

# Establishment of SDGs in Stork Habitat Village\*

Sungchae MOON\*\* · Young Sook NAM\*\*\*

**Abstract:** The purpose of this study is to identify the goals and sub-goals of SDGs for stork village. The research method was conducted by telephone interviews with three persons related to Yesan Stork Village. An expert group was formed consisting of three stork experts and two sustainable development experts was formed, and expert advice and consultations with researchers were held four times. The research results and conclusions are as follows. Yesan Stork Village was engaged in eco-friendly agriculture to create a stork habitat environment, as well as forming a community-centered village cooperative, and expanding the stork re-introduction area. For the stork village SDGs, 12 goals and 52 sub-goals were selected in the areas of society, economy, environment and infrastructure. For the social field, the composition of the village community and residents' council, establishment of a communication system, and the establishment of an education system were selected. Regarding the economic area, eco-friendly agriculture and ecological service projects based on a circular economy were selected to revitalize the local economy. It was decided that several factors including conservation and management of local resources for the conservation of stork habitat, the creation of an environment for stork habitat and the control of threat factors were necessary in the environmental area. In the area of infrastructure, policy support and governance were selected to achieve the goals of stork village. This study is expected to be applied when constructing additional stork re-introduction areas. As a follow-up study, it is necessary to prioritize SDGs in stork villages and determine necessary policies and resources.

**Key Words:** SDGs, Oriental Stork, Conservation of Habitat, Zero-Carbon, Carbon Neutrality

## I. Introduction

Carbon neutrality has become a global topic since 121 countries joined the '2050 Climate Alliance for Carbon Neutral' after the Paris Agreement in 2016. In the international community, carbon neutrality and response

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\*\* First Author, Senior Researcher, Korea National University of Education

\*\*\* Corresponding Author, Professor, Korea National University of Education

to climate change must be done in the context of sustainable development (SD) that pursues an inclusive society. In order to achieve carbon neutrality, it is important to establish a carbon-neutral plan of not only the state but also local governments, and induce the voluntary participation of the private sector. In addition, carbon neutrality is not only a goal in the environmental field, but is also emerging as a global economic, social and security issues.

As such, carbon neutrality indicates that it should be approached from the perspective of SD. SD is development in which environmental conservation, social stability and integration, and economic growth are oriented toward sustainability (Ministry of Environment, 2019). For the SD of developing countries, the United Nations (UN) established eight Millennium Development Goals (MDGs) to be achieved from 2000 to 2015, and set the Sustainable Development Goals (SDGs) that the global community should achieve from 2016 to 2030 (Jin, 2017; Lee, Son and Lee, 2018). The SDGs proposed by UN (UN-SDGs) consisted of 17 goals, 169 sub-goals. Compared with the MDGs, UN-SDGs were reduced health sector, maintained education, gender equality, unity sectors, expanded poverty and environment sectors, and established seven new goals. The expanded and newly established targets were mainly economic and environmental sectors. The UN-SDGs set out the goals in specific that modern society must achieve from the local community narrowly to the global community broadly.

In order to monitor the implementation of each country's SDGs, the UN suggested for each country to establish a SD index system suitable for its mechanism and process based on the UN-SDGs, and prepared a system to monitor and report the implementation status. Therefore, Korea has established Korean Sustainable Development Goals (K-SDGs)

system from 2018, which was included 7 goals, 122 sub-goals, 214 indicators and 143 sub-indicators to be achieved by 2030. In particular, K-SDGs were increased the areas for restoration of tidal flats and the certification of eco-friendly agriculture ratio (Ministry of Environment Sustainable Development Committee, 2019).

For carbon neutrality and successful implementation of the K-SDGs, it is necessary to set goals and sub-goals suitable to the actual conditions of each city, province and country, and then implement them. Therefore, in this study, the research topic was to create stork habitat villages (stork villages) related to the restoration of endangered species, restoration of tidal flat and eco-friendly agriculture that the goal indicators were increased in K-SDGs.

A Korean stork village called Yesan Stork Village was established in Yesan-gun. Since the first ceremony of stork reintroduction was held in 2015, over 100 storks have returned to nature, and 7 breeding pairs reproduced 25 offsprings by 2021 (Yesan Stork Park, 2021). In addition to Yesan-gun, four areas including Chungju-si, Seosan-si, Gimhae-si, Gochang-gun, Haenam-gun were selected as stork habitats (Cultural Heritage Administration, 2019). Therefore, it became necessary for new stork villages to set specific goals and sub-goals to make a stable natural and social environment for reintroducing storks to nature.

