Biodiversity conservation in protected areas requires strict legal limitations to land use. In the Civilian Control Zone (CCZ) of the Republic of Korea (ROK), military control has created an accidental sanctuary for the world’s rarest crane species: the white-naped crane (*Antigone vipio*) and the red-crowned crane (*Grus japonensis*). Yet varying land use demands on the CCZ by stakeholders have caused disagreements in achieving cooperative crane conservation. This paper aims to clarify relevant stakeholders’ interconnection and their motives that have led them to either promote or inhibit crane conservation in the Cheorwon Basin of the CCZ. To answer these questions, we conducted participatory Net-Map interviews and identified stakeholders with a powerful role in crane conservation. Our results identify 44 stakeholders whose trust relations occurred twice as often as conflicts. More than 80% of stakeholders included in this study supported crane conservation initiatives. We attribute local farmers’ increased level of environmental stewardship to two key schemes: a community-led farming project generating financial incentives and a communication channel for stakeholders. Our case study demonstrates that Net-Map is a valid tool to analyze human-crane interactions, which is critical to ensure acceptance of legal restrictions to land use as well as crane conservation.

**KEYWORDS**

*Antigone vipio*, biodiversity, civilian control zone, *Grus japonensis*, human-wildlife interaction, network mapping, protected area, stakeholder analysis, transboundary conservation

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**INTRODUCTION**

As the destruction of natural habitats continues to threaten wildlife populations, reducing the negative impact of human activities is an important aim of conservation (Oldekop, Holmes, Harris, & Evans, 2016). Accordingly, designating new protected areas and sustaining existing ones are key tools for halting biodiversity loss (Di Marco et al., 2016). Despite their key function for conservation, the legal designation of protected areas inevitably involves limitations to stakeholders’ opportunities to use and gain income from the land. Often, this has fueled conflicts (i.e., two or more concerned parties...
compete in their interests and have different perceptions of these interests) (Rechciński, Tusznio, & Grodzińska-Jurczak, 2019). Projects prone to resentment and management failure are those where conservation objectives and land use restrictions are imposed on local people. Another cause for protected area conflicts are when wildlife damages the livelihoods of people (Soliku & Schraml, 2018), which has been extensively studied in the field of human-wildlife interactions (Ceaus¸u, Graves, Killion, Svenning, & Carter, 2019; Hodgson, Redpath, Sandström, & Biggs, 2020; König et al., 2020; Nyhus, 2016; Teixeira et al., 2020; Treves, Wallace, Naughton-Treves, & Morales, 2006). Criticism of exclusionary concepts of protected areas evolved in the 1980s and 1990s, and led to a paradigm shift toward concepts that emphasize the participation of concerned actors, such as community-based conservation (Berkes, 2007; Hirschnitz-Garbers & Stoll-Kleemann, 2011) or collaborative environmental governance (Gieseke, 2020). Despite implementing modern, integrated concepts in protected areas, management failures have still been reported; in Europe, these failures are attributed to neglecting the specific area’s socioeconomic and political conditions, as well as lacking sensitivity for the perceptions and attitudes of local people (Hirschnitz-Garbers & Stoll-Kleemann, 2011). A global review on community-based conservation underlines the importance of social factors, concluding that supportive cultural beliefs and capacity building in local communities are critical factors for long-term conservation success (Brooks, Walen, & Borgerhoff Mulder, 2013).

