

Renovated Program for Supporting Local Residents Living in Dam Surrounding Areas

Kim, Jin Soo. K-water, jsoo@kwater.or.kr

Park, Won Cheol. K-water, humanp@kwater.or.kr

Gang, Seung Ju. K-water, Gangsj@kwater.or.kr

It has long been documented that dams provide various benefits such as supplying water for municipal and industrial purposes, mitigating flood damage, increasing crop yield by irrigation, and generating hydroelectric power. Despite the fact that dams have promoted the economic development of many countries over last century, the construction of dams faces difficulties because of the opposition for social and environmental reasons. Major reasons for this resistance, especially in social impacts, can be summarized to: the relocation of local residents, the loss of fishery, a decline in the fertility of farmlands, inconveniences caused by the interruption of transportation, and restriction against developing private lands. These adverse effects are leading dam-affected communities and/or people to a strong movement against water resources and dam development.

Many efforts have been endeavored by the Korean government and the K-water to harmonize the demand of local residents who are suffering difficulties in their economic and cultural lives. According to the Act on the Dam Construction Areas and Surroundings, several practical actions have been taken for dam-affected communities including infrastructure development and eco-friendly dam surrounding renovation. Social overhead capital has been invested for building road, community culture centers, water & wastewater treatment plant, and organic farmland. The rehabilitation of dam surrounding areas has been focused on providing recreational and cultural places for tourists, and further promoting community income for local residents. However, these types of support programs are proven not to be substantial, and some dwellers are continuously asking more practical support for promoting their living standards.

In this paper, a recent investigation for monitoring the efficacy of current support system will be presented. In addition, some suggestions for efficiently supporting reasonable and beneficial facilities for dam-affected residents will be provided. More details of the renovated supporting program will be discussed.

Keyword: dam development, support program, surrounding areas

1. LOCAL IMPACTS CAUSED BY DAM CONSTRUCTION

Dam construction not only brings economic effects such as flood control, water supply, and electric generation, but also produces supplementary effects such as job creation, and the promotion of dam resources-based tourism in the region concerned. In the short term, it also provides short-term employment effects in local areas during its period. However, dam construction in Korea should have procured workers from outside the areas concerned due to the shortages of skilled manpower in those areas, thereby causing inconvenience due to the increased traffic, which aiming for the transportation of construction materials and the influx of workers from other areas. In addition, prospects for fostering tourism in the dam surroundings have not been so good due to the regulations on the surrounding areas except Andong Dam, which has become successful in this regard. In the meantime, dam construction causes negative effects including the relocation of dwellers, natural and environmental property losses, changes in river flow, separation of river channels, impact on economic activities due to weather change, damage to the dwellers' health, disbandment of the concerned community, limitations in terms of exercising rights over property, and forced land sale. These negative influences caused by dam construction are summarized as follows.

1.1 Direct impacts

- Loss and relocation of the community concerned and relocation of the dwellers

- Limitation in exercising property rights in the dam construction areas and surrounding areas
- Damage caused in the process of construction
- Delayed investment in regional development programs
- Psychological damage caused to the dwellers following the loss of their native or residential places.

1.2 Indirect impacts

- Isolation of the community concerned
 - The created dam markedly reduces accessibility between the affected area and other areas in terms of distance and time, isolating the area concerned.
 - The community concerned is socially and culturally isolated, thereby suffering a severe reduction in the population.
 - Due to the geographical characteristics of the dam construction surroundings in Korea, alternative nearby areas are difficult to secure, reducing the community and debilitating living conditions.
- Change in climate and other impacts are caused, inflicting damage to economic activities in the surrounding areas.
- Population drainage arises, weakening the foundation of the municipality concerned.
- The creation of both beneficiary and affected areas creates social inequality problems.

2. KOREAN SUPPORT INSTITUTIONS FOR DAM CONSTRUCTION SURROUNDINGS

In regard to support for dam construction surroundings, the Power Plant Surroundings Support Act was instituted in June 1989, which gained a foothold in providing support funds of

power generation dams. With the amendment of the Special Multipurpose Dam Act on December 10, 1993, the full support for multipurpose dams began in 1995. The Act on Support for Dam Construction Areas and Surroundings, etc., which was finally instituted on September 7, 1999, has provided the foundation for the current related law institution.

2.1 Laws related to support programs for dam construction surroundings

- From 1990 to 1994, pursuant to the Power Plant Surroundings Support Act, support programs were carried out (including power plants under the control of KEPCO and K-water)
- Since 1995, with the amendment of the Special Multipurpose Dam Act, K-water has been conducting separate support programs for multipurpose dams, and
- Since 2000, pursuant to the Act on Support for Dam Construction Areas and Surroundings, etc., it has been conducting expanded support programs.