The purpose of this study is to set the SD goals and sub-goals for new stork villages. In order to achieve this research purpose, the research questions were set as follows.

1. How is the SD status of Yesan stork village?
2. What are the main goals of stork village SDGs?
3. What is the difference between stork village SDGs and K-SDGs?
4. What are the sub-goals of stork village SDGs?

## 5. How does carbon neutrality affect stork village in a long run?

# II. Theoretical Background

## 1. UN-SDGs and K-SDGs

The UN-SDGs that the global community must achieve by 2030 include three areas (economic growth, social integration and environmental protection), 17 goals, 169 sub-goals and 232 indicators, which consist of human healthy life, global ecology, construction of governance by partnership, global peace, common prosperity (Ministry of Environment Sustainable Development Committee, 2019; Lee, Son and Lee, 2018; Park, Jeong and Kim, 2017). The UN adopted 'the Strategic Plan for Biodiversity 2011-2020' to be pursued from 2011 to 2020. Also, Korean Ministry of Environment (2019) identified and adopted six major strategies, (1) biodiversity in priority, (2) reinforcement of conservation, (3) reduction of threat factors, (4) sustainable use of ecosystem services, (5) establishment of biodiversity research and management system, (6) strengthening of international cooperation, and established 18 action goals for biodiversity on the Korean Peninsula. The K-SDGs emphasized the importance of environmental restoration and conservation for biodiversity by increasing the target values for the restoration rate of major endangered species, the tidal flats' restoration area and the proportion of certificated eco-agricultural areas (Ministry of Environment, 2019; National Institute of Environmental Sciences, 2019).

The detailed studies for K-SDGs were the analysis of K-SDGs implementation status and the suggestion of improvement plans (Park, Jeong and Kim, 2017), and the study of ESD program development and

implementation based on K-SDGs (Kang et al., 2018; Jo and Lee, 2019; Lee and Oh, 2017; Moon, Kim and Nam, 2019; Moon, Eun and Nam, 2020). After the establishment of K-SDGs, the researches of SDGs on a village level have been done, but it was not easy to find studies on setting goals necessary for creating sustainable stork villages. Previous researches on sustainable village development included the study on the importance of cultivating a mind for a formation of a sustainable village community (Lee et al., 2018), identification of 38 indicators for the evaluation of sustainable ecotourism in the Upo Wetland (Ryu and Lee, 2019), and reinforcement of cooperation among residents through the creation of an eco-village using Jeju-hyodoncheon ecological resources (Kim and Choi, 2020). Based on these previous studies, the research topic of this study was chosen as ‘the selection of SDGs for creating a sustainable stork village’.

## 2. Stork Restoration and SDGs

The stork, *Ciconia boyciana* is a bird of the order, *Ciconiiformes*, the family, *Ciconiidae*. In the past, it mainly bred in Korea, Russia, China and Japan, and migrated according to the seasons (Eco-Institute for Oriental Stork. 2021). According to the literature, storks were commonly seen as resident birds in Korea in the 1900s (So, 2007), but their numbers decreased sharply after the Korean War in 1950 and became extinct in Korea in the 1970s (Eco-Institute for Oriental Stork, 2021). The main causes of the decline in the stork population are habitat destruction and lack of safe food organisms. The stork is a globally protected species designated as an endangered species by the International Union for Conservation of Nature (IUCN) and the International Commission for the Protection of Birds (ICBP), and Natural Monument No. 199 and No. 303 in

Korea and North Korea, respectively (Jeong, 2005).

In Korea, restoration of the endangered stork began in 1996 at Korea National University of Education. Over 100 storks attached a location tracker were reintroduced into nature from 2015 to 2021, and the stork habitat was analyzed with location information (Eco-Institute for Oriental Stork, 2021).