This paper presents a case study in the historically unique setting of the Cheorwon Basin in the Civilian Control Zone (CCZ) of the Republic of Korea (ROK). Here, land use restrictions were implemented based on military objectives and nearly 70 years of strictly limited access created a sanctuary for biodiversity as accidental by-product (John, Youn, & Shin, 2003; Lee, Jabłoński, & Higuchi, 2007; Lee & Mjelde, 2007). The area hosts one of the last available wintering sites of two endangered crane species, the white-naped crane (Antigone vipio) and the red-crowned crane (Grus japonensis). Recently, the ROK governments made plans to open part of the CCZ for economic development, as detailed in the Declaration for Peace, Prosperity and Unification of the Korean Peninsula at the third inter-Korean summit in 2018 (Lee & Oh, 2020; Ministry of Foreign Affairs, 2018). However, the existing governance by military restrictions will have to be shifted to the state in which conservation policies are implemented by collective effort of public, nonprofits, and for-profit organizations, not by a single authority (Gieseke, 2020; Nita, Ciocanea, Manolache, & Rozylowicz, 2018). The ROK government has repeatedly proposed trans-frontier reserves in the CCZ (Kim, Steiner, & Mueller, 2011; Ministry of Environment, 2001), yet establishment of these reserves has been halted due to perpetual opposition of local residents and other stakeholders against crane conservation initiatives (Choo & Jamal, 2009; Kim et al., 2011). Previous research has shown that local initiatives have already succeeded in encouraging farmers to participate in crane conservation. While local farmers were mainly antagonistic toward cranes before 2003 (John et al., 2003), a later study highlighted that farmers had a positive attitude toward cranes, as they could use the image of cranes for marketing their products (Kim et al., 2011). Moreover, a habitat suitability analysis for G. japonensis revealed that cranes predominately use harvested fields as foraging grounds in the Cheorwon Basin (Kim et al., 2016). This prevents problems of crop damage that have been reported at other sites (Barzen, Gossens, Lacy, & Yandell, 2020). Nevertheless, the need to understand the perspectives of stakeholders other than farmers has been identified as significant research gap (Kim et al., 2011). Recent development plans (build railways and industrial complexes and introduce large-scale livestock farming) in the CCZ have increased the number of parties interested in land-use changes (Brady, 2019; Kim, 2013) and made it even more important to identify the range of diverse stakeholders. The general aim of this paper is to understand the constellation of stakeholders involved in crane conservation in the CCZ. To achieve this, we performed a social network analysis, as it provides an ideal framework to analyze how management structures are formed and coordinated (Bodin et al., 2019; Manolache et al., 2020). We adopted the interview-based participatory network-mapping tool Net-Map (Schiffer & Hauck, 2010). Mapping of stakeholders’ positions, values, attitudes, and goals is an essential first step to understand the context of conservation conflicts (Redpath et al., 2013). We define “stakeholders” as (groups of) people who hold interests regarding the issue at stake and are directly or indirectly affected by corresponding actions or policies, and/or influence these themselves (Freeman & Reed, 1983; Vogler, Macey, & Sigouin, 2017).

In the analysis, we focus on the following research questions:

1. Who is engaged in and plays a central role in crane conservation in the CCZ? (Section 3.1—Key Stakeholders).

2. Are there linkages (money flows, trust relations, conflicts) between identified stakeholders? (Section 3.2—Stakeholder Linkages).

3. What motivates the identified stakeholders to support or oppose crane conservation? (Section 3.3—Motivation).

4. How strong and imbalanced are stakeholders’ levels of influence on crane conservation in the CCZ, and how can such information be used to address potential challenges? (Section 3.4—Influence Level).
In addressing these research questions, we provide up-to-date information on the network of relevant stakeholder groups, their motivations to support or oppose crane conservation in the CCZ, and the underlying factors that defined these opposing positions. Additionally, we assess the levels of influence of each stakeholder group and explore how power imbalances can be dealt with to achieve long-term conservation of the crane wintering site in Cheorwon Basin.

2 | DATA AND METHODS

2.1 | Study site and background information

The Cheorwon Basin (Figure 1) is located in the center of the Korean Peninsula (38°17′ N, 127°13′ E), making it a strategic foothold during the Korean War. At present, the Cheorwon Basin belongs to the CCZ, a land strip of 5–20 km along the southern border of the Demilitarized Zone (DMZ). The DMZ is a de facto protected area providing an important habitat for rare species since its creation in 1953 (John et al., 2003; Lee et al., 2007). This border has served as a buffer zone between the ROK and Democratic People’s Republic of Korea (DPRK) amidst ideological turmoil on the Korean Peninsula (Hwang, 2011; Westing, 2010). Especially in the CCZ, land use activities were heavily regulated after the Korean War Armistice because the government established farming villages for the strategic purpose of anti-communism programs (Kim, 2001; McGranahan & Collins, 2018). As a result, spatially overlaying double or triple restrictions (Military Facility Protection Act, Cultural Heritage Protection Act, and the Natural Environment Conservation Act) have suspended land development in the region.

Limited human disturbance has created relatively well-preserved ecosystems and the last wintering site for migratory cranes on the Korean Peninsula (Higuchi & Minton, 2000; Kim et al., 2016). In January 2018, 64% of the existing 6,750 A. vipio and 28% of the existing 3,300 G. japonensis wintered in the Cheorwon Basin (National Institute of Biological Resources, 2018).

2.2 | Data collection using Net-Map

Net-Map is a participatory social network-mapping tool that combines network analysis and influence map drawing (Lelong, Stark, Hauck, Leuenberger, & Thronicker, 2016). Net-Map offers a methodology for understanding the power relations between stakeholders and identifying areas of improvement (e.g., strengthening alliances, alleviating conflicts) (Schiffer & Peakes, 2009). Net-Map is designed to help conduct in-depth qualitative analysis. Thus, sample sizes tend to be small to support a single case study in detail (Bryman, 2016; Metelerkamp et al., 2020). Case-specific challenges observed in the different stages of Net-Map interviews in Costa Rica, Germany, Tanzania, and China are described by Schröter et al. (2018).

