

**A Study on the Resolution of Conflict on the Relocation of the Daegu Water
Intake Source**

By

OH, Jeongjin

CAPSTONE PROJECT

Submitted to

KDI School of Public Policy and Management

In Partial Fulfillment of the Requirements

For the Degree of

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ABSTRACT

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In the process of rapid industrialization and urbanization, demand for water resources in rivers increases rapidly, while the availability of rivers is absolutely limited, causing disputes over water to continue. The conflict between Daegu Metropolitan City and Gumi City, which have the Nakdong River as a source of water, is a representative example of the conflict over the use and distribution of rivers that has not been resolved for nearly 20 years. To resolve disputes over these rivers, it is necessary to first identify the cause of the conflict and stakeholders through conflict analysis, then create a consultative body for all stakeholders to discuss. Each interested party will be able to resolve distrust and misunderstanding of each other by examining uncertainties together. Through continuous dialogue and consultation, each stakeholder will know what the other really wants, and if they explore their BATNAs and develop many mutually beneficial alternatives, they will eventually be able to find an agreement that works best for each other. The investigator expects that if such a negotiation process is carried out, even water-related conflicts that have not been resolved for 20 years will be able to reach a mutual agreement. This report first summarized the process of conflict over the relocation of water sources and the main issues of conflict and analyzed the positions and

interests of each stakeholder on the issue through analysis of various indirect data. Finally, based on this conflict analysis, it presents a step-by-step procedure and negotiation method for the building consensus among stakeholders.

Keywords: *Disputes over water, Consultative body, BATNA, Beneficial alternatives, The relocation of water sources, Negotiation method, Building consensus*

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1. Introduction

The stream provides water resources as absolutely necessary water for human survival, living and production (Choi, 2004). However, in the process of rapid industrialization and urbanization, demand for water resources in rivers increases rapidly, while the availability of rivers is absolutely limited, causing disputes over water to continue. In particular, as urban development and industrialization are seriously polluting rivers, the amount of availability continues to decrease. To solve this water shortage problem, the government is trying to secure various water resources, including large-scale dam and beam construction, water pipes installation and riverbed filtration water development, but it is reaching its limit due to geographical or environmental conditions.

If it is impossible to secure water through the development of water resources by the government, the local government intends to relocate the water intake source to secure additional quantities. However, due to the mobile nature of the river flowing upstream and downstream, the use of the river varies locally, causing regional conflicts regarding the distribution of the river when the water intake source is relocated (Choi, Chae, & Yang, 2016). In particular, rivers have non-distribution characteristics that are difficult to prevent free use as shared goods shared by many people, and when water is used on one side, it reduces the use of the other, which can cause complicated conflicts in the process of regulating or distributing the entire water use. The conflict over the relocation of water intake sources between Daegu Metropolitan City and Gumi City, which have the Nakdong River as the same source of water, can be seen as a representative example of the use and distribution of rivers. Daegu City is a city located in the middle of the Nakdong river, where most of the residents' drinking water sources are supplied through the water purification process after being taken from the Nakdong

river. The Daegu Metropolitan Government raised the issue of the relocation of water intake sources upstream from the Nakdong River phenol pollution accident in 1991. After the phenol accident, Daegu City has experienced several water accidents due to the discharge of pollutants in the upstream area, raising concerns over water pollution. The demand for safe and clean drinking water from residents has also increased. In response, the Daegu Metropolitan Government independently reviewed the relocation site considering various factors and proposed the relocation of the water intake to Gumi directly to the government. Gumi City was angered by Daegu's unilateral decision, and Gumi citizens, along with the heads of local governments, opposed the Daegu City government's plan to relocate the water intake center in solidarity with various organizations. The relocation plan was slowed down for a while by the result of active opposition from Gumi City and the nonconformity of the preliminary feasibility study for the relocation of the drinking water source in Daegu City. However, due to the hydrofluoric acid leak in Gumi in 2012, the Daegu Metropolitan Government re-promoted the plan to relocate the water intake center, and the Ministry of Land, Infrastructure and Transport ordered a service for the clean water supply plan in Gyeongbuk and Daegu in 2014. The results suggested two proposals: moving the intake water source of Daegu to the Haepyeong water purification plant in Gumi and developing the riverside filtration water. Gumi City proposed the formation of a public-private council with Daegu City to solve the water intake problem when the results of the service felt disadvantageous to itself, and the council was held nine times, but ended without much benefit. When the conflict between local governments over the water intake source was not resolved, the government tried to resolve the conflict centered on the Office for Government Policy Coordination. Through these efforts, government officials and local governments surrounding the Nakdong River all agreed to study ways to improve water management in the Nakdong River basin in April 2019. Although the results of the study were summarized to some extent in 2020, local governments in Gumi and other candidate areas

for the relocation of the water intake center were at odds, distrusting the results of the study and criticizing the government and Daegu. Then, why is the conflict over the relocation of the water intake center over the stream so far that there is no agreement between the stakeholders even though it has been nearly 20 years? Also, how can we resolve this conflict?

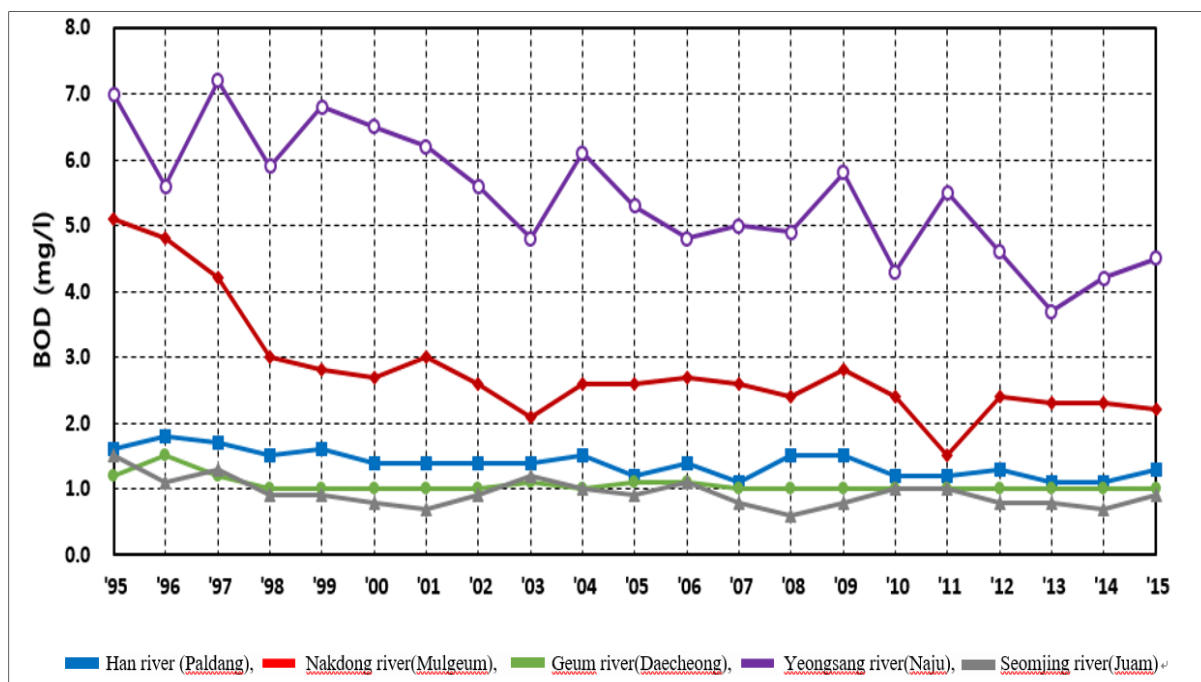
In order to find the answer to this, it would be meaningful to first find out the causes of national conflicts, such as the relocation of the water intake plant, then find solutions to them, and find common ground with each other. Some studies suggest that the causes of public conflict regarding the location and operation of public facilities arise from economic, administrative and political reasons (Kim, Kim, Jeong, & Park, 2009). First of all, the root cause of public conflict is that the residents who benefit from the policy and the residents who provide the benefits are different. In the case of relocation of the water source, local residents who receive water supply due to relocation receive clean water without much cost, but residents in the supply area will inevitably suffer from lack of flow rate and tightening regulations. Therefore, in order to solve this problem, the government should give reasonable compensation to the supply area to feel that nothing is damaged by the transfer of the water source and that it is profitable. Second, in terms of administration, the government's unilateral communication method creates conflict. In the case of the relocation of the water intake source, residents in the supply area are concerned that additional water intake will cause various risks, such as lack of quantity, water pollution, and ecosystem destruction. In order to reduce these concerns, it is necessary to secure procedures for local residents to participate in risk surveys and express their opinions before deciding on the relocation of the intake agency. Third, from a political point of view, conflicts arise due to the formation of complex interests among many stakeholders in policy decisions. In other words, the issue of relocation of the intake agency is complicated with various interests and issues, including the government, local governments,