Stork restoration is a concept including an increase of the stork population and restoration of habitat for reintroduction to nature. To preserve a habitat of storks, ecosystems should be conserved and restored as follows. Trees and forests should be cultivated, various wetlands including paddy wetlands should be created and conserved, and environmental pollution should be minimized gradually to accomplish zero-carbon. To do these, it is necessary to convert an agriculture method using pesticides and fertilizers to eco-friendly and organic one, to restore the environment for conservation of ecosystem and biodiversity, and to establish a system controlling human activities harmful to environment. Since the scope and contents of these activities for stork restoration are vast, it is necessary to set goals in priority for creating a stork habitat. Therefore, SD goals and sub-goals for a stork village will be set in this study.

### **3. Stork Village and Carbon Neutral**

Yesan-gun developed agriculture with abundant water such as Sapgyo Stream and Wuhan Stream, but the population of Yesan-gun decreased by more than 2,000 people every year due to urbanization (Choi, 2004). However, since Yesan Stork Park was opened and Yesan Stork Village was established in 2015, many tourists have visited there, and Yesan has been revived (Yesan County Office, 2020). The economy of stork village

consists of agriculture and tourism, and it is oriented toward eco-friendly farming methods to create a habitat for storks.

Carbon neutrality means that the actual total amount of carbon dioxide is made to be zero, which is a neutral state by taking measures to absorb as much as carbon dioxide emissions (Lee, 2021). A stork village's carbon-neutral policy includes expanding the supply of eco-friendly agricultural products, recycling of agricultural products, and revitalizing local foods.

The purpose of this study is to establish a sustainable environment and society in which storks and humans coexist by setting the goals and sub-goals for establishing the stork village to achieve carbon-neutral SD.

### III . Research Design and Methods

#### 1. Study Design and Procedures

The research design and procedure were conducted as shown in Figure 1. First, sustainability of stork village was selected through the analysis of previous studies. Second, an expert group consisted of three stork experts and two SD experts. Third, the SD goals of stork village were selected and classified by the expert group. Fourth, the SD goals and sub-goals of stork village were selected and classified three times by the expert group through focus group interviews. Fifth, the current status of Yesan Stork Park was investigated by interviews of three persons. Finally, the SD goals and sub-goals of stork village were determined.

〈Figure 1〉 Study design and procedure

	Research Objective	Research Method
1	Selection of Sustainable Development Area for Stork Village	Analysis of Previous Research
2	Formation of Experts' Group	Invitation of Three Stork Experts and Two SD Experts
3	Selection of Components for Stork Village	Discussion with Two Stork Experts and Two SD Experts (1st interview)
4	Selection of SD Goals and Sub-goals for Stork Village (1st time)	Discussion with Three Stork Experts and One SD Experts (2nd interview)
5	Selection of SD Goals and Sub-goals for Stork Village (2nd time)	Discussion with Two Stork Experts (3rd interview)
6	Selection of SD Goals and Sub-goals for Stork Village (3rd time)	Discussion with Three Stork Experts and One SD Experts (4th interview)
7	Analysis of Yesan Stork Village's Current Status	Interview with One Agricultural Federation Member, One Stork District Agricultural Association Member and One Yesan Stork Park Researcher
8	Organization of SD Goals and Sub-goals for Stork Village	Group Discussion of Researchers

## 2. Focus Group Interview

A focus group interview means that an expert group having experiences in a topic discusses about the topic and collects data which are difficult to obtain (Hatch, 2015). The focus group for this study consisted of three stork experts and two SD experts (〈Figure 1〉). Stork experts consisted of those who had a doctoral degree and experienced at least several years in stork restoration. SD experts were composed those who had a doctoral degree and experienced at least several years in SD. The interviews were conducted via email and/or on the phone from



November 12, 2019 to September 5, 2020.

The first consultation was conducted from November 12, 2019 to February 18, 2020. The second consultation was conducted from November 17, 2019 to February 26, 2020. The third consultation was conducted from March 13 to 24, 2020. The fourth consultation was conducted from August 27 to September 5, 2020.

### 3. In-Depth Interview

To investigate the status of Yesan Stork Village, interviews were conducted over the phone from September 9 to 17, 2020 after a breeding season of storks. Based on a semi-structured questionnaire, interviews were conducted with a member of Yesan Stork Village agricultural association, an expert of stork restoration, and a member of stork local farming association. Questions for interview were shown in <Table 1>.