The first interviewee was selected by direct recommendation from researchers studying crane conservation.
in the region. Subsequent participants were added based on the previous interviews using snowball sampling (described by Goodman, 1961). Each interview provided an overview of potential interviewees to contact when certain individuals or groups shared outstanding attributes (e.g., they had a high influence level, or a contradicting perspective, or belonged to a different sector).

A total of 13 people were contacted in consecutive order via email or phone for face-to-face interviews. Eight consented to participate and were interviewed in June 2019. Such a sample size is congruent with similar studies using Net-Map (Aberman & Edelman, 2014; Bryan, Hagos, Mekonnen, Gemeda, & Yimam, 2020; Delgadillo, Graef, Schröter, & Halle, 2020). The first author conducted all the interviews in the Korean language, and each interview took ~2 h. The eight interviews were recorded with participants' consent, and their personal information was kept confidential. Using an interview guideline in Korean (see Supporting Information for the English version), participants were requested to (a) name the major stakeholders involved in crane conservation, (b) define the linkages between them (e.g., institutional and legal support, trust relations, and conflicts), (c) identify one or more motivations of stakeholders whose standpoints differ, and (d) rate the influence level of each stakeholder on a five-point scale (a higher number indicates greater influence).

In Korea, people tend to avoid directly referencing money, as it is associated with negative connotations such as bribery or corruption. Therefore, the term “money flow” was replaced by “institutional and legal support” in the interviews to avoid possible controversy. Trust relations and conflicts indicated whether stakeholders are cooperating with each other. We also predefined the term “influence” to refer to the stakeholder’s capacity to exert influence on crane conservation measures. Last, we address interviewees’ perspectives on crane conservation (e.g., positive, neutral, negative) and factors that might change the network in the future. Inter-Korean relations are dependent on domestic and foreign political landscapes, and vary temporally. Therefore, interviewees were asked to focus on the present circumstances and exclude past/future conditions when they answered the questions. The first interview was carried out as a pretest to for methodological improvements. Since no changes were made to the guideline, we included the pretest interview in the final analysis.

### 2.3 Data analysis

The maps created during the interviews were converted to an Excel spreadsheet to categorize the stakeholders and list their motivations, the interrelations between stakeholders, and the level of influence perceived by the interviewees. Then, the data were transferred into UCINET/NetDraw, a commonly used software package for analyzing social network data (Borgatti, 2002; Borgatti, Everett, & Freeman, 2002; Borgatti, Everett, & Johnson, 2018). UCINET visualizes network graphs that consist of separate entities and existing connections, referred to as “nodes” and “edges,” respectively. We calculated four network parameters using the NetDraw function: betweenness centrality, degree centrality, link weight, and node value. Betweenness centrality and degree centrality clarify who is a hard-to-replace stakeholder within the network. The former describes the stakeholders’ influence as a bridge over the flow of resources between two other stakeholders (Hanneman & Riddle, 2005), while the latter represents the number and direction of links with a particular stakeholder (Schiffer & Waale, 2008). Link weight represents the number of times a link is reported by interviewees and is represented as “edge size” (a thicker line represents a more dominant perceived link). Node value is the sum of stakeholders linked with a node (a larger node size indicates interaction with more stakeholders). We produced three graphs in this study to visualize money flow, trust relations, and conflicts among stakeholders. Then, we applied node value to describe trust relations and conflicts as they are reciprocal while money flow depends on the input–output direction. Last, the influence level of stakeholders was calculated as the median score assigned in the interviews.

To ensure data privacy and anonymity, all stakeholders mentioned during the interviews were aggregated and classified into 11 groups (agriculture, conservation, etc.) that shared similar features, such as the same interests and profession (Table 1). Each stakeholder in a group was given a code comprising an abbreviation and a number, such as AGR 1 (Agriculture 1) (see Supporting Information). We analyzed local farmers as a single group (AGR 4) and as three individual farmers (Farmer 1, Farmer 2, Farmer 3) to explore their potential roles in the network. In addition, we selected quotations from the transcribed interviews to underline the reasoning between different motivation types. All statements were originally given in Korean, but were translated to English for the narrative analysis. Hereafter, we refer to the source of each interview statement with square brackets, such as agriculture group (AGR) and research group (RES). Last, we used the influence level of stakeholders to identify the most influential stakeholders in DMZ crane conservation. The individuals remain anonymous, but the official names of the organizations and governments are used on the maps.
3 | RESULTS

