes include the success of anti-development campaigns, the suspension of the JAL project and several other development or construction projects, small-scale habitat improvements, and the implementation of Ecological Checks. Although some of these initiatives are still far from ideal, otters have clearly emerged as significant political actors within Kinmen's waterscape. A local technocrat expressed to me, "when it comes to otters, it is like stepping on a landmine" (Interview with technocrat, March 2022). Otters have caused headaches for some technocrats, politicians, and developers, who see them as obstacles to development and infrastructure projects. This indicates that otters possess the capacity to influence policy decisions, thus their agential role in co-shaping the waterscape. While political ecological research has highlighted the hybrid nature and uneven processes of waterscapes, most studies remain anthropocentric, primarily focusing on social-political and economic dynamics. Therefore, the case of Kinmen otters underscores the role of nonhuman beings as political and affective subjects (Hobson, 2007), complicating our understanding of the politics surrounding the production of waterscapes.

Due to otters' elusive nature, the role of alternative encounters becomes crucial in this case, including with celebrity otters, otter mascots and artworks, and monitoring and tracking of otters. Each of these encounters involves different mechanisms and produces varying effects. Celebrity otters draw public attention in the early stage of conservation. An important reason for their influence is that otters' aesthetic charisma becomes perceivable by humans due to the confined environment of the zoo. As otters' low detectability offers them relatively low "ecological charisma" in the wild, the zoo provides a platform for humans to encounter individual otters and perceive their aesthetic and corporeal charisma (Lorimer, 2007). Moreover, these individual otters are given names and stories, which allot them 'personhoods' that are crucial for fostering humans' affection (Lorimer, 2007; Milton,

2003). These names often include words associated with Kinmen, helping people establish a connection between otters and Kinmen.

This connection is further strengthened and maintained through otter-themed merchandise and artworks found throughout the islands. These have become a central element of Kinmen's landscape, serving as representatives for wild otters to remind residents and tourists of their presence. Additionally, otter mascots are utilized by the government to promote the islands and are also mobilized by conservationists in anti-development campaigns. In this context, otters are framed as both a cute symbol and a potential victim of proposed development or infrastructure projects. This representation, combined with an emphasis on their endangered status and Kinmen being the only habitat, has resulted in the successful suspension of several projects. Yet in different situations, otters can also be framed as a harmful actor to the environment (Goedeke & Rikoon, 2008). This highlights the necessity to examine how otters are represented and mobilized by humans.

Finally, tracking and monitoring provide new ways of sensing, observing, and representing otters. Tracking allows researchers to advance knowledge about otter distribution and their connections environments, making a stronger case for waterscape conservation. Monitoring footage offers a close observation of otter behavior and interactions with other species, sparking viewers' curiosity, awe, and sentimentality (Lorimer, 2010). The otter videos circulated online also serve as a form of virtual encounter, enabling people from other locations to care about them, thus mobilizing conservation actions beyond Kinmen (Büscher, 2016; Fair & Schreer, 2025). Community monitoring and patrolling programs enroll a wider demographic to engage with and care about otters and the environment, and have the potential to reshape community views on conservation, development, and the waterscape. Locals are beginning to consider the water bodies not just as resources for human use, but also as habitats and essential spaces for nonhuman species.

By focusing on these three forms of alternative encounters, I have demonstrated that otters' charisma and agency in coproducing the waterscape is relational. Without these human-mediated alternative encounters and representation of otters, they may not have become present and affective. However, the heightened presence of otters also risks making other species absent (Hincliffe, 2008) and 'simplifying' the waterscape in Kinmen (Probyn, 2017). Some ecologists have noted that certain animal-friendly infrastructures in Kinmen are only friendly to otters. To achieve a more inclusive and just more-than-human waterscape would therefore require continuous efforts to foster people's care for nonhumans and to extend such attention beyond otters.