<Table 1> Study design and procedure

Categories	Questions
Environmental Change	How much is the area of eco-friendly farmland? How many eco-friendly agricultural workers are there?
Social Change	What is the perception of the villagers about stork restoration ? What is the formation of a community of villagers?
Economic Change	How is the establishment and operation of the village cooperative?
Infrastructure Change	What about support from local government and governments?

The interview was recorded using a mobile phone recording application, and a researcher transcribed all the recorded contents. The interview contents were analyzed and extracted main contents from each area. Additional interviews to check out previous interview contents were conducted with an expert of stork restoration and a member of stork

community farming association, respectively. The interview contents were written without recording.

4. Validity and Reliability

In order to verify the validity of the interview content analysis, agreement percentages were calculated as follows (Creswell, 2015). The reliability of the analysis was calculated based on the consensus rate (Miles and Huberman, 2015).

Reliability

=

Total Numbers of Consensus

Total Numbers of Consensus + Total Numbers of non-Consensus

The consensus rates of each category were 79.5% in the area of society, 92.1% in the area of economy, 88.6% in the area of environment, and 86.9% in the area of infrastructure (〈Table 2〉).

〈Table 2〉 Consistency of Expert Evaluation

Analysis Content	Category	Numbers	Reliability(%)
SDGs of Stork Village	Society	4	79.5
	Economy	4	92.1
	Environment	4	88.6
	Infrastructure	4	86.9

IV. Results and Discussion

1. Current Status of Yesan Stork Village

Yesan Stork Village began eco-friendly farming in 2010 to restore stork habitats, and Yesan Stork Park was built in June, 2015. In Yesan-gun,

several breeding areas including Simok-ri, Geolgok-ri, Jangjeon-ri, Waera-ri, Dae-ri, Deokseon-myeon and Sinyang-myeon were designated, and the nest towers were built there.

In Yesan Stork Village, the number of eco-friendly agricultural farms and areas were increased compared to before. An artificial ponds called Doombung, an eco-friendly agricultural method of ancestors, was created. The paddy waterway was made of soil instead of concrete. As a result of citizens' effort for eco-friendly farming, storks' food organisms has been increased in paddy fields. It was a significant achievement for the environment.

*They've maintained eco-friendly environment for a long time. I think this is an amazing thing. 10 years. I heard it's a rare case to last this long. The villagers said, "We should be eco-friendly; otherwise storks would run away. Then our town can't be 'Stork town'." Many farmers are engaged eco-friendly farming because of their mind of that.*

The inconvenience of the residents near a stork nest tower was raised as a problem. Sometimes the issue of compensation for damaged paddy fields by storks were raised. However, most residents did not mind their inconvenience because storks gave them a peaceful mind and comfort.

*Farmers don't hate (storks) entering rice paddies except for the rice planting season. But, during the rice planting season, storks have large feet, so some farmers chase storks for fear of stepping on the planted seedlings. In particular, there are many baby birds near the nest, so they often step on seedlings. We planted the seedlings in the floating seedlings hole because of this problem every year, but we missed that period(planting the damaged seedlings) this year, so we still have a task to do compensation for a loss of each farmhouse.*

*In the case of Jangjeon-ri, the back of the nest was a paddy field. And the farmer there farmed peppers, but they(peppers) turned white, so he found that storks excrete out of the nest. But he likes storks, so he didn't care much about it. I think he thought it was not that uncomfortable because of his love to storks.*

Residents near a stork nest tower have been suffered from some photographers' senseless behaviors such as cooking, eating and garbage dumping.

*The stork itself has little negative effect, but there are side effects that occur. As the photographers flocked, a complaint has been raised to move the stork nest. Traffic became so inconvenient, and some photographers don't think about villager at all. When residents asked photographers to go out (of their residential area), he(a photographer) screamed and complained, "Why are you treating me like this when I publicize storks."*

The community of stork village was voluntarily formed to meet the needs of visitors and consumers. The stork festival was also developed from a village festival to a big project organized by Yesan Stork Festival Promotion Committee.

*The farming association provides hands-on learning. The state built facilities for hands-on activities related to Yesan Stork Park. The farming association has clear items to generate profitable activities for visitors. As storks are so elegant compared to egrets when fly or sit on rice paddies, photographers take pictures and visitors pay attention to storks.*

*Recently, the Yesan Stork Festival Promotion Committee(YSFPC) was established. In the past, village heads led promotion committees to*

*hold a festival, but now YSFPC composed of representatives of farming and cooperatives in the village run a festival. It means that a group generating profit and giving direction for development is created.*

Yesan Stork Village's economy was based on eco-friendly agriculture with stork brand. However, the profit was somewhat lower than that of farmer's expectations. Therefore, marketing is needed to improve a stork brand power.