3.1 | Key stakeholders

Each interviewee named 8–24 stakeholders that they categorized as promoting or inhibiting crane conservation. In sum, we divided the 44 identified stakeholders into 11 groups (Table 1). The three most frequently named stakeholders, mentioned in 7 of the 8 interviews, were a local NGO for crane conservation, local farmers and a publicly initiated local coordinative committee for crane conservation. Moreover, interviewees mentioned local farmers in two different ways—local farmers as a group and/or individual farmers by mentioning their names. Three farmers were specified during the interview and kept separate to explore whether these three individuals were notably engaged in the network. Promoters accounted for over 80% of identified stakeholders. Interviewees named seven inhibitors from the central government (the Korea Agricultural and Rural Infrastructure Corporation; and the Korea Ministry of Land, Transport and Maritime Affairs), the municipal authority (the Cheorwon County Office Livestock Division), industry (livestock pen developers, external landowners) and the military (the Korea Ministry of National Defense, military bases). The past 2 years have seen an increase in livestock pens being added to the crane habitat in the Cheorwon Basin, which led interviewees from the research and conservation groups to include a county office livestock division and pen developers as inhibitors of crane conservation. Interviewees from the research and conservation groups also stated that as the opportunities for opening up the border grow, more governmental bodies involved in land development and national security join the network as stakeholders.

3.2 | Stakeholder linkages

3.2.1 | Money flow

Interviewees mentioned money flow 24 times and identified 15 involved stakeholders (Figure 2). Based on the map, we identified five money sources: two from the central government group, two from the donation group, and one from the business group. The two major money sources were a public electric power corporation (GOV 3) and a private oil company (BIZ 1). The former interacted more with governmental bodies (e.g., municipalities), while the latter interacted with organizations for crane conservation. The National Nature Trust (CON 12) is an intermediary linking private donations (DONAT 1, DONAT 2) and a local NGO (CON 3). Additionally, the private organization for crane conservation (CON 13) was mapped as an isolated component due to its self-funding and profit-making mechanism.

The betweenness centrality and degree centrality scores in the money flow network (see Supporting Information) indicate that the Cheorwon County Office (MUNI 3) is the largest money distributor within the network and has the greatest role in bridging stakeholders. The Wonju Regional Office (MUNI 5) and a public electric power corporation (GOV 3) set up a joint fund to incentivize local farmers to participate in crane protection initiatives (RES). Interviewees frequently mentioned a local NGO for crane conservation (CON 3) and a local

| Stakeholder group | Number of stakeholders | Frequency (times mentioned) | Promoters | Inhibitors |
|-------------------|------------------------|----------------------------|-----------|-----------|
| Conservation      | 13                     | 42                         | 13        | 0         |
| Agriculture       | 6                      | 19                         | 6         | 0         |
| Central government| 5                      | 14                         | 3         | 2         |
| Municipality      | 5                      | 18                         | 4         | 1         |
| Research          | 4                      | 8                          | 4         | 0         |
| Tourism           | 3                      | 4                          | 3         | 0         |
| Industry          | 2                      | 3                          | 0         | 2         |
| Military          | 2                      | 2                          | 0         | 2         |
| Donation          | 2                      | 2                          | 2         | 0         |
| Business          | 1                      | 3                          | 1         | 0         |
| Education         | 1                      | 1                          | 1         | 0         |
| Total             | 44                     | 116                        | 37        | 7         |
3.2.2 | Trust relations and conflicts

Our interviewees listed 35 stakeholders interlinked by trust, representing 82 linkages in total (Figure 3), whereas conflicts were mentioned only 16 times and occurred among 13 stakeholders (Figure 4). The current strong trust bonds are found among local stakeholders who participate together in crane conservation activities. The coordinative committee (CON 4) and Cheorwon County Office (MUNI 3) were the two most dominant stakeholders, connected to 16 and 14 stakeholders through trust relations, respectively, followed by the private organization (CON 13) with 9 connections. Interviewees noted that more conflicts exist between promoters than with inhibitors due to the lack of a communication channel. The conflicts between promoters were attributed to the burden of bureaucratic procedures. It is notable that interview participants mentioned conflict of the two entities (Livestock Division [MUNI 2], Tourism Division [MUNI 3]) within a single organization.
(Cheorwon County Office). The map also illustrates the links of individual farmers. Farmer 1 formed four trust relations, while Farmer 3 formed only one. Notably, Farmer 2 appears to be the only stakeholder who has formed trust relations with an inhibitor (IND 1).