- Support programs for power plant surroundings ('90 ~ '94)
 - Funds: within 0.5% of proceeds from electric power sales
- Support programs for multipurpose dam surroundings ('95~'99)
 - Funds: within 1% of proceeds from electric power sales, and within 5% of water sales
- Support programs for dam surroundings (2000 ~)
 - Funds and support amounts

Year	Proceeds from sales of electric power	Proceeds from sales of water
2000~2002	Within 2%	Within 10%
2003~2004	Within 3%	Within 10%(within 15% for dams for water)
2005~	Within 6%	Within 20%

2.2 Laws related to reshaping projects for dam construction surroundings

- September 7, 1999: Instituting the Act on Support for Dam Construction Areas and Surroundings, etc.
 - Created the ground for reshaping dam construction surroundings
 - Instituted enforcement ordinances of the Act on Support for Dam Construction Areas and Surroundings, etc. (March 13, 2000)
- December 31, 2001: Amending the Act on Support for Dam Construction Areas and Surroundings, etc.
 - Created the ground for reshaping programs for existing dam surroundings (dams constructed prior to March 7, 2000)
 - Amended the enforcement ordinances of the Act on Support for Dam Construction Areas and Surroundings, etc. (July 30, 2002)

- Funds: the nation and the program undertaker shall shoulder 90%, and the municipality shall shoulder 10%
- Criteria for financing
 - Dams under construction: base amount (30 million USD) + additional amount (a maximum of 20 million USD)

- Additional amount = 20 million USD
 $\times [\text{water storage area coefficient} + \text{total water storage capacity coefficient} + \text{relocated households coefficient} + \text{development demand coefficient (population density)}] / 4$
- A maximum 1.5 for water storage area and water storage capacity, and a maximum 0.5 for the number of relocated households and development demand
- Existing dams: base amount (20 million USD) + additional amount, (20 million - 30 million USD)
- Additional amount: 10 million USD \times (water storage area coefficient + total water storage capacity coefficient + relocated households coefficient) / 3

2.3 Comparison of two types of programs

Two types of support programs based on different legal backgrounds are compared in terms of target size and areas, funds, program undertakers, and types of projects as shown in Table 1. Support programs vs. reshaping projects

Description	Support programs	Reshaping projects
Target size and target areas	<ul style="list-style-type: none"> • Target dam size <ul style="list-style-type: none"> - Dams with a storage area of over 2 million m² or a total storage capacity of over 20 million m³ • Target areas <ul style="list-style-type: none"> - Areas within 5km of the flood water level - Areas within a 2km radius of the dam power plant 	<ul style="list-style-type: none"> • Target dam size <ul style="list-style-type: none"> - Dams with a storage area of over 2 million m² or a total storage capacity of 20 million m³ • Target areas <ul style="list-style-type: none"> - Areas within 5km of the flood water level - Areas within a 2km radius of the dam power plant

Funds (Annual budget)	<ul style="list-style-type: none"> • Within 6% of proceeds from electric power sales • Within 20% of proceed from water sales (Within 20% for only water supply dam) 	<ul style="list-style-type: none"> • The dam construction undertaker shoulders 90% • The related municipality shoulders 10%
Program undertaker	<ul style="list-style-type: none"> • Municipality : income boosting projects, life infrastructure creation projects • K-water : support programs for dwellers' livelihoods, educational projects, support programs for dam storage usage fees, publicity and supplementary projects 	<ul style="list-style-type: none"> • The related municipality
Kinds of projects	<ul style="list-style-type: none"> • Income boosting projects, life infrastructure creation projects, support programs for dwellers' livelihoods, educational projects, support programs for dam storage usage fees, publicity and supplementary projects 	<ul style="list-style-type: none"> • Production infrastructure creation projects, welfare and cultural facilities projects, and public facilities projects

2.4 Achievements from support and reshaping programs

As for support programs, approximately 200 thousand USD per dam was supported until 1999. The support program costs have markedly been increased since 2005, and they stand at a range of 660 thousand USD (Buan Dam) to 7.003 million USD (Chungju Dam) (about 50 million USD is

budgeted in support of a total of 21 dams) in 2007 as shown in Tables 2 and 3. The regional reshaping projects for existing dams began in 2003, and currently a support cost of 20 million to 30 million USD per target dam is budgeted as shown in Table 4.