*Villagers who attracted Yesan Stork Park expected to increase sales profits of eco-friendly agricultural products with stork brands, but actual profits didn't meet their expectation. The price is higher than the practice because of eco-friendly agriculture... it takes a lot of effort. Farmers have to pull out grass and to deal with those things. It is easy as they spray pesticides, but by not spraying pesticides, older farmers have to continue working hard. Complaints about it should be compensated with high-priced agricultural products(with a stork brand), but the price is not as high as expected. They don't have much expectation now, because they get just the same money as a general eco-friendly products.*

*Most profit activities turn into a surplus. Only one cooperative where the business is active, and the rest has no deficit and no surplus. (The difference between successful and unsuccessful cooperatives)The success depends on whether it has created a clear profit structure or not. (ellipsis) Each cooperative is engaging in profit activities by creating its own stork brand, but it has not been specialized. (ellipsis) Increasing the stork brand power is very important in the long run. (ellipsis) Creating a distribution system for agricultural products linked to Yesan Stork Park and opening an online shopping mall.*

*Eco-friendly agriculture is fully supported. (ellipsis) It is maintained because there is such a subsidy in the Yesan-gun. Without brand power, it(eco-friendly agriculture) would collapse within 10 years. We have such a resolution, because expectations (for profits) are falling due to aging.*

2. Establishment of SD Goals for Stork Village

The SD goals of stork village in this study were set as shown in <Table 3>. Four categories contained society, economy, environment and infrastructure. The stork village SD goals (SV-SDGs) of each category were (1) to establish a communication system and education system, and to form residents' consultative body in the social area, (2) to establish a plan for revitalizing the local economy in the economic area, (3) to establish conservation and management systems of local natural resources, to create a suitable habitat for reintroduced storks, and to control environmental threats in the environmental area, (4) to set a vision and goals for stork village and policy support, and to construct public infrastructure and governance in the infrastructure area.

<Table 3> SD goals for a stork village

Category	SV-SDGs
Society	<ul style="list-style-type: none"><li>•Establishment a communication system between/in village communities</li><li>•Formation of consultative body for residents</li><li>•Establishment of stork village education system</li></ul>
Economy	<ul style="list-style-type: none"><li>•Establishment of a plan for revitalizing the local economy</li></ul>
Environment	<ul style="list-style-type: none"><li>•Conservation system of local natural resources</li><li>•Management system of regional natural resources</li><li>•Creation of a suitable habitat environment for reintroduced storks</li><li>•Control of environmentally threatened elements</li></ul>
Infrastructure	<ul style="list-style-type: none"><li>•Construction of vision and goal for stork village</li><li>•Economic support</li><li>•Building public infrastructure</li><li>•Governance</li></ul>

### 3. Comparison of SV-SDGs and K-SDGs

〈Table 4〉 shows the comparison of SV-SDGs and K-SDGs. The comparison results of each category between SV-SDGs and K-SDGs were as follows. In the social category, K-SDGs contained personal life related goals such as poverty reduction and strengthening social safety (Goal 1), healthy and happy life (Goal 3), and gender equality (Goal 5). Whereas, SV-SDGs did not contain personal related goals, but they emphasized to form a village community such as communication system (Goal I) and resident council (Goal II). Educational goals were also different. K-SDGs emphasized a personal education (Goal 4) compared to a local education system (Goal III) in SV-SDGs.

In the economic category, K-SDGs contained an expansion of good jobs and economic growth (Goal 8), the establishment of infrastructure, an expansion of R&D and economic growth (Goal 9), an elimination of inequality (Goal 10), and a creation of safe and resilient residential areas (Goal 11). However, SV-SDGs contained a revitalization plan of local economy.