## References

- Acevedo-Guerrero, T. (2025). Water with larvae: Hydrological fertility, inequality, and mosquito urbanism. *Environment and Planning E*, 8(1), 13–30. <https://doi.org/10.1177/25148486221099801>
- Barua, M. (2021). Infrastructure and non-human life: A wider ontology. *Progress in Human Geography*, 45(6), 1467–1489. <https://doi.org/10.1177/0309132521991220>
- Bear, C. (2011). Being Angelica? Exploring individual animal geographies. *Area*, 43(3), 297–304. <https://doi.org/10.1111/j.1475-4762.2011.01019.x>
- Bouleau, G. (2014). The co-production of science and waterscapes: The case of the Seine and the Rhône Rivers, France. *Geoforum*, 57, 248–257. <https://doi.org/10.1016/j.geoforum.2013.01.009>

- Bourguignon, N., Leonardelli, I., Still, E., Nelson, I. L., & Nightingale, A. J. (2023). More-than-human co-becomings: The interdependencies of water, embodied subjectivities and ethics. In W. Harcourt, A. Agostino, R. Elmhirst, M. Gómez, & P. Kotsila (Eds.), *Contours of feminist political ecology* (pp. 129–153). Palgrave Macmillan. <https://doi.org/10.1007/978-3-031-20928-4>
- Budds, J., & Hinojosa, L. (2012). Restructuring and rescaling water governance in mining contexts: The co-production of waterscapes in Peru. *Water Alternatives*, 5(1), 119–137. <https://www.water-alternatives.org/index.php/alldoc/articles/vol5/v5issue1/161-a5-1-8>
- Büscher, B. (2016). [Nature 2.0: Exploring and theorizing the links between new media and nature conservation](#). *New Media & Society*, 18(5), 726–743. <https://doi.org/10.1177/1461444814545841>
- Carse, A. (2012). Nature as infrastructure: Making and managing the Panama Canal watershed. *Social Studies of Science*, 42(4), 539–563. <https://doi.org/10.1177/0306312712440166>
- Casellas Connors, J. P., Short Gianotti, A., & Anderson, R. M. (2024). Policy mobilities, infrastructures, and nonhuman political agency. *Annals of the American Association of Geographers*, 114(8), 1877–1887. <https://doi.org/10.1080/24694452.2023.2271554>
- Chang, S.-W., Chang, H.-L., & Hsu, S.-L. (2019). Taiwan shuita de guoqu [History of Eurasian otters on the island of Taiwan]. *Ziran baoyu jikan [Nature Conservation Quarterly]*, 106, 12–23. <https://www.airitilibrary.com/Article/Detail?DocID=16072928-201906-201907080008-201907080008-12-23>
- Chen, C.-H., & Lee, L.-L. (2003). *Jinmen buru dongwuxiang diaocha [Kinmen mammal survey]*. Kinmen National Park.
- Chen, L. (2019, November 16). Tiandun yangzhiqiu changqi yanhua. Jinsha zhendaihui jianyi gaiwang tachu zuo xushui chi [Tiandun aquaculture area has suffered from long-term salinization. The Jinsha Township Representative Council has suggested relocating the planned reservoir to somewhere else]. *Kinmen Daily News*. <https://www.kmdn.gov.tw/1117/1271/1272/312627/>
- Cheng, H.-C., Changchien, L.-W., Lin, R.-S., Yang, C.-H., & Chang, S.-W. (2017). *The red list of terrestrial mammals of Taiwan, 2017*. Endemic Species Research Institute, Council of Agriculture, Executive Yuan.
- Chong Jun Engineering Consultant. (2018, November 6). *Jinshaxi liuyu shuihuanjing gaishan gongcheng jihua minzhong shengtai jianhe gongzuofang [Jinsha Stream Watershed water environment improvement project—Public Ecological Check workshop]*. Kinmen County Government.
- Chuang, H.-C. (2022, May 24). Zouguo 42 nian shuita xunhu de cangsang lu [Walking through 42 years of otter patrol]. *Facebook*. <https://www.facebook.com/lutra.kin/posts/pfbid02Ze9aKp5mt5a9e43AGn5r7mAGpJ4E5SYFIEdCrqBtv5G1nERpLNzwC7LwzYFdetnml>
- Conroy, J., Melisch, R., & Chanin, P. (1998). The distribution and status of the Eurasian Otter (*Lutra lutra*) in Asia—A preliminary review. *IUCN Otter Special Group Bulletin*, 15(1), 15–30.
- de Carvalho Cabral, D., & Lähdesmäki, H. (2023). Multispecies cultures and environmental change. In E. O’Gorman, W. San Martín, M. Carey, & S. Swart (Eds.), *The Routledge Handbook of Environmental History* (pp. 91–105). Routledge. <https://doi.org/10.4324/9781003189350-9>
- Donfrancesco, V. (2024). De- and re-peasantization through wolves: A more-than-human political ecology of agrarian change. *Journal of Political Ecology*, 31, 586–603. <https://doi.org/10.2458/jpe.5720>