and local residents. In these complex situations, stakeholders form alliances with various actors, developing power, and exerting pressure to carry out their own interests. Therefore, in order to resolve this conflict, it is necessary for all stakeholders to gather together to investigate the phenomenon, share opinions, and find an agreement that will benefit everyone. In this process, stakeholders will trust each other, form bonds, find common agreements, and try to ensure that the agreements are continuously implemented. Therefore, the report first deduced the issues of conflict regarding the relocation of the Nakdong River intake in Daegu, the stakeholders' claims, and what they really want. Based on this analysis, the entity also proposed a step-by-step process to create a consensus that would benefit interested parties. The researchers hope that this analysis and process will be a good guide to resolving disputes related to various rivers.

2. The history of the conflict

2.1 The current status of Nakdong River

The entire length of the Nakdong River is 400.7 km, a large river with an area of 23,384km² basin. The upper part of the Nakdong River has relatively clean water quality, which is equivalent to the first grade based on BOD. However, because the middle and lower regions such as Daegu and Busan are located in large industrial complexes and large cities with a large population, relatively low quality rivers of two to three grades are flowing. In addition, various pollutants from around the river are being discharged into the Nakdong River, which is causing serious distrust of drinking water among residents of large cities due to the risk of water pollution. For this reason, the government is continuously expanding basic environmental facilities and making efforts to improve water quality, but the degree of improvement in the Nakdong River has been relatively slower than before.

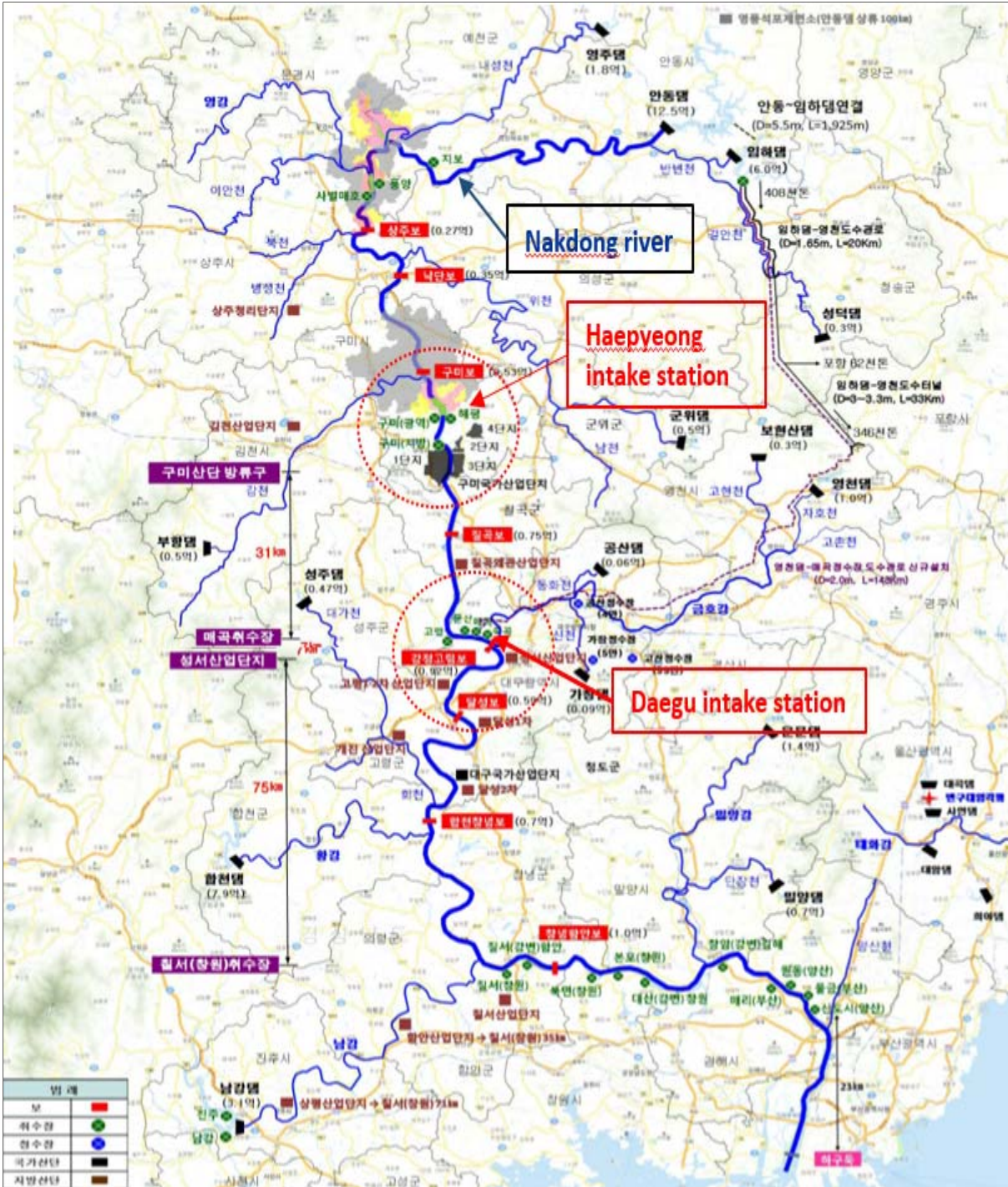


Source: K-water

Figure 1. Comparison table of BOD changes by river

Despite this risk of water quality, large cities in the Nakdong River water system are relatively vulnerable to water quality risks, as they directly take the Nakdong River (66% in Daegu, 88% in Busan) and supply water. Seoul Metropolitan Government and Incheon Metropolitan City take water for living downstream of Paldang Dam in the Han River Water System, while Daejeon Metropolitan City supplies water for dams in Daecheong Dam. Although Gwangju Metropolitan City is located in Yeongsan river water system, it is supplied with water from the Seomjing River multipurpose dam due to water quality problems.