3.3 | Motivation

Based on their motivation, stakeholders can be categorized as promoters or inhibitors of crane conservation. According to the interviewees, the number of promoters increased for two main reasons: First, the introduction of an environmentally friendly rice production system (Cheorwon Odae rice) created incentives for local farmers, which prompted stakeholders to reach an agreement to pursue coexistence with cranes rather than conflict. This is demonstrated in the interview statements below:

Incentives for farmers who create feeding and sleeping areas in their farmlands provide extra income for farmers, and that has been successful in prompting more farmers to participate. [RES]

...in the past, farmers fought against top-down approaches to conservation that gave little space to locals...now they believe protecting cranes is helping them get extra income from eco-friendly rice. [AGR]

When visitors come to see cranes, they spend a certain amount of money on buying local agricultural produce, including ‘crane rice’...since it has remained the top-selling rice brand for a long time, many farmers now appreciate the existence of cranes. [CON]

Second, the establishment of the Crane Coordinative Committee in 2016 became an important communication channel. Initially, the committee members had diverse interests with respect to the cranes, but they mediated opinions through regular meetings and forged an alliance among members for more sustainable crane conservation.

Due to the establishment of the Crane Coordinative Committee, now farmers have a communication channel to share opinions with the local government. [AGR]

The Crane Coordinative Committee has provided institutional support for those who are engaged in crane conservation activities. As a result, it strengthened trust bonds among members by combining the symbolic and historical meaning of the cranes in this region (Cheorwon). [CON]

On the other hand, inhibitors were believed to be more interested in obtaining economic gains through
commercial development. Interviewees recognized the adverse effects of CCZ development. They mentioned potential challenges resulting from the downsizing of the CCZ, such as the possibility of development plans threatening crane habitats when new facilities are built in the area or a policy vacuum provoking land speculation during the transition between military and governmental control.

There are new developmental threats, such as large-scale livestock pens, which are considered to be among the main culprits of farmland destruction and contamination, which devalue the rice brand (Cheorwon Odae rice). [RES]

One of the current government initiatives is to promote green energy; therefore, more and more facilities are built in the Cheorwon area due to the relatively sparse population compared to other big cities...it led to landscape destruction and made farmers start to emphasize the value of cranes. [MUNI]

The government’s decision to downsize the CCZ opens up possibilities for commercial development by outsiders and chaotic sprawl; then, not only will farmers lose sovereignty over farmlands but cranes will lose their habitats. [AGR]

Livestock pens, railways, and excessive tourism throughout Cheorwon will negatively affect crane habitats as they compete with crane habitats and may repel the source of income (cranes). [CON]

3.4 Influence level

Interviewees tended to assign moderate levels of influence to the stakeholders (Table 2, see Supporting...
Information for the full list of the stakeholders). Nevertheless, the influence scores do distinguish between promoters (indicated by a positive superscript: +) and inhibitors (indicated by a negative superscript: −).

The local organization (CON 3, influence score = 4+) has promoted a community project to grow chemical-free rice and retain rice straw after harvest so that cranes can feed on the stray grains (RES). This local organization was initially founded in 1993 initially as a volunteer group to protect cranes in the Cheorwon Basin. Interviewees (CON, RES) indicated that this organization was one of the most active and influential stakeholders in crane conservation in the region. Farmer 1, the president of this organization, was the only stakeholder given an influence score of 5+ due to over 30 years of devotion to crane conservation (CON). The Crane Coordinative Committee (CON 4, influence score = 4+) was viewed as an influential stakeholder because of its intermediary role between the public and community sectors, providing a cross-sectoral communication channel. The committee was established by the Cheorwon County Office in 2016. The aim of the committee was to gather the opinions of local organizations engaged in crane conservation and ecotourism in the Cheorwon Basin (RES, MUNI). Currently, the committee has 19 members, including community members actively interacting with cranes by feeding or rescuing them and people from the public sector who provide administrative support and arbitration.

The influence level of the two major money sources differed despite their similar roles: the public electric power corporation (GOV 3) had an influence score of 2.5+ and the private oil company (BIZ 1) had an influence score of 4+. Interviewees perceived a higher influence level for the private oil company because money from the private enterprise flows more directly to the local organizations than money from the public enterprise and has lasted more than 10 years (CON). The other two money sources, corporate and individual donors (DONAT 1, DONAT 2), also received influence scores of 4+.