- Doubleday, K. F. (2017). Nonlinear liminality: Human-animal relations on preserving the world's most famous tigress. *Geoforum*, 81, 32–44. <https://doi.org/10.1016/j.geoforum.2017.02.005>
- Eurasian Otter in Kinmen. (2021, February 3). *Eurasian otter in Kinmen NO.5*. Youtube. <https://www.youtube.com/watch?v=TfOsqedmM0o>
- Eurasian Otter in Kinmen island. (2022a, December 5). *Jinmen shuita de siren huisuo yu youyongchi | Jinmen yesheng ouya shuita shengtai [Kinmen otters' private club and swimming pool | Kinmen wild Eurasian otter ecology]*. Youtube. <https://www.youtube.com/watch?v=cfXGP5vFI28>
- Eurasian Otter in Kinmen island. (2022b, November 10). *Juda yesheng miandianmang | Ouya shuita yao yu | gui bie yelu gongyou qi de | Jinmen shengtai [Giant wild Burmese python | Eurasian otter bites fish | Turtle and heron share habitat | Kinmen ecology]*. Youtube. <https://www.youtube.com/watch?v=rNn44hhrUpQ>
- Evans, L. A., & Adams, W. M. (2018). Elephants as actors in the political ecology of human–elephant conflict. *Transactions of the Institute of British Geographers*, 43(4), 630–645. <https://doi.org/10.1111/tran.12242>
- Fair, H., & Schreer, V. (2025). Lively gifts and exclusive commodities: Rethinking encounter value in orangutan conservation. *Geoforum*, 159, 104213. <https://doi.org/10.1016/j.geoforum.2025.104213>
- Flaminio, S., Rouillé-Kielo, G., & Le Visage, S. (2022). Waterscapes and hydrosocial territories: Thinking space in political ecologies of water. *Progress in Environmental Geography*, 1(1–4), 33–57. <https://doi.org/10.1177/27539687221106796>
- Goedeke, T. L., & Rikoon, S. (2008). Otters as actors: Scientific controversy, dynamism of networks, and the implications of power in ecological restoration. *Social Studies of Science*, 38(1), 111–132. <https://doi.org/10.1177/0306312707077363>
- Gramaglia, C., & Sampaio da Silva, D. (2023). Researching water quality with non-humans. An actor network theory account. In M. Schillmeier, J. Passoth, & B. Peuker (Eds.), *Agency without Actors? New approaches to collective action* (pp. 178–195). Routledge.
- Hinchliffe, S., Kearnes, M. B., Degen, M., & Whatmore, S. (2005). Urban wild things: A cosmopolitical experiment. *Environment and Planning D: Society and Space*, 23(5), 643–658. <https://doi.org/10.1068/d351t>
- Hinchliffe, S. (2008). Reconstituting nature conservation: Towards a careful political ecology. *Geoforum*, 39(1), 88–97. <https://doi.org/10.1016/j.geoforum.2006.09.007>
- Hobson, K. (2007). Political animals? On animals as subjects in an enlarged political geography. *Political Geography*, 26(3), 250–267. <https://doi.org/10.1016/j.polgeo.2006.10.010>
- Hsu, C.-T. (2014, June 5). Shuita xiongdi duannai le [The otter brothers have been weaned]. *Kinmen Daily News*. <https://www.kmdn.gov.tw/1117/1271/1272/239555/>
- Hsu, C.-K. (2019, April 9). Jinmen ying chenghuang qianjin beishi dongwuyuan zhoumo shuita baoyu huodong [Kinmen's Chenghuang Parade heads to Taipei Zoo: Otter conservation activities this weekend]. *Kinmen Daily News*. <https://www.kmdn.gov.tw/1117/1271/1272/304892/>
- Hung, C., Li, S., & Lee, L. (2004). Faecal DNA typing to determine the abundance and spatial organisation of otters (*Lutra lutra*) along two stream systems in Kinmen. *Animal Conservation*, 7(3), 301–311. <https://doi.org/10.1017/S1367943004001453>
- Hurst, E., Ellis, R., & Karippal, A. B. (2022). Lively water infrastructure: Constructed wetlands in more-than-human waterscapes. *Environment and Planning E: Nature and Space*, 8(1), 77–99. <https://doi.org/10.1177/25148486221113712>