In the environmental category, K-SDGs were to produce and consume eco-friendly energy (Goal 7), promote sustainable consumption and production (Goal 12), respond to climate change (Goal 13), and conserve marine ecosystems (Goal 14) and terrestrial ecosystems (Goal 15). On the other hand, SV-SDGs did not contain climate change and energy problems. SV-SDGs emphasized to controlling environmental threats (Goal V), constructing conservation and management systems of local natural resources (Goal VI, Goal VII), and making a suitable habitat for reintroduced stork.

In the infrastructure category, K-SDGs contained human rights, justice and peace (Goal 16), and strengthening of global cooperation (Goal 17).

Whereas SV-SDGs contained construction of vision and goals of stork village (Goal IX), policy support (Goal X), building public infrastructure (Goal XI), and governance (Goal XII).

In K-SDGs, the goals related to basic human lives and healthy life, and macro-ecosystem conservation were evenly distributed in social, economic and environmental categories. On the other hand, SV-SDGs consisted of the goals limited to villagers and a village environment. In SV-SDGs, the economic goals were somewhat simple compared to social and environmental goals, because the economy in stork village was centered on eco-friendly agriculture and tourism.

〈Table 4〉 Comparison of K-SDGs and SV-SDGs

Category	K-SDGs	SV-SDGs
Society	<ul style="list-style-type: none"><li>•Goal 1. Reducing poverty, Strengthening the social safety</li><li>•Goal 2. Enhancing food security, Strengthening sustainable agriculture</li><li>•Goal 3. Ensuring a healthy and happy life</li><li>•Goal 4. Promotion of education</li><li>•Goal 5. Ensuring gender equality</li><li>•Goal 6. Water management in healthy and safe</li></ul>	<ul style="list-style-type: none"><li>•Goal I. Establishment of communication system within/between village community organizations</li><li>•Goal II. Establishment of resident council</li><li>•Goal III. Establishment of stork village education system</li></ul>
Economy	<ul style="list-style-type: none"><li>•Goal 8. Expansion of good jobs and economic growth</li><li>•Goal 9. Establishment of infrastructure, Expansion of R&amp;D and economic growth</li><li>•Goal 10. Elimination of inequality</li><li>•Goal 11. Creation of inclusive, safe and resilient cities, and residential areas</li></ul>	<ul style="list-style-type: none"><li>•Goal IV. Revitalization plan of local economy</li></ul>
Environment	<ul style="list-style-type: none"><li>•Goal 7. Eco-friendly production and consumption of energy</li><li>•Goal 12. Promotion of sustainable consumption and production</li><li>•Goal 13. Response to climate change</li><li>•Goal 14. Conservation of marine ecosystems</li><li>•Goal 15. Conservation of terrestrial ecosystems</li></ul>	<ul style="list-style-type: none"><li>•Goal V. Control of environmental threats</li><li>•Goal VI. Construction of conservation system of local natural resources</li><li>•Goal VII. Construction of management system of local natural resources</li><li>•Goal VIII. Making a suitable habitat for reintroduced storks</li></ul>



Infrastructure	<ul style="list-style-type: none"> <li>•Goal 16. Human rights, justice and peace</li> <li>•Goal 17. Strengthening of global cooperation</li> </ul>	<ul style="list-style-type: none"> <li>•Goal IX. Construction of vision and goals of stork village</li> <li>•Goal X. Policy support</li> <li>•Goal XI. Building public infrastructure</li> <li>•Goal XII. Governance</li> </ul>
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#### 4. Establishment of SD Sub-Goals for a Stork Village

SD goals and sub-goals for stork village were shown in <Table 5>. In the social category, sub-goals for establishment of communication system within/between the village community organizations (Goal I) were to establish a philosophy for a village community, to make a decision in a democratic process, to construct a coordination system of opinions, to have various stakeholders participate in a decision-making, to make a discussion with mediators from various perspectives, and to construct a system for accepting experts' opinions. Sub-goals for the establishment of resident councils (Goal II) consisted of fostering leaders, making voluntary participation of residents, forming a network and partnership, fostering a community spirit and competencies of the local community, forming community members with various backgrounds and expertise, creating an equal and fair community, and constructing a social safety network. Sub-goals for establishing an education system in a stork village (Goal III) contained to build at least one school in a village, to establish a lifelong education system for villagers, to inherit a village culture and heritage, to make a connection between storks and a traditional culture, to develop and promote education programs for stork restoration, to educate various perspectives on healthy ecosystem, and to feedback educational effects. In the social field, sub-goals for constructing communication and network systems were essential factors for eliciting cooperation from residents.