The fact that many local governments in the Nakdong River water system, including Daegu, Busan, and Gyeongnam, are in sharp conflict over the river also stems from this unstable water supply system. Daegu City, which is promoting the transfer of water sources to safe living water, has an annual water supply of 3.1 billion^m³ in 2018, and Daegu City has facilities to produce 1.54 million^m³ a day at six water purification plants in the four systems. Based on the production volume, about 76.7 percent of the water purification plants in Daegu



Source: Korea federation of Water academic organizations, 2020. p5~6

Figure 2. Current Status of Water Resources and Map of Nakdong River Basin

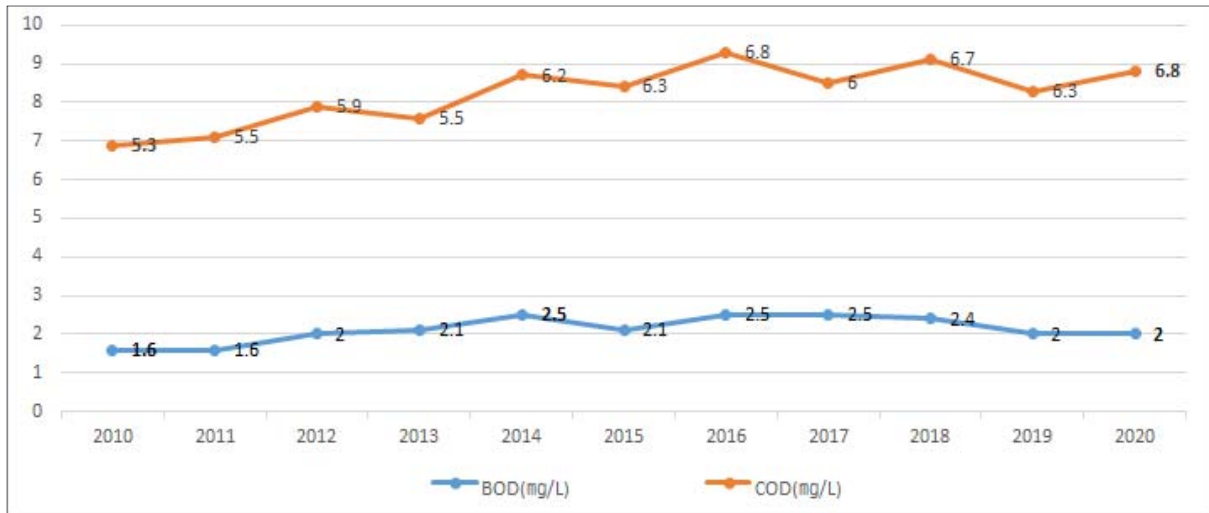
City are collected through the water purification plant (Maegok, Munsan, and Jukgok) located in the main stream of the Nakdonggang River. However, anxiety over drinking water continues to be a problem in Daegu due to pollution from upstream pollutants.

Table 1. Current status of water intake system and water purification plant production in Daegu (2018)

	Sum	Nakdong River system			Unmun Dam	Gachang Dam	Gongsan Dam
		Maegok	Munsan	Jukgok	Gosan	Gachang	Gongsan
Production volume (million m ³)	327.5	166.6	46.2	38.4	60.1	11.2	4.7
Ratio	100%	50.9	14.1	11.7	18.4	3.4	1.5

Source: Daegu Statistical Yearbook (Daegu Metropolitan Statistics Website)

Although the concentration of harmful substances such as heavy metals is considered more important than biological or chemical oxygen requirements (BOD) in the water intake of Nakdong River, the level of COD continues to rise every year, unlike BOD. This seems to be due to various contaminated wastewater from large-scale national industrial complexes in Gumi and water pollution caused by the large population and industrial development in Daegu.



Source : Statistical data of Daegu metropolitan city

Figure 3 Water pollution around the drinking water (Maegok) in Daegu City

2.2. The history of conflict on relocation of water intake source

Discussions on relocating Daegu's water intake to Gumi were first raised in 2004 as a countermeasure against water quality accidents in the industrial complex in the upper Nakdong River. In July 2006, the perchlorate emitted from Gumi Industrial Complex was detected in the water intake, water purification plant, and tap water in Daegu. In September of the same year,

the Daegu Metropolitan Government prepared a detailed plan for the relocation of the water source and proposed it directly to the Ministry of Construction Transportation, Environment and National Assembly. In March 2008, the phenolic contamination accident on the Nakdong River caused by the explosion of the Gimcheon Kolon Oil Plant temporarily suspended the intake stations of Gumi and Daegu. In January 2009, 1,4-dioxane was detected at the Nakdong River intake station. In the wake of these incidents, the Daegu Metropolitan Government once again recommended the relocation of Daegu's water intake to Andong Dam, and Gumi-si also recommended the relocation of Gumi water intake to the upstream. The Ministry of Land, Infrastructure and Transport held a meeting in May 2009 in Daegu City, Gyeongsangbukdo Province, Gumi, Gimcheon, and Sangju City, and selected the area near the frontline bridge in Gumi as the transfer point in June. In December 2009, the Ministry of Strategy and Finance launched a preliminary feasibility study on the transfer of water sources near the ILSOEN Bridge in Gumi. However, when the Daegu Metropolitan Government announced in 2010 that Daegu's water intake would be relocated upstream of Gumi, Gumi City was very angry at Daegu's unilateral announcement. In other words, Gumi City opposed the relocation of the water source because Daegu City had no prior explanation to the Gumi City Council or residents, and the relocation of the water source caused damage to residents due to the designation of water source protection zones. This led to a temporary suspension of preliminary feasibility studies and a cut in related budgets for the transfer of water sources. In particular, civic groups in Gumi formed the Gumi City Opposition Promotion Committee to launch an organizational campaign to oppose the relocation of the water intake. Due to this opposition move, the preliminary feasibility study in August 2011 concluded that the relocation of the water intake to the vicinity of the ILSOEN Bridge was not feasible due to the opposition of nearby residents and the resulting compensation. This opposition led to the conclusion that the preliminary feasibility study in August 2011 was not valid. However, in September 2012, when

a hydrofluoric acid leak at Gumi Industrial Complex killed 5 people, injured 10 people, and dried up nearby agricultural products and street trees. The Daegu City again proposed the relocation plan to Haepyeong intake source. It secured the cost for preliminary feasibility study on the transfer of water sources in November 2013, and the Ministry of Land, Infrastructure and Transport and the Korea Water Resources Corporation conducted a service called "Review of the Comprehensive Plan for Clear Water Supply in Daegu, North Gyeongsangbukdo Province." The main contents of the service were the analysis of the impact on the quantity and water quality level of the downstream area due to the transfer of the water source, and the alternative method of securing water other than the transfer of the water source. As a result, it was analyzed that there was no shortage of water downstream even if the water source was relocated to Haepyeong intake station in February 2015, and that there was no significant impact on the water quality grade of the water source transfer section. In addition, as a review of various alternatives to the transfer of water sources, it proposed the relocation plan of the Gumi Haepyeong intake source and the development plan of the riverside filtration water in the Gumi area as feasible alternatives. The proposed relocation of the Haepyeong intake station already had the advantage of no additional regulations as the area of the intake station was designated as a water source protection zone, and local governments did not have to bear any extra project costs. However, from the perspective of Gumi City, ①As the river water volume in the Gumi City section decreases by $7.8\text{m}^3/\text{s}$, the possibility of discharging pollutants from the total amount of water pollution to be observed in Gumi City may be reduced. ②In case of drought, there is a concern that the quantity may be insufficient. ③Water source protection zone in Daegu Metropolitan City are lifted while that in Gumi area are not released, causing problems in local sentiment. In addition, Daegu City will bear an additional 40 billion won annually as the cost of purchasing raw materials increases from $50.3\text{won}/\text{m}^3$ to $223\text{won}/\text{m}^3$. On

the other hand, the development plan for riverside filtration can reduce the water source protection area by using the existing Haepyeong water supply facility as an industrial water supply facility, and if the water quality is good, the water source protection area may not be designated. However, there is a problem that the initial investment cost is high, the safety is not fully verified in terms of water quality, and the cost of purchasing raw water(not purified) for Daegu citizens increases. Daegu City welcomed the results of these services and commented that the relocation of the intake plant was more realistic than the development of riverside filtration. On the other hand, Gumi opposed the idea, citing the possibility that the joint use of the Haepyeong intake plant will greatly reduce the quantity and reduce the water quality due to drought. As the disadvantageous situation developed due to the result of the service, Gumi Mayor proposed to Daegu City in February 2015 to form a public-private council to solve the problem of relocating the Daegu water source. As Daegu City agreed with Gumi City's proposal, the two regions formed a public-private council. However, from March 2015 to November 2016, the nine rounds of consultation ended without any significant income after only identifying differences in their positions. This is because the two local governments had different purposes of participating in the public-private council and had limited agendas for discussion. In other words, Gumi City tried to find the fictionality of the transfer of the water source through verification of the results of the service, and Daegu City participated with the aim of realizing the transfer of the water source through validation of the service report. In November 2016, the 9th public-private council ended with a joint proposal to the government regarding the relocation of the Daegu water source by combining the requirements of Daegu City and Gumi City. As the conflict was not resolved through the public-private council, the Cabinet Office has been at the center since 2017 to resolve the conflict with the Ministry of Land, Infrastructure and Transport and the Ministry of Environment. Starting with a meeting with members of the public-private council in February, the talks continued through several