- Jang-Liaw, N.-H. (2021). A barcoding-based scat-analysis assessment of Eurasian otter *Lutra lutra* diet on Kinmen Island. *Ecology and Evolution*, 11(13), 8795–8813. <https://doi.org/10.1002/ece3.7712>
- Jang-Liaw, N.-H. (2023). *Jinmen diqu ouya shuita zuqun jiance ji zuqun dongtai diaocha jihua* [Kinmen Eurasian Otter population monitoring and population dynamics survey project]. Kinmen County Government.
- Jepson, P., & Barua, M. (2015). A theory of flagship species action. *Conservation and Society*, 13(1), 95. <https://doi.org/10.4103/0972-4923.161228>
- Karpouzoglou, T., & Vij, S. (2017). Waterscape: A perspective for understanding the contested geography of water. *WIREs Water*, 4(3), e1210. <https://doi.org/10.1002/wat2.1210>
- Kinmen County Council. (2019, May 17). *Di qi jie di yi ci dingqi hui* [The first regular meeting of the seventh term]. Kinmen County Council. <https://agenda.kmcc.gov.tw/CouncilManage/AgendaGovMinutes/Detail/dc50ea93-90e7-41f5-9048-8e4f35921818>
- Kinmen County Council. (2023, May 9). *Di ba jie di yi ci dingqi hui* [The first regular meeting of the eighth term]. Kinmen County Council. <https://agenda.kmcc.gov.tw/CouncilManage/AgendaGovMinutes/Detail/4cac8679-e5a8-49b6-879e-f30620543c39>
- Kinmen County Government. (2017, November 15). *106 nian 11 yue 15 ri guihua sheji jieduan—Jiben ji xibu sheji chengguo shencha huiyi* [Planning and design stage—Preliminary and detailed design results review meeting on November 15, 2017]. Kinmen County Government.
- Kinmen Eurasian Otter Conservation Alliance. (2014). *Jinmen dao da kaifa* [Kinmen Islands Development] [Graphic]. <https://www.facebook.com/photo/?fbid=918793404797555&set=g.952394081443133>
- Kooy, M. (2014). Developing informality: The production of Jakarta's urban waterscape. *Water Alternatives*, 7(1), 35–53. <https://www.water-alternatives.org/index.php/alldoc/articles/vol7/v7issue1/232-a7-1-3>
- Lee, L.-L. (1996). Status and distribution of river otters in Kinmen, Taiwan. *Oryx*, 30(3), 202–206. <https://doi.org/10.1017/S0030605300021645>
- Lee, L.-L. (2013). *Jinmen shuita fenbu bianqian yu zuqun shengtai yanjiu I* [Study on the distribution changes and population ecology of the Eurasian Otter in Kinmen I]. Kinmen National Park.
- Lee, L.-L. (2015). *Jinmen shuita fenbu bianqian yu zuqun shengtai yanjiu (3/3)* [Research on distribution changes and population ecology of Kinmen's River Otter (3/3)]. Kinmen National Park.
- Li, C.-S. (2014, April 3). Yiji baoyulei dongwu jinmen luonan jisong taibei anzhi qidi bian jiandi ouya xiao shuita cheng guer [First-class conservation animal in distress in Kinmen urgently sent to Taipei for shelter. Habitat turned into construction sites, Eurasian otter becomes orphaned]. *China Times*.
- Li, C.-S. (2015, July 6). Ouya shuita song beishi dongwuyuan Jinmen ren xiang yao huilai [Eurasian otters were sent to the Taipei Zoo. The people of Kinmen want them back]. *China Times*.
- Li, C.-C. (2019, April 6). Jiang yao minzhong mingming jinmenji shuita jinsha you sheng 1 zhi xiao baobao [Public invited to name the new baby—Kinmen-born otter "Jinsha" gives birth to another pup]. *Kinmen Daily News*. <https://www.kmdn.gov.tw/1117/1271/1272/304759/>