However, inhibitors such as external landowners (IND 1) and the Cheorwon County Office Livestock Division (MUNI 2) were both given a low influence score of 1− because they are presently perceived to have indirect influence on crane conservation. On the other hand, another inhibitor, the Korea Agricultural and Rural Infrastructure Corporation (GOV 1), was given an influence score of 4− since its policies to improve infrastructure and farming methods adversely affect crane habitats in the region (RES). In addition, an influence score was not given to three stakeholders associated with national development and security (the Korea Ministry of Land, Transport, and Maritime Affairs [GOV 5]; the Korea Ministry of National Defense [MILI 1]; and the military base [MILI 2]) because interviewees found it difficult to evaluate their influence. However, interviewees stated that when these inhibitors claim their property rights and make future decisions on land use, they would affect the existence of crane habitats [CON, RES].

4 | DISCUSSION

4.1 | Promoters and inhibitors

Human interactions with wildlife can be positive or negative, which determines coexistence or conflicts between humans and wildlife (Nyhus, 2016). Identifying whether stakeholders support or oppose a cause is an important process to understand stakeholders’ response to wildlife conservation (Estifanos, Polyakov, Pandit, Hailu, & Burton, 2020; Manolis et al., 2009). Our analyses divided stakeholders into two groups: promoters and inhibitors. These two groups show distinct land use purposes, with promoters focusing more on benefits gained from coexistence with cranes and inhibitors focusing on benefits from development (e.g., livestock pens, railways). A prior study found that farmers in the Cheorwon Basin fiercely opposed biodiversity conservation efforts (Kim et al., 2011). Our study found a dramatic change in views, with the majority of promoters engaged in crane conservation activities found at the community level. Increased local support is a significant indicator that sentiment has shifted in favor of conservation goals (Bennett & Dearden, 2014).

However, there were no common patterns in how each interviewee described stakeholders in the network. Fewer inhibitors were identified than promoters because relatively new groups of inhibitors (e.g., external landowners, pen developers), are less likely to be recognized by all interviewees. Net-Map involves subjective descriptions of the current network by interviewees, so perception gaps may occur depending on interviewees’ intensity or frequency of interaction with certain stakeholders and information sources (McGrath & O’Toole, 2010; Schiffer & Hauck, 2010). In our study, six inhibitors were named only once in the course of the interviews, with more than a half of them being associated with governmental groups. Further analysis of these inhibitors was restricted due to limited access to government authorities for interviews; e.g., governmental organizations that oversee border security of ROK are restricted in giving information to the public. The future success of crane conservation in the Cheorwon Basin rests on understanding these inhibitors, both to minimize bias in the research results (Oliveira & Rabechini Jr, 2019) and prevent inhibitors’ resistance from gaining momentum (Holmes, 2013).
4.2 | Financial support and trust building

Economic incentives are an important element of sustained conservation projects (Selinske et al., 2017). At least in the short term, economic activities and associated social costs need to be balanced with biodiversity conservation (Balmford et al., 2002). Especially in the Cheorwon Basin, financial support provides different livelihood strategies for people who are feeding and protecting cranes. Such tangible benefits often lead to the greater involvement of community members (König et al., 2020; Weston, Fendley, Jewell, Satchell, & Tzaros, 2003). To maintain participation, it is important to consider whether current financial support will be long term and, if not, what intervention by different sectors is needed. The existing financial mechanisms for crane conservation in the Cheorwon Basin are reliant on both the public and private sectors, but some attention should be given to the self-reliance of the local community. A circular economy of local resources is crucial for environmental sustainability and local well-being (Sauvé, Bernard, & Sloan, 2016). Stakeholders who are interconnected by the money flow show reciprocal trust, suggesting that financial support and trust formation are directly correlated in the case of Cheorwon crane conservation. Thus, monetary incentives can be an effective driver to alleviate potential conflicts among stakeholders, resulting in the successful implementation of conservation projects (Redpath et al., 2004).

While most conflicts between promoters stem from bureaucratic procedures and are likely to be resolved through a coordinative committee, conflicts between a promoter and an inhibitor have less chance of being alleviated via a communication channel. The conflict between the Livestock Division (MUNI 2) and Tourism Division (MUNI 3) of the County Office indicates inefficient and inconsistent crane conservation plans, as the two entities represent a single organization. Additionally, the types of conflicts were not specified because interviewees were cautious about elaborating about on-going conflicts among stakeholders.