meetings of related agencies (Daegu, Gumi, and the Ministry of Environment), but the gap between the two was not easily narrowed. However, through the government's continued efforts, the two local governments agreed to resolve the conflict at a meeting of heads of local governments organized by the prime minister in October 2018. The main agreement was to verify the feasibility of the wastewater-free discharge system that reuses all wastewater generated in Gumi without discharging it. The other was to conduct a study for rational water use, allocation, and management by comprehensively analyzing the impact on the quantity and quality of the entire Nakdong River basin. In April 2019, the Prime Minister, Daegu Mayor, Ulsan Mayor, Gumi Mayor, Gyeongbuk Governor, Environment Minister, and the head of the Office for Government Policy Coordination signed an MOU to solve the water problem in the Nakdong River basin through the above analysis. These studies published the results of a review of three areas: the 2020 Water Quality Improvement Plan, the diversification of water intake sources, and regional support measures. First, in the field of water quality improvement, measures to reduce pollutants entering the Nakdong River and various water quality improvements were considered. In particular, regarding the wastewater-free discharge system, it was proposed to install it first at Gumi public sewage treatment plant and Daegu Seongseo industrial complex, which has a large amount of wastewater discharge, in consideration of the cost. Second, when it comes to diversifying water intake sources, only a few quantities are secured through the development of Haepyeong Water Plant (Gumi), Imha Dam, and riverside filtration, rather than relocating the entire water intake in Daegu. This seems to reflect Daegu City's willingness to reduce criticism of giving up water quality management of the Nakdong River and secure emergency water sources. However, the Andong City and Gumi City strongly opposed the results of these services, and the interim briefing session was not held in August 2020 due to opposition from Gumi City. Third, as a way to support the region, economic support measures for residents of the area who transferred water intake sources through the

creation of water supply funds and regional win-win funds were proposed. The results of these services were officially announced through an online briefing session in November 2020 with experts and civic groups participating. However, as stakeholders who participated in the briefing session raised strong complaints about the results of the service, conflicts over the transfer of water sources do not seem easy to resolve.

Table 2. The research on the management of integrated materials of Nakdong River

	Main contents
Water quality Improvement	<ul style="list-style-type: none"> ◦ The wastewater no discharge system shall be phased out after reviewing the two areas first. <ul style="list-style-type: none"> - Priority installation of public sewage treatment facilities in Gumi and the Seongseo industrial complex in Daegu ◦ Strengthening the management of pollutants near the main stream of the Nakdong River <ul style="list-style-type: none"> - Strengthening regulations such as introducing TOC¹ Water Quality Total System and restricting the installation of contaminated facilities ◦ Reinforcement of water quality accidents (water quality measurement center, monitoring system for tracking harmful substances, etc.)
Water source diversification	<ul style="list-style-type: none"> ◦ 1 Plan : Water conversion to Haepyeong water source (300,000 m³/day) Installation of an advanced water treatment system at its own water intake station (Munsan, Maegok) (288,000 m³) ◦ 2 Plan : Use of raw water (300,000 m³/day) in the Imha Dam, Installation of an advanced water treatment system at its own water intake station (Munsan, Maegok) (288,000 m³) ◦ 3 Plan : Development of riverside filter water (230,000 m³/Sun), Installation of an advanced water purification system at its own water intake station (Munsan, Maegok) (358,000 m³)

1) It stands for total organic carbon, which is dissolved in water.

Regional Support	<ul style="list-style-type: none"> ◦ Support for the establishment of up-and-down cooperation projects (subject: areas affected by two local governments). Support for residents in affected areas due to the relocation of water sources; ◦ Expansion of support for water funding (buy of land in areas restricted from the establishment of factories, etc.) ◦ Creating and supporting a win-win fund in the region (signing an agreement on the business of beneficiary areas-impact areas);
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Source: Korea Federation of Biological Organizations, 2020

Then, why has the conflict over water intake not been resolved for more than 20 years despite the efforts of these stakeholders? What is wrong with conflict resolution efforts? These questions can be found to some extent by looking at the problem in terms of the method and procedure of consensus building in conflict. Analysis of the problem of relocation of water intake source described above in terms of consensus formation is as follows. After referring to these analyses, if you look into the contents of each stage consensus building and compare them, you will easily understand why the conflict over the movement of water intake sources is still drifting without reaching an agreement.

Table 3. The analysis of problems in conflict on relocation of water intake source

Stage	Problems in the process of consensus building
Conflict and Stakeholder analysis.	<ul style="list-style-type: none"> ◦ There was no accurate conflict and stakeholder analysis in the issue of water intake <ul style="list-style-type: none"> - Conflict analysis of quantity, water quality, and development benefits has recently become an issue. - Farmers, local residents, civic groups, etc. are excluded from the negotiating body.
Forming a consultative body.	<ul style="list-style-type: none"> ◦ Negotiations on the relocation of water intake sources are conducted led by local governments such as the government, Daegu, and Gumi. ◦ There was no appropriate consultative body for various stakeholders such as local farmers, residents, and businessmen to participate (The public-private consultative body consists of a small number of stakeholders, such as professors and public officials)

Joint fact -finding	<ul style="list-style-type: none"> ◦ No stakeholders directly participate in various water quantities and water quality survey services. - As a result, civic groups, local residents and related local government did not trust and accept the service results.
Interests-based negotiation	<ul style="list-style-type: none"> ◦ There was no official consultative body involving various stakeholders, so profit-oriented negotiations could not be made. - The public-private consultative body asserts only the "position" with the participation of minority stakeholders such as professors and public officials)
Consensus	<ul style="list-style-type: none"> ◦ An agreement centered on the government and local governments could not obtain the consent of all members. - Civic groups, local residents, and farmers who failed to participate in the formation of an agreement oppose the outcome of the agreement. (Objection to holding a briefing session) Opposition protests, etc.)
Approval of members	<ul style="list-style-type: none"> ◦ Since there was no official consultative body representing stakeholders, the consent process of internal members could not be carried out.
Implementation and monitoring	Not applicable.

3. The stakeholders and issues

3.1. Suggestions on how to identify stakeholders

When it comes to conflict, it is important to first identify who the stakeholders are, what issues are conflicting, and what they really want in conflict. In general, this analysis is conducted through various question-and-answer and interviews with interested parties by third parties (conflict appraisers), who are not directly involved in the conflict, and this is called conflict impact analysis. These analyses allow evaluators to identify stakeholders, identify their practical interests, and envision areas of agreement and disagreement between them (Susskind, Mckearnan, & Thomas-Larmer, 1999). The information identified through this conflict analysis determines whether the conflict can be resolved through building consensus or how the effort should be structured if the agreement is formed (e.g., issue decisions, meeting

numbers, technical support, etc.). And it will also enable participants to identify issues and conflict topics that they value, and their priorities (Office for government policy coordination, 2016). However, if these analytical investigations go awry, important stakeholders may be omitted or important parties may be excluded from the consultation process. If important issues of stakeholders are missing from the agenda, the analysis should be conducted very closely because stakeholders may not participate in the consultation or may think less reliable about the consultation process (Office for government policy coordination, 2016). In the absence of such an analysis, conflict impact analysis is a very important procedure for consensus formation, as negotiations can be discussed in their respective positions rather than in their actual desired interests (Office for government policy coordination, 2016). For this reason, the Regulations on the Prevention and Resolution of Conflict of Public Institutions (Article 10)² also have provisions for analyzing the impact of conflict on the establishment, implementation, and change of public policies.