- Li, T.-W. (2020, June 6). Jinmen wuchan zhan zai taizhong fengyuan taipingyang baihuo dengchang [Kinmen product exhibition kicks off at Taichung Fengyuan Pacific Department Store]. *Kinmen Daily News*. <https://www.kmdn.gov.tw/1117/1271/1272/319713/>
- Liao, P.-Y. (2014, May 3). Shuita xiongdì jìnshì gē àiwān dì ānfēn [The otter brothers are eating – one loves to play while the other is calm]. *United Daily News*. Taiwan News Smart Web.
- Lin, L.-K. (2016). *Zhibiao wuzhong qide huanjing gaishan, yingzao ji jiance pinggu—Ouya shuita 2 [Habitat improvement, creation, and monitoring assessment for indicator species—Eurasian Otter 2]*. Kinmen National Park.
- Lin, L.-K. (2018). *Jinshaxi liuyu shuihuanjing gaishan jihua—Shuita huodong jiance, yingxiang pinggu yu youshan sheji jihua [Jinsha Stream Basin water environment improvement plan—Otter activity monitoring, impact assessment, and animal friendly design project]*. Kinmen County Government.
- Lin, L.-K. (2019). *Jinmen diqu ouya shuita yingxiang souji, zuqun jiance ji qidi gaishan jihua [Kinmen Eurasian otter image collection, population monitoring, and habitat improvement project]*. Kinmen County Government.
- Lorimer, J. (2007). Nonhuman charisma. *Environment and Planning D: Society and Space*, 25(5), 911–932. <https://doi.org/10.1068/d71j>
- Lorimer, J. (2010). Moving image methodologies for more-than-human geographies. *Cultural Geographies*, 17(2), 237–258. <https://doi.org/10.1177/1474474010363853>
- Lorimer, J. (2024). Worlding and weirding with beaver: A more-than-human political ecology of ecosystem engineering. *Transactions of the Institute of British Geographers*, e12698. <https://doi.org/10.1111/tran.12698>
- Loy, A., Kranz, A., Oleynikov, A., Roos, A., Savage, M., & Duplaix, N. (2020, January 31). *Lutra lutra (amended version of 2021 assessment)*. The IUCN Red List of Threatened Species 2022. <https://dx.doi.org/10.2305/IUCN.UK.2022-2.RLTS.T12419A218069689.en>
- MacDonald, S., & Mason, C. (1990). *Otters: An action plan for their conservation* (P. Foster-Turley, Ed.). IUCN. <https://doi.org/10.2305/IUCN.CH.1990.SSC-AP.3.en>
- Margulies, J. D., & Bersaglio, B. (2018). Furthering post-human political ecologies. *Geoforum*, 94, 103–106. <https://doi.org/10.1016/j.geoforum.2018.03.017>
- Milton, K. (2003). *Loving nature: Towards an ecology of emotion*. Routledge.
- Ministry of Agriculture. (2023). *Binwei wuzhong ji zhongyao qidi shengtai fuwu jifu tuidong fangan [Endangered Species and Critical Habitat Payments for Ecosystem Services Program]*. Ministry of Agriculture.
- Morita, A. (2017). Multispecies infrastructure: Infrastructural inversion and involutory entanglements in the Chao Phraya Delta, Thailand. *Ethnos*, 82(4), 738–757. <https://doi.org/10.1080/00141844.2015.1119175>
- Pai, Y.-C. (2015, January 20). "Xin guxiang yuanjing" bie rang shengtai miejui ta guo de hao, ren cai guo de hao huan gei shuita yige jia ["Vision of a new homeland": Don't let ecology become extinct. If they live well, people will live well—Give the otters a home]. *China Times*.
- Probyn, E. (2017). How to represent a fish? *Cultural Studies Review*, 23(1). <https://doi.org/10.5130/csr.v23i1.5110>
- Scaramelli, C. (2013). Making sense of water quality: Multispecies encounters on the Mystic River. *Worldviews: Global Religions, Culture & Ecology*, 17(2), 150–160. <https://doi.org/10.1163/15685357-01702006>