In the economic category, sub-goals for revitalizing the local economy

(Goal IV) consisted of creating regional jobs and income, reducing the income gap among residents, collecting community funds, making a social economy, establishing a strong agriculture foundation, constructing direct channels for selling eco-friendly farming products, developing a marketing strategy for stork brands, doing eco-service business, constructing a system for circular economy, and accepting professional advice. These sub-goals in the economic field suggested specific ways to revitalize the economy of stork village focused on agriculture and tourism.

In the environment category, sub-goals for control of environmental threats (Goal V) were selected to conserve regional resources, to check the percentage of afforestation, to construct a system for waste disposal and recycling, to educate residents about illegal incineration, to construct an energy independence system including new renewable energy and zero-Carbon system. Sub-goals for constructing a conservation system (Goal VI) and a management system (Goal VII) of local natural resources included recycling and management systems of local natural resources, monitoring and management systems for natural resource and environmental condition, assessing habitat suitability, constructing artificial ponds and wetlands, monitoring reintroduced storks, developing and supporting technologies for ecology restoration, and planning the numbers of stork breeding pairs. Sub-goals to make a suitable habitat for reintroduced storks were to analyze threat factors, to construct a management system for threat factors, to develop technologies for resolving threat factors, and to eliminate hazardous substances such as chemicals and radiation. In the above, the environmental sub-goals were composed of factors to create the environment suitable for reintroduced storks including zero-Carbon and wetlands.

In the infrastructure category, sub-goals for constructing vision and goals of a stork village (Goal IX) and policy supports (Goal X) were to construct a sharing system of vision and goals for a stork village, and to enact ordinance for a local government, respectively. Therefore, in order to achieve the goals and sub-goals in the social, environmental, and economic fields for the creation of a stork village, it is important to establish an infrastructure for enacting relevant laws and ordinances.

〈Table 5〉 SV-SDGs and sub-goals

Category	SV-SDGs	SV-SD sub-goals
Society	•Goal I. Establishment of communication system within/between village community organizations	<ol style="list-style-type: none"> <li>1. Establishment of philosophy in village community</li> <li>2. Democratic process of decision-making</li> <li>3. Coordination system of opinion</li> <li>4. Participation of various stakeholders</li> <li>5. Mediators for discussion from various perspectives</li> <li>6. System for accepting experts' opinions</li> </ol>
	•Goal II. Establishment of resident council	<ol style="list-style-type: none"> <li>1. Fostering leaders</li> <li>2. Voluntary participation of local residents</li> <li>3. Network and partnership</li> <li>4. Fostering community spirit</li> <li>5. Fostering competencies of local community</li> <li>6. Various background and expertise of community members</li> <li>7. Equality and fairness</li> <li>8. Formation of social safety network</li> </ol>
	•Goal III. Establishment of stork village education system	<ol style="list-style-type: none"> <li>1. Being at least one school in stork village</li> <li>2. Establishing a lifelong education system for village members</li> <li>3. Education system for inheriting village culture and heritage</li> <li>4. Connection between storks and traditional culture</li> <li>5. Development and promotion of education program for stork restoration</li> <li>6. Education about various perspectives on healthy ecosystem</li> <li>7. Feedback system of educational effect</li> </ol>
Economy	•Goal IV. Revitalization plan of local economy	<ol style="list-style-type: none"> <li>1. Creating regional jobs and income</li> <li>2. Reducing income gap</li> <li>3. Collecting community funding</li> <li>4. Making a social economy</li> <li>5. Establishing a strong agricultural foundation</li> </ol>