3.2. Analysis of conflict issues and stakeholders

3.2.1 Conflict issues

Conflict impact analysis is, in principle, investigated by a neutral third party through interviews with each stakeholder. However, due to restrictions on interviews with parties following the 2020 COVID-19 pandemic, the investigator analyzed conflict issues and stakeholders through various indirect data.³

First of all, as it is a dispute over the use of river in terms of conflict issues related to the relocation of drinking water sources, conflicts exist between each other, mainly on three sides:

2) Article 10 (Conflict Impact Analysis) (1) Where the head of a central administrative agency deems that there is a grave and widespread impact on public life or excessive social costs are likely to occur due to conflicts of interest of the public, he/she may conduct a conflict impact analysis before deciding on the relevant public policy.

3) Utilization of various media articles, related papers, and materials for presentation of upstream areas (2020) for the management of Nakdong river integration;

water quality, quantity, and practical benefits of development of river watersheds. When it comes to conflict over river water quality, Daegu City, located in the middle of the Nakdong River, sees the inflow of harmful substances in the upper part of the Nakdong River as a cause of low water quality, so it believes that the only way to relocate the water source to the upper part (Gumi) is to secure clean raw water. In other words, Daegu City believes that the relocation of drinking water sources is inevitable to secure safe drinking water because even if the stream is purified through its own advanced water treatment system, it cannot completely remove small amounts of harmful substances. However, from the perspective of Gumi City in the upper part of the river, all facilities in the Gumi area emit treated water within the discharge water standard, considering that the Seokpo smelter located in the upper part of the river can emit environmental pollutants, the relocation of the water source is meaningless (Seo Jung-cheol, 2020). In addition, environmental civic groups say that if Daegu City relocates the water source, the pollution control of the Gumi Industrial Complex will be lax. And water pollution is expected to worsen as riverfront developments take place as the water supply protection zone is lifted following the relocation of the water source (Choi, Chae, & Yang, 2016)

Second, in relation to the quantity, if Daegu relocates the water source, the quantity of Gumi City may be insufficient in the dry season, such as a drought, causing damage to agricultural and industrial water, etc. Daegu's additional intake of rivers is believed to be limited to the total amount of pollution proportional to the amount of rivers, which could cause economic damage in the Gumi area (Son, 2017). On the other hand, the Daegu Metropolitan Government refutes such concerns that even if the water source is relocated to Gumi through two verification services⁴ by experts, there will be no shortage of water and no impact on water quality.

4) Review Service for Clear Water Supply in Daegu, Gyeongsangbuk-do (2004) and the Nakdong river integrated management plan service (2020) examined the effects of quantity and water quality on the relocation of water intake sources.

Third, it is a conflict related to the actual benefits of development of river basin. If the Daegu water source is relocated upstream, Gumi can expand the current water supply protection area, causing land price to fall. It is claimed that the installation of factories and large industrial complexes will be restricted, causing infringement of property rights by residents. On the other hand, Daegu believes that the existing water source area will be lifted from the water source protection zone due to the relocation of the water source, resulting in economic benefits from the development of various recreational facilities and commercial complexes around the riverside (Seo, 2020). In other words, Gumi believes that Daegu is trying to use the river without proper compensation for their economic damage caused by the relocation of the water source.

3.2.2 Analysis of stakeholders

Stakeholder analysis can enable successful conflict management and negotiation by identifying the composition and distribution of stakeholders, identifying issues and issues that they value, effectively identifying their desired interests as well as their position (Office for government policy coordination, 2016). In this analysis, position is defined as the negotiating party's explicit preference for a particular agenda (Yun, Chae, & Im, 2011). Interest, on the other hand, refers to the internal needs of the parties, which refers to the underlying desire and motivation for determining the position of guiding the actions of the parties (Yun, Chae, & Im, 2011). In other words, when people go against any policy, it is related to factors that cause their position, such as "why people oppose policies" and "what they want to gain by opposing policies." It is not easy to resolve because we usually put ourselves in conflicting positions, not in "interests," which correspond to each other's needs, desires, interests, and fears, when negotiating for conflict resolution. These interest-oriented negotiation methods will be explained later, and various stakeholders' positions and interests in the Daegu-Gumi conflict over the relocation of water sources are analyzed as follows. Based on the positions of Daegu

and Gumi over the relocation of the water source, negotiations on an agreement between them seem impossible. However, if we look at the issues in terms of interests, it seems that the conflicts between them can be resolved if rational alternatives to what they really want, such as securing adequate quantities for Gumi, compensating local residents, and improving the river environment are proposed.

Table 4. Analysis of position and Interest by stakeholder

Stakeholder	Position	Interest
The dep. of environment	<ul style="list-style-type: none"> ▶ Local governments agree between Daegu and Gumi to resolve the water problem ▶ Improvement of water quality of Nakdong River by preparing integrated water management measures for Nakdong River 	<ul style="list-style-type: none"> ▶ Improving the role of the Ministry of Environment by solving problems with the Nakdong River intake source ▶ Solving water problems in the Nakdong River by unifying water management
Daegu mayor City council member	<ul style="list-style-type: none"> ▶ Difficult to secure safe water intake due to pollution in upstream areas ▶ Securing safe water for Daegu citizens is a matter of survival. ▶ Improving river water quality and securing drinking water sources are separate 	<ul style="list-style-type: none"> ▶ Creating positive public opinion based on the transfer of water source ▶ Re-election in local elections
Daegu citizens (union)	<ul style="list-style-type: none"> ▶ Need to secure clean drinking water safe for pollutants ▶ Need to relocate upstream of water source 	<ul style="list-style-type: none"> ▶ To relieve anxiety about drinking water

<p>Gumi mayor City council member</p>	<ul style="list-style-type: none"> ▶ The relocation of drinking water sources without consultation with Gumi citizens is not possible. ▶ Gumi and Daegu do not make much difference in water quality because of their water intake sources, and the quantity in Daegu is rich ▶ Daegu secures its own water intake by improving water quality 	<ul style="list-style-type: none"> ▶ Transfer of water sources that are subject to securing financial support ▶ Securing government budget to improve water quality in Gumi area ▶ Difficulty in re-election when water intake is transferred
<p>Gumi citizens (opposition promotion committee)</p>	<ul style="list-style-type: none"> ▶ Unable to relocate without consultation with Gumi citizens ▶ Lack of quantity and property rights infringement when water source is transferred. ▶ The government and Daegu City assume the relocation of water sources in advance. 	<ul style="list-style-type: none"> ▶ To include the committee in the consultation process for the relocation of water sources ▶ Compensation for economic losses of Gumi city residents
<p>Gumi farmer's organization</p>	<ul style="list-style-type: none"> ▶ Lack of agricultural water when water sources are transferred (against relocation). 	<ul style="list-style-type: none"> ▶ Securing agricultural water or compensation for farmland
<p>Gyeongsangbuk-do</p>	<ul style="list-style-type: none"> ▶ The transfer of water intake sources is not possible without the agreement of the affiliated local governments. ▶ Securing its own water intake sources by improving water quality in Daegu 	<ul style="list-style-type: none"> ▶ Do not want to be involved in disputes between local government ▶ Prevent lack of water quantity of local governments in Gyeongsangbukdo