- Shen, P.-Y. (2019, April 8). Jinmen wudao chenghuangji lai dao taibei dongwuyuan raojing xue shuita baoyu [Kinmen Wudao City God Festival arrives at Taipei Zoo Parade and otter conservation education]. *Liberty Times Net*. <https://news.ltn.com.tw/news/life/breakingnews/2752033>
- Singh, N. M. (2013). The affective labor of growing forests and the becoming of environmental subjects: Rethinking environmentality in Odisha, India. *Geoforum*, 47, 189–198. <https://doi.org/10.1016/j.geoforum.2013.01.010>
- Strang, V. (2024). Listening to the river: Representing non-human needs and interests in debates about water governance and management. *River Research and Applications*, 40(9), 1698–1709. <https://doi.org/10.1002/rra.4137>
- Sultana, F. (2013). Water, technology, and development: Transformations of development technonatures in hanging waterscapes. *Environment and Planning D: Society and Space*, 31(2), 337–353. <https://doi.org/10.1068/d20010>
- Sundberg, J. (2011). Diabolic caminos in the desert and cat fights on the río: A posthumanist political ecology of boundary enforcement in the United States–Mexico Borderlands. *Annals of the Association of American Geographers*, 101(2), 318–336. <https://doi.org/10.1080/00045608.2010.538323>
- Swyngedouw, E. (1999). Modernity and hybridity: Nature, regeneracionismo, and the production of the Spanish waterscape, 1890-1930. *Annals of the Association of American Geographers*, 89(3), 443–465. <https://doi.org/10.1111/0004-5608.00157>
- Taipei Zoological Foundation. (2018). *Jinmenxian shuita shourong zhongxin ziliao souji ji shezhi pinggu jianyi jihua [Kinmen County otter shelter data collection and establishment assessment recommendation project]*. Kinmen County Government.
- Taiwan Rivers Network. (2020). *"Quanguo shuihuanjing gaishan jihua jin, lan pingguo jiang" ge anjian pinggu ji fenshu liebiao [Evaluation and score list for each case in the "National Water Environment Improvement Plan Golden and Rotten Apple Awards"]*.
- Tsai, C.-C. (2014, October 1). Xianfu BOT an hui qidi bisi jinmen shuita tamen bei po chuzou you chuan bei che zhuang si... [County government BOT project destroys habitat, driving Kinmen otters to death. They are forced to leave and reported being hit and killed by cars]. *United Daily News*.
- Tsai, Y.-H. (2020, July 29). Ouya shuita jinsha yinglai di 3 tai beishi dongwuyuan gongbu xingbie [Eurasian otter "Jinsha" welcomes her third baby—Taipei Zoo announces the baby's gender]. *Liberty Times Net*. <https://news.ltn.com.tw/news/life/breakingnews/3242958>
- Tseng, C.-H. (2017). *Qianpuxi shengwu langdao gaishan yu xiaoyi pinggu zhi yanjiu [Study on the improvement and benefit assessment of the Qianpu stream ecological corridor]*. Kinmen County Government.
- Tsou, M.-H. (2020, October 15). [Overall progress, problems persist: Civil groups announce the second "Golden Apple and Rotten Apple Awards" for Forward-Looking Water Environment Projects. *Environmental Information Center*. <https://e-info.org.tw/node/227381>
- Van Looy, K., Piffady, J., Cavillon, C., Tormos, T., Landry, P., & Souchon, Y. (2014). Integrated modelling of functional and structural connectivity of river corridors for European otter recovery. *Ecological Modelling*, 273, 228–235. <https://doi.org/10.1016/j.ecolmodel.2013.11.010>
- Wakefield, S. (2020). Making nature into infrastructure: The construction of oysters as a risk management solution in New York City. *Environment and Planning E: Nature and Space*, 3(3), 761–785. <https://doi.org/10.1177/2514848619887461>