Table 2. Costs for support programs of multipurpose dam projects in 2007 (unit: thousand USD)

	Support funds by dam											Other support
Total	Soy-ang	Andong	Daech-eong	Chun-gu	Hapcheon	Ju-am	Imha	Namgang	Yongdam	Seomjin	Jangheung	
49,156	5,060	3,682	4,011	7,033	2,851	2,955	2,140	1,883	2,458	1,660	927	14,496

Table 3. Costs for support programs of water supply dam projects in 2007 (unit: thousand USD)

Total	Support funds by dam					Other support
	Sayeon	Sueo	Yeongcheon	Unmun	Daegok	
2,842	323	430	795	808	201	285

Table 4. Costs for reshaping projects of existing dams (unit: million USD)

Soy-ang	Chun-gu	Andong	Daech-eong	Imha	Hapcheon	Ju-am	Seomjin	Boryeong	Bu-an	Sayeon	Su-eo	Yeongcheon	Unmun
30	30	30	30	30	30	30	30	23	21	21	21	23	25
Step1('03~'07):240								Step2('05~'11):134					

3. PROBLEMS OF CURRENT SUPPORTING PROGRAMS

Although we have executed support programs for area near dam facilities as stated before, the complaints of residents are not dwindling. In this context the survey on the cause and solution of these complaints is provided as follows.

3.1 Requirement of residents

■ Financial size of support and distribution:

The residents of dam surroundings claimed an increase in supporting budget for flood control, agricultural water, and watercourse maintenance water. Current subsidiary calculation has purpose of a decrease of dams' supporting budget difference and balanced district development by minimizing the budget of the dam which has a great deal of endowment and supporting small-scale dams. However, the residents who live in surrounding area of large scale dams claimed supporting budget according to the endowment of dam. In addition to, residents who live upriver district of dams and have more limitation compare with the downriver district dams claimed additional support budget.

■ **Contents of the project:** Decision-making for project execution should be made in consideration of various matters when K-water promotes the projects. However, inappropriate decision-making standards make processes to become slow, which lead a delay for the agreement of support project conference, not to mention of setback of the project execution. Transfer of K-water's assignment including livelihood support and education to the local government was alleged by the resident.

■ **Execution of project:** Although divisions in working level have performed the resident supporting program with much time and effort, there is not enough incentive because of feeble evaluation and compensation to the staff.

3.2 Problems concerning support and reshaping systems for dam surroundings

- **Unclear purpose of support and reshaping projects:** Support and reshaping projects for dam surroundings aim to invigorate economic and social activities of areas where dams are located, or to support the affected dwellers, thereby defining the project details and pursuit methods accordingly. However, Korea's current support schemes focus on the facilitation of dam construction, without determining whether to define the area concerned or the dwellers as the main target.
- **Insubstantial supports:** Although funds for improving the support system have markedly been enhanced, they are small, compared to national funds for supporting power plants as well as for the development of other areas where submergence of the area concerned is not required and long-lasting negative impact does not arise from the dams concerned. Certain support programs for dam surroundings are no better than some support benefits that other areas equally receive from the government. Also, support programs are focused on the development of public infrastructures, thereby proving no real assistance in increasing the dwellers' income and improving their welfare conditions.
- **Unclear criteria for operating the support system:** Adverse impact of dam construction occurs on the basis of a smaller administrative unit of Myeon, but support programs are carried out on the basis of a larger municipality, meaning that within the same

area concerned, both beneficiary and suffered areas may be created.

- Regional conflicts over the sharing of support costs for Hoengseong Dam surroundings: the two administrative units, Gapcheon-myeon and Cheongil-myeon, disputed over the criteria for sharing support funds (submergence area/affected population) due to the insufficient regulation on support funds sharing among smaller administrative units than the basic municipality.
 - Conflicts over the sharing of support funds for educational and scholarship projects in Andong Dam and Imha Dam surroundings: support funds for scholarship projects were unilaterally provided to all elementary schools within the area concerned irrespective of whether they suffered from the dam construction, thereby inviting complaints of the victim dwellers.
- **Minimum passive regional measures:** Current countermeasures for affected dam surroundings focus on minimizing the negative impact that the dwellers or the area concerned suffers. This approach does not consider the potential value of dams, but only attempts at a minimum use of dams and reservoirs within the legal purposes. This practice appears to try to achieve water quality and dam safety, but eventually downgrades the image of dams, thereby making it difficult to construct dams.

4. IMPROVEMENT MEASURES FOR SUPPORTING PROGRAMS

4.1 Financial size of support and distribution

■ Additional financial aid of the government:

Additional financial aid of the government for flood control, agricultural water, watercourse maintenance water would be a good way to obtain further subsidiary. There are some difficulties for additional endowment of K-water in areas of generation of electric power and water supply as follows:

- Substantially high rate of endowment compared with other support programs
(Surrounding area of a hydroelectric power plant: 3.7%)
- Just 3 years since re-adjustment of the endowment
(Electric generation: 3% → 6%, Water supply: 10% → 20%)
- More burden of general public caused by rise in water price are predicted if K-water donates more endowment

■ Requests of supporting budget in proportion to the dams' endowment:

By adjusting the calculate method for the residents who live surrounding area, the dwellers could get more supporting expense if the dam has more endowment than other dams.

section	current	recommendation	effect
basic subsidy	Fixed amount (23% of total endowment)	Fixed rate (25% of total endowment)	The support budget could be reflected according to the endowment scale.