(Daegu) Environmental organization	<ul style="list-style-type: none"> ▶ Transferring water sources is not an alternative to securing safe water ▶ Improvement of water quality of Daegu's own water intake sources first 	<ul style="list-style-type: none"> ▶ Concerns over worsening environmental pollution due to the relocation of water sources (concerns over lifting the water reserve) ▶ Concerns about reducing the role of environmental organizations
(Gumi) Environmental organization	<ul style="list-style-type: none"> ▶ Daegu needs to drink its own water through water quality improvement ▶ Need to review securing water intake sources using Daegu riverside filter water 	<ul style="list-style-type: none"> ▶ Concerns over deepening water pollution in the Nakdong River when water source are relocated ▶ Improve the role of environmental organizations
K-water	<ul style="list-style-type: none"> ▶ Active support to resolve water source conflicts ▶ Acting as a public institution to improve river water quality 	<ul style="list-style-type: none"> ▶ Expanding institutional engagement in business ▶ Form a positive image of the institution
Ulsan City	<ul style="list-style-type: none"> ▶ No direct comment. 	<ul style="list-style-type: none"> ▶ Troubleshooting the protection of hemisphere petroglyphs by relocating water sources
Busan & Gyeongnam	<ul style="list-style-type: none"> ▶ There is no direct conflict, but there is a lot of interest. 	<ul style="list-style-type: none"> ▶ Concerns over deepening downstream contamination when water sources are transferred (Unmanaged river pollution in Daegu area)

4. Establishment of consensus building procedures

As mentioned above, there are a wide variety of stakeholders surrounding conflicts over the relocation of water sources, including the government, the heads of local governments and local councilors, local residents, civic groups, and public corporations. In addition, various issues such as river quantity and quality management, resident compensation and profits development are complicated in terms of conflict issues. With many stakeholders and various

issues, it is difficult to resolve the conflict through bilateral negotiations between Gumi and Daegu. This is because there are various stakeholders on the issue, and each stakeholder tries to carry out their interests through solidarity with various forces.

In other words, interested parties try to unite and build strength with other forces when they are perceived to be weak, and even if they are strong, they try to carry out their interests through solidarity with other forces. In order to prevent the government's announcement of its plan to relocate the water source, Gumi residents joined forces with civic groups to exert pressure on mayors and city councilors to carry out their opinions. In the presence of such diverse stakeholders, it is difficult for individual parties to contact each stakeholder to persuade and resolve. Therefore, it would be the best way to resolve the conflict if various parties gathered together to form a consultative body and reach a mutually beneficial agreement through mutual negotiations. (Kim, Kim, Jeong, & Park, 2009).

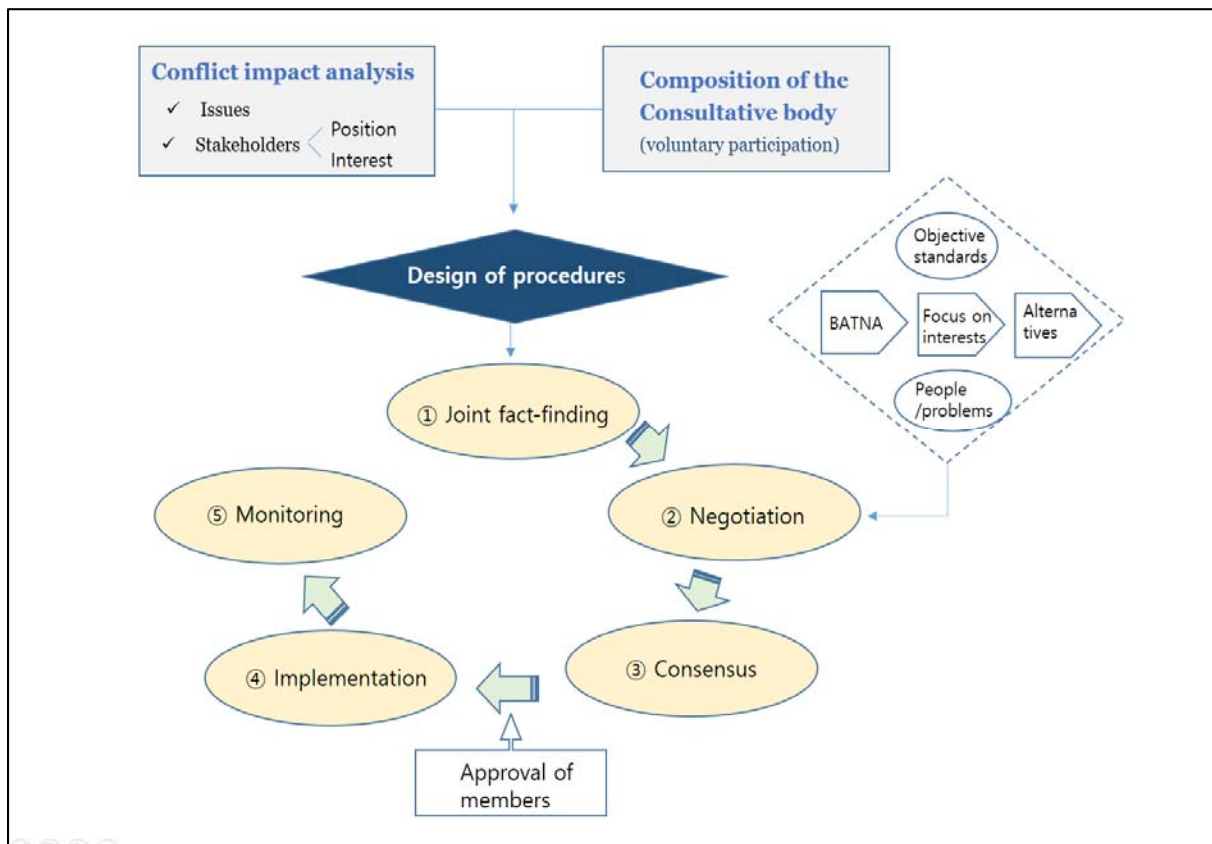


Figure 4 Consensus building flow chart

4.1 Conditions under which all interested parties voluntarily participate

When forming a consultative body, interested parties to all conflicts do not necessarily want to participate in the negotiations. Therefore, various conditions and atmosphere creation are required for stakeholders to voluntarily engage in negotiations. According to the theory of negotiation, the conflicting parties do not bother to participate in the negotiations if there is an alternative that will satisfy the real interests of the conflicting parties as much as possible (Fisher & Ury, 1983). For example, when there is a conflict with the government over the installation of public facilities, there is no incentive for residents to come to the negotiating table if they recognize that they can pressure lawmakers to delay public installation. Also, when the parties to the dispute attend a conversation or negotiation table and feel there is nothing they can do, the parties refuse to participate in administrative procedures to solidify the government's decision (Park, Kim, Kim, & Lee, 2009). Also, if either side feels unilaterally strong, it may not feel the need for negotiations. Therefore, when some balance of power is achieved between the conflicting parties and uncertainty is recognized as increasing if the problem is solved alone without negotiation, the parties are motivated to return to the negotiating table (Kim, Kim, Jeong, & Park, 2009). In addition, the conflicting parties have a stronger incentive to participate in the dialogue if they recognize that the cost of abandoning the dialogue is too high. In the conflict over the relocation of drinking water sources, Gumi City did not try to come to the negotiating table, including the public-private council, until the results of the service of the comprehensive plan to supply clean water in Daegu, Gyeongbuk Province. Gumi City believes that the demand for the cancellation of the water source relocation plan could be better than participating in the negotiations, and that Daegu City's unilateral policy drive and government involvement were not balanced. Therefore, in order for all stakeholders to participate in the negotiations for the transfer of water sources conflict, the participation of various stakeholders must be ensured through stakeholder analysis through

neutral third parties. It is necessary to lower the entry threshold so that any agreement after participation, including fair rules and information sharing, can be deviated from negotiations at any time. In addition, rather than verifying the results of existing services, it proposes the possibility of consultation on various agendas, such as the need to relocate water sources and ways to improve water quality. It will be necessary to create an atmosphere in which stakeholders can voluntarily participate through persuasion or public opinion that if they do not participate in negotiations, the costs they will pay could increase.