- Water Resources Agency. (2024, November). *Jiaqiang pindi rengonghu ji fuliushui tuidong jihua (di2 ci xiuzheng) (caoan) [Draft of the Revised Plan (2nd Revision): Strengthening the Artificial Lakes and Underground Streams Projects]*. Ministry of Economic Affairs.
- Weng, W.-C. (2014, November 27). Baoyu benxian shuita zhuanjia: Jianli youshan huanjing [Otter Conservation is in the county: Build a friendly environment]. *Kinmen Daily News*. <https://www.kmdn.gov.tw/1117/1271/1272/246745/>
- Wild Bird Society of Kinmen. (2023). *Jinmen youshan shuita shengtai fuwu jifu shequ fudao jihua [Kinmen otter-friendly payments for ecosystem services community guidance program]*. Kinmen County Government.
- Woods, M. (2000). Fantastic Mr. Fox? Representing animals in the hunting debate. In C. Philo & C. Wilbert (Eds.), *Animal spaces, beastly places*. Routledge.
- Wu, T.-H. (2019, October 13). Buzhi shihu shuita quantai sheng 200 zhi 7 da yuanyin hai bin jue [Not just leopard cats—Only 200 otters left in Taiwan. Seven major reasons behind their endangerment]. *United Daily News*.
- Wu, Z.-T. (2014, October 8). 1 zhou si 2 zhi jinmen shuita you bei lusha [Two otters killed in one week; another Kinmen otter dies in a road accident]. *Liberty Times Net*. <https://news.ltn.com.tw/news/local/paper/819764>
- Wu, Z.-T. (2019, May 25). Taipei dongwuyuan shuita baobao jinmen chenghuangye ding guiming qingyu [Taipei Zoo's otter baby named "Qingyu" by Kinmen City God]. *Liberty Times Net*. <https://news.ltn.com.tw/news/life/breakingnews/2801732>
- Yang, S.-Y. (2014, December 15). Xianyunhui jixiangwu puguang Q ban shuita chao meng [County Games mascot unveiled: Adorable cute-style Otter]. *Kinmen Daily News*. <https://www.kmdn.gov.tw/1117/1271/1272/247461/>
- Yang, S.-Y. (2015, December 8). Shuita rongying Jinmen shengtai dashi [Kinmen's ecological ambassadors]. *Kinmen Daily News*. <https://www.kmdn.gov.tw/1117/1271/1272/261412/>
- Yang, S.-Y. (2021, December 3). Yuhui dingqihui yiyuan zhixun gonwuchu zhengfungchu yewu zhihxing qingxing [The regular session of the council includes inquiries from council members regarding the implementation of business operations by the Public Works Department and the Ethics Office]. *Kinmen Daily News*. <https://www.kmdn.gov.tw/1117/1271/1272/338257/>
- Yu, J.-C. (2023, December 1). Jinmen xiuzheng guanghua yuan pohuai shuita qidi ai hong xianfu jinji han tinggong huifu huangjing [Renovation of Guanhua Park in Kinmen criticized for destroying otter habitat; county government halts construction and vows to restore the environment]. *China Times*. <https://www.chinatimes.com/realtimenews/20231201003398-260421?chdtv>
- Yuan, H.-Y. (2023, October 6). Xushui gongcheng jiang pohuai ouya shuita qide Jinmen jinshaxi rengonghu xianfu zhong yun zhanhuan [The water storage project will destroy Eurasian otter's habitat—Kinmen's Jinsha River artificial lake has finally been temporarily suspended by the county government]. *Environmental Information Center*. <https://e-info.org.tw/node/237783>
- Yuan, S.-L. (2022). *Jinmen diqu ouya shuita zuqun jiance diaocha, lusha fangzhi guihua ji gaishan jihua [Kinmen Eurasian Otter population monitoring, roadkill prevention planning and improvement project]*. Kinmen County Government.