4.3 | Local initiatives and motivation for coexistence

Identifying the motivations of different stakeholders can help inform management options for coexistence and cooperation (Dayer et al., 2020; Mutahara, Warner, & Khan, 2019). The most salient points of the motivation analysis were the two initiatives that shifted stakeholder motives toward favoring crane conservation in the Cheorwon Basin: the introduction of a new premium rice brand and the establishment of a coordinative committee. First, the high retail price of local produce is an important financial incentive for local farmers to begin supporting crane conservation. Providing financial benefits to stakeholders has proven to be a successful tool for biodiversity and wildlife conservation globally (Estifanos et al., 2020; Soe & Youn, 2019). For example, in Vietnam, rice produced by a “crane-friendly farming” approach contributed to increasing crane numbers and attracting consumers willing to pay a premium for environmental value-added products (Khai & Yabe, 2015). A virtuous cycle between supply and demand motivates farmers to maintain existing initiatives (Kaufman et al., 2020; Moon, Florkowski, Brückner, & Schonhof, 2002).

Second, the coordinative committee helped reduce distrust of government-driven conservation policies by providing a forum for stakeholders to voice their opinions. The committee held regular meetings before the onset of conservation activities, such as the retention of stubble fields and shallow water in the rice paddies after harvest. Conflicts can impede the implementation of more effective crane conservation, and a reduction in conflicts can promote mutual understanding among stakeholders (König et al., 2020; Redpath et al., 2013). Jacobson (2009) and Rastogi, Badola, Hussain, and Hickey (2010) observed that fostering communication promotes collaborative relationships in conservation. Interactive communication raises awareness of local stakeholders who have been marginalized, as their opinions can be represented in the conservation dialog (Kovács, Fabók, Kalóczkai, & Hansen, 2016; Sterling et al., 2017). Such feelings of inclusion and recognition in the decision-making process play a large role in the successful implementation of conservation initiatives in the Cheorwon Basin. The two initiatives identified in our study represent local stakeholders’ efforts to initiate institutional and financial measures, leading to a paradigm shift in the Cheorwon Basin, where people once believed wildlife conservation would take away their livelihoods (Kim et al., 2011). However, this community-based approach can only work as long as local governance continues to protect the site. If the government chooses to open the site for economic activities because of financial interests, local conservation activities will fail no matter how well they are designed.

4.4 | Influence imbalances and breakthroughs

Our findings identified powerful stakeholders who are perceived to shape the present narrative of crane conservation in the Cheorwon Basin. Evaluating influence level
is an integral part of identifying stakeholders’ active crane conservation efforts. However, this study found a perception gap among interviewees when they assigned influence scores to each stakeholder. For example, influence scores were not given equally to stakeholders even when they had identical roles (e.g., money sources), and not all stakeholders were assigned influence scores, despite their existence in the network. Moreover, we found that interview participants preferred to assign influence scores of 3, likely to maintain moderation in their responses. We believe that cultural practices contributed to this phenomenon. Several interviewees implied that defining someone’s influence level as high or low arouses suspicion that they are arbitrarily imposing their “authority” on other stakeholders. Such characteristics of interview participants might unintentionally lead to the underrating or overrating of stakeholders’ influence level.

Only one stakeholder received full marks for influence (Farmer 1). It is a conservation asset that this core-influence stakeholder is strongly in favor of crane conservation. However, the current influence networks cannot be proven stable without addressing unrated stakeholders who may wield strong influence over crane conservation. It is necessary to analyze the three inhibitors not assigned an influence score in the course of the interviews (the Korea Ministry of Land, Transport and Maritime Affairs; the Korea Ministry of National Defense; and the military base) to avoid pitfalls in interpreting these data and to clarify how their influence will affect crane conservation. Considering their institutional mandates to draft key decisions on land utilization, it is imperative to include these inhibitors in the conservation discourse.

4.5 | Methodological reflections

This first attempt to apply Net-Map to crane conservation in the DMZ enabled this paper to describe human-wildlife interactions from a social network perspective, with the aim of achieving more efficient and consistent conservation planning. We recognize that Net-Map interviews are highly influenced by the subjective perceptions of the participants. Due to the lack of comparable Net-Map data conducted in the cultural setting of Korea, a pretest was necessary. Despite unfamiliarity with this approach, the eight interviewees were intrigued by the visualizing network map during the interview that differed from the conventional interview format. We hope that inhibitors identified in this study will participate in the Net-Map interview for further studies. In this way, heterogeneous experiences, knowledge, and opinions will be integrated.

Net-Map helped us to avoid the pitfalls of overlooking influential stakeholders and the issues that arise from comparing quantitative and qualitative data. More specifically, stakeholders on the fringe of the network—and therefore with low centrality scores—can still be seen as influential when they have links with other groups outside of the network (U.S. Army and Marine Corps, 2007). This suggests that a more accurate description of stakeholders’ roles requires meticulous analysis from various angles. This process will help practitioners and policymakers to avoid marginalizing stakeholders who were not identified in the current network but can be part of the network through other categories of connections (e.g., knowledge exchange, command, and training) (Prell, Hubacek, & Reed, 2009; Schiffer & Hauck, 2010).