4.2 The phase of the consensus building process

4.2.1 The design of procedures

It is necessary to organize procedures on how to proceed with the consultation when interested parties are cleared up to resolve the conflict and conditions for voluntary participation are formed.

First of all, in the consultative body, it is important to select the presidents, assistants, representatives of the implementing parties, and external experts and clearly specify the authority and duties of all participants (Kim, Kim, Jeong, & Park, 2009). There should also be an explanation of the legal status and role of the agreement reached through consultation. The rules for proceeding the meeting are very important to be discussed and decided before the negotiations begin, and must be set through consensus across the participants. It is necessary to include specific details, such as the method of presenting opinions and agreeing on agenda items (individual processing, package processing, etc.), the time and frequency of meetings, the provision and demand of information, and funding. In addition, the agenda of the meeting can be identified to some extent through the analysis of stakeholders, but the order of negotiations will have to be determined through consultation due to different importance of each stakeholder. It is also necessary to determine in advance how participants of the council will communicate with their organizations and the general public (Kim, Kim, Jeong, & Park,

2009). Once the pre-consultation procedure is completed, consultations are conducted to form an agreement in accordance with the five steps of ① Joint fact-finding ② Interests-based negotiations ③ Consensus ④ Approval of Members ⑤ Implementation and monitoring.

4.2.2. Joint fact-finding

Once the consultation process is sorted out, a joint investigation process by interested parties is needed. This is because joint investigations allow parties with different views or interests to investigate data and information together, analyze facts and predictions, make comments based on this information, and finally leverage the information they create to reach decisions together (Susskind et al., 1999). In particular, if there is an adversarial conflict over important technical or scientific facts, a good alternative can be presented during the joint investigation process. In other words, by participating in joint fact-finding, participants learn a lot about the scientific basis of various claims. This will enable negotiations with stakeholders who lack expertise to be negotiated on a more equal footing and build strong relationships with each other because it will enable parties to better understand each other's interests during the investigation. Despite two verification services in the conflict over the transfer of water sources, other interested parties other than Daegu City do not accept them because the parties were not involved in the investigation process. According to Susskind et al(1999), including a joint fact-finding step is more likely to reach a more reliable, more creative, and more durable agreement between the parties than not. These joint investigations have the disadvantage of being time consuming and costly. However, the information generated in the course of the joint investigation could be used appropriately in the consensus-making process and would contribute to a better understanding of the more cohesive relationships and differing views between the parties.

4.2.3. Interests-based negotiation

Usually, when negotiations on public conflicts are carried out, participants target positions that are mutually opposed to each other, not interests such as the needs, interests, and fears that each stakeholder wants. This means that negotiations are negotiated solely on the outcome without considering the cause, delaying negotiations and making it difficult to reach an agreement. Therefore, paying attention to interests, not positions, can facilitate the development of solutions to conflicts. So what does it take to negotiate based on these interests? A variety of theories are discussed regarding negotiation strategies, and the authors propose six methods, finding common ground through negotiation strategies of Fisher & Ury and Harvard Business Essentials.

Table 5. Negotiation strategies by researcher

Scholar	Key Techniques
Fisher & Ury	<ul style="list-style-type: none"> · Separate people from problems. · Focus on interests, not positions · Develop mutually beneficial options · Insist on using objective criteria
Harvard Business Essentials	<ul style="list-style-type: none"> · Think about what would be a mutually desirable outcome for each other. · Look for potential value creation opportunities · Check the reserved interval with your BATNA, and identify the other party. · Try not to weaken your BATNA · Prepare for issues related to negotiating authority · Identify as much information as possible about the opposing people's culture, goals, and approaches to a particular issue. · Be prepared to adapt to changes in circumstances · Secure external standards and technologies related to fairness · Change the negotiation process to an advantage

Source: KIPA Research Report p60, p65

The first is to identify the BATNA. Best Alternative To Negotiated Agreement (BATNA) is the most preferred alternative that a party can choose without negotiated transactions (Sim,

Hoe, Lee, & Son, 200). In other words, it means the best outcome that can be achieved without negotiations as the "last best alternative" that can be taken when negotiations break down. This is a necessary point to reach a conclusion and can be a threshold for negotiations. If the current negotiations give only less value than BATNA, it becomes difficult to proceed further. So the parties should not accept alternatives that are inferior to BATNA. However, many people often engage in negotiations without identifying the BATNA of themselves or their organizations, which is the same situation in which he participates in investments such as auctions without knowing his bank account balance (Kim, Kim, Jeong, & Park, 2009). If the parties participate in the negotiation table without even knowing their BATNAs, they are significantly restricted from taking appropriate strategic measures in each situation that is transformed during the negotiation process. However, if the parties have a good BATNA, they will be able to secure a position in the negotiations because they have a better alternative than the negotiations, even if the negotiations are not going in the direction they want. The reason why BATNA is important for these counterparts is that they and their counterparts' BATNAs can be used to determine the zone of possibility agreement (ZOPA). In addition, if the other party's BATNA is known, it can be compared to the other party's proposal to decide whether to accept it or not, and to make suggestions that can maximize one's interest by proposing it on better terms than the other's BATNA. In other words, knowing these BATNAs would allow all parties to create alternatives that would give them more than the actual profit that their BATNA could give them

Second, focus on interests, not on each other's shoes. In order to lead negotiations to mutual benefit, it is necessary to focus on the actual interests or goals pursued rather than on ostensible demands or arguments. That is, the requirements or arguments that the parties present in the negotiations may differ from the benefits they are actually pursuing. In actual negotiations, finding out what mutual benefits are is very important. For example, if A and B, who argue to

have one orange each other, find out that A needs the skin of an orange and B needs orange contents, they can easily solve it by identifying interests, not positions. According to Eun Jae-ho et al (2011), in order to apply these guidelines in negotiating situations. ①We analyze the interests of us and the other party. ②Communicate clearly to communicate our interests to the other party. ③Listen carefully to understand interests such as concerns and needs of the other party. ④We present methods for identifying and exchanging what we and the other party consider important and less important. It would be easy to find alternatives to satisfy the requirements of the parties if they separate their positions and interests in conflict and create multiple alternatives based on their interests.

Thirdly, develops mutually beneficial alternatives. The key to developing mutually beneficial alternatives is to acquire the technology to create options by increasing them significantly before dividing the pie (Yun, Chae, & Im, 2011). In other words, it creates a value that can be a variety of alternatives through negotiations and leads to negotiations that benefit everyone. In this way, it is possible to negotiate mutually beneficial to grow pie first and then allocate pie. This creation of value is difficult in negotiations, but it is the most necessary and optimal way to reach an agreement. According to Eun Jae-ho et al(2011), six methods were proposed as strategies to create these values. ①It is necessary to expand the issue. ②To ask diagnostic questions to lead to information that can grow pies. ③It is to disclose interests and priorities. ④Develop many mutually beneficial alternatives. ⑤It is to examine whether there is any possibility of improving the current agreement. ⑥Making interdependent agreements using differences between the parties (attitudes to risk, time preferences, etc.). In 1989, the government tried to promote reconstruction and modernization of the underdeveloped Seoul National Hospital building, but Gwangjin-gu and residents demanded the relocation of the hospital to other regions due to disgusting facilities. In this conflict, interested parties went

beyond their respective positions and discussed various alternatives based on the actual benefits of improving Gwangjin-gu's image and regional development, modernizing the National Medical Center, and starting early construction. Such consultations could lead to the creation of the National Institute for Mental Health, a comprehensive medical complex consisting of medical administration towns and medical bio centers. This was a case in which the two parties resolved the conflict through the development of various options as a result of the third proposal, not the original initiative.