		<div>6. Establishing a direct channels for selling stork farming products</div> <div>7. Developing a marketing strategy for stork brands</div> <div>8. Eco-service business such as eco-tourism and eco-education</div> <div>9. Circular economy such as ecosystem services and eco-friendly agriculture</div> <div>10. Professional advice</div>
Environ- ment	•Goal V. Control of environmental threats	<div>1. Conservation of regional resources</div> <div>2. Percentage of afforestation</div> <div>3. Construction of system for waste disposal and recycling</div> <div>4. Education of residents about illegal incineration</div> <div>5. Energy independence using new renewable energy</div> <div>6. Absence of greenhouse gas emission (zero-Carbon)</div>
	•Goal VI. Construction of conservation system of local natural resources	<div>1. Recycling of local resource</div> <div>2. Management of local natural resource</div> <div>3. Monitoring and management systems of natural resource and environmental condition</div>
	•Goal VII. Construction of management system of local natural resources	<div>1. Assessment of habitat suitability for environmental conditions</div> <div>2. Construction of Doombung (artificial ponds) and wetland</div> <div>3. Monitoring reintroduced storks</div> <div>4. Development and support of technologies for ecology restoration</div> <div>5. Planning the numbers of stork breeding pairs</div>
	•Goal VIII. Making a suitable habitat for reintroduced storks	<div>1. Analysis of threat factors</div> <div>2. Construction of management system for threat factors</div> <div>3. Development of technologies for resolving threat factors</div> <div>4. Absence of hazardous substances such as chemicals and radiation</div>
Infra- struc- ture	•Goal IX. Construction of vision and goals of stork village	<div>1.Construction of sharing system of vision and goals in stork village</div>
	•Goal X. Policy support	<div>1.Enactment of ordinance for local government</div>
	•Goal XI. Building public infrastructure	
	•Goal XII. Governance	

## V. Conclusion and Suggestion

The research results on the setting of SDGs and sub-goals for a stork village were as follows. First, Yesan Stork Village have been implementing

eco-friendly agriculture to create a suitable habitat for reintroduced storks, forming a village community, and expanding the areas for storks' habitat. Second, for SV-SDGs, 12 goals and 52 sub-goals were selected in the areas of society, economy, environment, and infrastructure. Compared with K-SDGs, SV-SDGs consisted of goals related to the conservation of storks' habitats. Third, SV-SDGs in the social area were selected the construction of village communities and residents' councils, the establishment of communication systems and education systems for stork restoration. Eco-friendly agriculture and ecological services based on the circular economy were selected to revitalize the local economy in the economic area. In the environmental area, SV-SDGs contained conservation and management systems of local resources, controlling threats and creation a suitable environment for storks' habitat. SV-SDGs in the infrastructure area consisted of policy support and governance.

Based on the results, the following conclusions were deduced. First, in Yesan Stork Village, an eco-friendly economic system was established and a social community was formed to create a suitable habitat for reintroduced storks. Although there was a local government-level subsidy, it was not enough compensation to pay for the opportunity cost of eco-friendly farms. Second, as a result of comparing SV-SDGs and K-SDGs, K-SDGs consisted of goals related to human welfare and macroscopic ecosystem conservation, whereas SV-SDGs consisted of goals related to the creation of habitats for storks. Third, the social area of SV-SDGs focused on forming a stork village community and constructing an education system for stork restoration. In the economic area, eco-friendly agriculture and eco-services were chosen to reuse resources and conserve environment. In the environment and infrastructure areas, the support and governance from local governments

were required to create suitable habitat conditions containing zero-Carbon and management system of natural resources.

This study provides basic information necessary for establishing an additional storks' villages by suggesting SV-SDGs and sub-goals. For further studies, it is suggested to set short-term and long-term goals necessary for the construction of a stork village in the future, and to set priorities of necessary policies and resources according to the situation and budget. This study provides implications for the current stork village and reduces the opportunity cost when constructing the other stork villages in the future, as well.

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**Sungchae MOON:** She is a senior researcher of the Eco-Institute for Oriental Stork in Korea National University of Education after completion a doctoral courses at Department of Technology Education. She received a Ph.D. degree from the Department of Life Science in Seoul National University. Her recent research interests are storks' physiology, behavior and molecular genetics, as well as biological and environmental education (scmoon@knue.ac.kr).

**Young Sook NAM:** She is a professor at the department of environmental education in Korea National University of Education, and currently serves as the director of the Eco-Institute for Oriental Stork. Her interest areas include environmental policy, environmental impact assessment, climate change, women, environment, culture, and sustainable development theory. In particular, the restoration and preservation of the Oriental Stork, which is the first class of endangered wildlife, and sustainable development models with Oriental Storks. In 1993, she received her Ph.D. degree(Environmental Policy and Evaluation) from the Department of Landscape Planning at Technical University of Berlin, Germany and served as a senior researcher at Korea Environment Institute (ysnam@knue.ac.kr).

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