Due to access restrictions, our study does not include the opinions of military and governmental agencies with jurisdiction over the DMZ and the CCZ. Including their sociocultural viewpoints would have given a more complete picture of crane conservation in the Cheorwon Basin. Our findings describe the present stakeholder network, but it is unclear how the network will change if the two Koreas experience political unrest. We conducted interviews in June 2019 when the political situation pointed toward progress of Korean reunification, as stated by our interviewees. However, in December 2020, hope of thawing inter-Korean relations has become opaque due to political challenges (Lee & Tan, 2020). In the long term, understanding a wider scope of the network will lead to the framing of crane conservation initiatives that are more acceptable to a greater number of stakeholders. Future studies should consider such aspects to promote a multi-stakeholder-driven decision-making process for securing crane wintering sites along the DMZ and the CCZ.

4.6 | Implications for conservation

We make the following three suggestions for securing one of the most important wintering habitats for *A. vipio* and *G. japonensis*. First, strengthen the trust bonds of current and potential stakeholders across sectors by sharing the benefits of crane conservation. When such benefits can compensate stakeholders who are in favor of development, mutual trust can be built, converting inhibitors into promoters. Second, expand the current communication channel to incorporate both promoters and inhibitors. Increasing the number of stakeholders involved in dialog may make reaching a consensus more difficult, but such discussions are necessary to help find the nexus of motives and reconcile differences. Third, encourage the participation of international stakeholders along the migratory route of cranes to draw attention to crane conservation. A potential challenge in designing more successful crane conservation plans is in
maintaining a steady stream of crane protection activities regardless of political upheaval between the ROK and the DPRK. To secure migrant crane populations at the flyway scale, it is essential to collaborate with key countries lying in the migration routes of cranes (Harris & Mirande, 2013; Sun, Hijikata, Ichinose, & Higuchi, 2015).

When more stakeholders are engaged, previously outlined results of social network analysis will constitute the cornerstone for promoting multilateral cooperation, such as joint research and conservational solidarity among relevant stakeholders (Mathevet, Thompson, Folke, & Chapin, 2016). In this way, the ROK government can achieve sustained crane conservation in the future.

5 | CONCLUSION

We acknowledge that it is difficult to generalize our findings. Yet our study presents a particular case in which schemes of local participation were successfully implemented. Our findings reveal that a broad number of stakeholders support crane conservation and suggest current institutional measures to bring them together are effective. Moreover, we were able to successfully test the social network approach Net-Map in the cultural setting of the ROK as well as in the context of human-wildlife interactions. Given the importance of including stakeholder perception in research on human-wildlife interactions, we believe this method will be valuable for other sites where social aspects affect stakeholders and their response to conservation efforts. Human-wildlife interaction seems like a zero-sum game in that the results are either the loss of species or disruption of human livelihoods. However, this paper suggests a potential win-win solution by creating a compensation scheme that allows both human and wildlife to thrive—a value-added rice brand with cranes. This approach will provide a better understanding of the larger context of the conservation issues throughout the DMZ. We hope that our results are useful for policy formulation at the local level, ensuring the continuing support for this important crane wintering site in the Cheorwon Basin and throughout the DMZ.

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CONFLICT OF INTEREST

The authors confirm no potential conflict of interest associated with this publication.

AUTHOR CONTRIBUTIONS

Hyeyeon Jin designed the study, organized and conducted all interviews, and carried out the analysis of interview data using Net-Map. Karoline Hemminger and Hannes König both assisted throughout the project as research advisors. Karoline Hemminger was also involved in the literature review, writing the introduction, and rearrangement of the tables. Jonathan J. Fong and SueKyoung Lee provided helpful advice and effective solutions to shape the research proposal. Claudia Sattler advised on the Net-Map application, verified the data analysis done by Hyeyeon Jin and shared relevant literature. Claudia Bieling and Jonathan J. Fong encouraged Hyeyeon Jin to investigate further aspects of the analysis with critical feedback. Hyeyeon Jin prepared the figures and wrote large parts of the manuscript with substantial input from all authors. Hannes König, Karoline Hemminger, and Jonathan J. Fong contributed to specific parts of the manuscript by critical revision and consistency check.

DATA AVAILABILITY STATEMENT

Raw data of this paper contain some private information of the interview participants. Thus, any queries as to the data availability should be discussed in advance with the first author for the article via email.

ETHICS STATEMENT

The purpose of the interviews and the use of data were explained to all interview participants. All interview participants agreed that the content of the interviews could be used for scientific analysis and published in an anonymous form.

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**SUPPORTING INFORMATION**

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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