Fourth, establish objective standards for consensus. Although negotiators have worked together to create many alternatives, which of them will be chosen is an important issue. If one alternative is advantageous on our side, but the other is slightly disadvantageous on our side, the difficult alternatives cannot be reached if each party insists on their own advantageous alternatives. Therefore, in choosing alternatives, it is necessary to first create objective principles or criteria to ensure that alternatives are chosen fairly. Objective criteria here mean something reasonable acceptable to the negotiating parties, such as practicability (cost, time, etc.), prevention of recurrence, similar cases, expert diagnostic opinions..

Fifth, separate people from problems. When there is a conflict between the parties, they consider the other party unfair and dishonest. However, from the other party's point of view, this is a natural act to secure one's rights, so negotiations should look at people and issues separately (Yun, Chae, & Im, 2011). If the problem is viewed as an act or reaction to objections rather than as a person, negotiations will discuss each other more technically and make it easier to solve the problem.

Sixth, build a mutual trust relationship. Building mutual trust is very important because most of the causes of public conflict are confrontation and distrust between the parties. In particular, if negotiations are not made on an equal footing, such as authoritative policy decisions, announcements, and non-delivery of information by the government, stakeholders

will not even be able to begin negotiations. The public-private council of Gumi and Daegu failed to reach an agreement because it was engaged in mutual consultations to stick to its respective positions. Many creative alternatives, such as securing quantities for upstream relocation and compensation measures for residents in Gumi, may have been created and turned toward conflict resolution if they discussed mutually for profit.

4.2.4. Consensus

Interested parties will draft an agreement if a final alternative is created through mutually beneficial negotiations. The agreement here may not be satisfactory enough for all interested parties involved in the consultative body (Park, Kim, Kim, & Lee, 2009). This may mean that there is no strong support for alternatives created after sufficient consideration for a limited time, but no rejection of them. When a draft agreement is drawn up and stakeholders sign it, this means that the mutual best efforts will be made until the agreement is finalized. On the other hand, even if the draft agreement is signed, it should be careful to disclose it, including the media, if it is not approved by all members. This is because it can be negatively affected if it is released to the media when the intention of the internal group is not finally decided.

4.2.5. Approval of members

In order for the signed draft agreement to be implemented as a final agreement, approval from within the group represented by each negotiator is required. That is, even though all negotiators agreed and signed, the internal members or final decision makers who participated in the negotiations may refuse that the deal is not in their interest. Interested parties should therefore communicate with sufficient time for internal members to approve the agreement. If necessary, one can ask the other party of the consultative body to find an objective basis for persuading internal members, and it would be a good idea to persuade members by involving a third neutral person (Park, Kim, Kim, & Lee, 2009). Through the approval process within

this group, the draft becomes effective as a final agreement.

4.2.6. Implementation and monitoring

The final step in forming such an agreement is to ensure that the agreement has continued effect in the future through its implementation. This requires several stages of progress. First, the final agreement must be formally signed by all concerned. In the signing process, some officials may not sign because they want to take effect conditionally or because they want to fully reverse the discussion. In such cases, the coordinator shall make good adjustments so that the agreement does not change at the last minute. Second, institutional mechanisms should be established so that stakeholders can implement projects or policies in the future as mutually agreed. In other words, it is necessary to establish an inspection committee to monitor the implementation of the agreement and to manage conflicts arising in the implementation process. This is a device for continuing the formation of agreements, which may be required as a condition for stakeholders to sign agreements. When a committee like this is formed, all parties shall determine what the Committee measures, what measurement methods it uses and what powers it will have. Finally, it informs stakeholders of the full situation in which the agreement is being followed. This means that the conflict has been resolved and the case closed by checking compliance by reviewing the agreement from clause to clause.

As above, we briefly looked at the six steps to form an agreement. Each of these steps is interconnected, and sequential progression can bring closer to mutual agreement. Through this process, interested parties will be able to resolve their initial distrust, think about the other party's position, and eventually find an agreement that benefits everyone. It will also work together to ensure that the arrangements made through such efforts are implemented.

5. Conclusion

The demand for river water continues to increase due to rapid industrialization and urbanization, but conflicts over river water use are accelerating due to the finite availability of river water and water pollution. The conflict over the relocation of water sources in Daegu City can also be seen as a reason behind this. In addition, unlike other water systems, the high dependence on water intake on the Nakdong River may be responsible for intensifying conflicts over river distribution. Daegu City has made a lot of efforts to secure fresh and safe water for nearly 20 years after the Nakdong River phenol incident, but the conflict has yet to be resolved. There may have been various reasons for this constant conflict, including discrepancies in benefits and costs related to the relocation of the water source, unilateral communication of Daegu City, and interests among stakeholders over various issues. Therefore, to resolve disputes over these rivers, it is necessary to first identify the causes of the conflict and its stakeholders through conflict analysis, then create a consultative body for all stakeholders to discuss and create conditions for all members to participate. Each interested party in one place will be able to resolve uncertainties and misunderstandings about the other by examining the facts together. Through continuous dialogue and consultation, each stakeholder will know what the other really wants, and if they explore their BATNAs and develop many mutually beneficial alternatives, they will eventually be able to find an agreement that works best for each other. The longstanding unresolved water supply problem could finally come to an end if it goes through these procedures. However, so far, the relocation of Daegu and Gumi water intake centers is seeking a solution through negotiations led by local governments without various stakeholders such as farmers, local residents, and environmental groups participating. These solutions cannot guarantee the implementation power of future negotiations, and opposition from stakeholders with conflicting interests will continue. Therefore, first of all, through conflict analysis organized to date, a composition that various stakeholders can continuously

discuss is created. Second, it is necessary for members to directly participate in the fact-finding survey to resolve uncertainties in water quality and quantity, and to create an agreement that can be shared by all stakeholders for development benefits from the relocation of water intake sources. In addition, these agreements should be continuously monitored by designating a supervisory authority agreed by members of the council, and the terms of the agreement should be made into ordinances and laws to strengthen their performance

With the announcement of the results of the Nakdong River integrated management service in 2020, important conflicts and interests such as quantity distribution, water quality improvement and compensation issues surrounding the transfer of water sources were largely resolved. However, Gumi City, Gyeongsangbuk-do and local environmental groups, where the water source is transferred, are still distrusting and unwilling to accept the results of the service.. However, Gumi, Gyeongsangbuk-do and environmental groups, which are areas before the water intake, still distrust the results of the service and refuse to accept it. On the other hand, Daegu City is positively expecting a possibility of negotiations, suggesting various compensation measures to be provided if it agrees to relocate the water source to Gumi City and Gyeongsangbuk-do. However, even if the final agreement is reached through consultations between the two local governments, it is doubtful whether various stakeholders, including the government, local residents, environmental groups and local companies, will agree it. Of course, at this point it will take a lot of time to solve the problem of water intake source through a consultative body involving various stakeholders, and there is a risk that the cost of resolution will be higher due to another issue. But if you reflect on the reasons why the water source conflict has not been resolved in nearly 20 years. Researchers think that it could be a more efficient, acceptable, and sustainable solution for various stakeholders to come together to think about creative alternatives and find mutual consensus.

Finally, it is very important that the participating parties have been given representation

or delegated authority by their organizations to conduct interest-based negotiations. It is also most necessary for all participants to have knowledge or trust in these negotiation techniques. However, it is difficult for members who participate as representatives of large numbers, especially governments and public organizations, to be given the authority to propose or negotiate various alternatives through mutual negotiations. In addition, a negotiation method based on interests is a technique that lacks people's awareness or empathy to the point where it is difficult to find books that explain it in Korea. In these days, when mutual interests and complex conflicts over water continue to increase, it is hoped that much research and education on the negotiation techniques will be conducted in Korea and settled as a dispute resolution method in our society.

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