■ More support expanse:

Residents who live upriver district of dams having more limitation compare with the downriver district dams

claimed more support expanse. When we distribute the support budget, we can increase the support budget by increasing the weights of the drainage area with act limitations.

4.2 Contents of the project

■ Poor decision-making standard:

We would claim the establishment of the guideline for dam surroundings and systematize the guideline and basic aim of the supporting programs to prevent the arbitrary decision of the person who is in charge of the supporting programs. Confusion of the program execution will be prevented through making the standard of the operation based on dam surroundings supporting program, analyzing the each dam's program execution standard and drawing the program execution standard of target, contents and procedure for support.

■ Delay of project execution in the line with the agreement of support project conference:

If the personnel of the council is reduced, we could make decision more quickly.

■ Transfer to the local government, the project of residents' life support and education:

From the result of survey, 82% of the residents prefer K-water to local government so that we can expand our programs through the promotion of the local council.

4.3 Execution of project

■ Feeble evaluation and compensation to the staff:

An incentive system should be established by using evaluation and result of the supporting programs and give the person in

charge reward. Besides, by allocating the special project expense that will make the motivation of the person and increase the efficiency of supporting programs.

4.4 Other improvement measures

■ Utilization of dams and lakes as valuable resources

- Opening of dams and reservoirs to the public and development of eco-friendly and leisure spaces

We need to establish institutions to develop eco-friendly leisure spaces out of dams and lakes within the area concerned. Korea strictly regulates the usage of dams and lakes, compared to the US and Japan. In particular, water source protection areas are more strictly controlled pursuant to the Enforcement Ordinances of the Tap Water Act. To activate the use of dams and lakes, the ministries together need to construct environmental treatment facilities and sewage facilities in the designated water source protection areas prior to the completion of dams.

- Efforts to allure tourists and visitors through promotion of events using dams and reservoirs

To invigorate the development of dam surroundings, we need to develop attractions to allure diverse tourists and visitors by promoting events using dams and reservoirs. Importantly, these events can allure visitors to the area concerned to create economic benefits and improve the image of dams. Thus, these events are hoped to be pushed for rather than by the basic municipality alone, but as a

large scale project with the backing of the local government (the beneficiary of dam construction) and the nation.

- Strengthening the publicity of dams and surroundings

Regional events using dams need to continuously be conducted, and to turn dam surroundings into constant tourist attractions, efforts need to be strengthened to provide the information for using diverse facilities. Primarily, we need to strengthen functions to provide information on diverse facilities, tourist and relaxation resources in dam surroundings. We also endeavor to offer interactive information including internet booking services for camping and accommodation facilities in the dam surroundings. K-water needs to further upgrade its current function to provide this information.

■ Strengthening of the dwellers' income foundations

- Review of current income promotion projects

Current income promotion projects for dam surroundings are categorized into production foundation creation projects under the reshaping projects and income expansion projects under the support programs. Recently funds for reshaping and support programs have been increased, and these two categories involve diverse types of detailed projects relating to income expansion, meaning that success in these pursuits will effectively increase the dwellers' income. However, some problems need to be addressed and to address these problems, ①

we need to review introducing the system of providing cash assistance to the affected dwellers, ② from the stage of selecting dwellers' income expansion projects and production foundation expansion projects, the nation needs to get involved and positively develop new income sources, ③ we need to create new jobs, and ④ we need to supplement the mechanism to better reflect the affected dwellers' opinions with regard to the selection of support programs.

- Diversification of support programs for income expansion

Dam construction and the development of the surroundings change the area's economic structure. Thus, efforts should first be made to change the dwellers' livelihood foundations in order to boost the income of the dwellers in the dam surroundings. However, the dwellers mostly stick to their existing economic activities and thus their efforts alone are limited in developing new livelihood foundations. Thus, dam constructors and managers need to positively lead and support efforts to change the methods of the dwellers' economic activities.

- Development of new jobs for the dwellers

The development and opening of dam surroundings can create new job opportunities for the dwellers. Thus, in the case of the development of leisure spaces out of dams, we need to mandate the hiring of the dwellers with priority with regard to the development of facilities under the reshaping and support programs for the dam surroundings, or we need to review measures to grant the dwellers the rights to sell diverse

products and operate service facilities. Furthermore, we need to review measures to use the dwellers for enlightening the visitors to dams and lakes on environmental conservation or for informing them of regional resources, and to use the area's manpower for environmental reshaping such as the disposal of garbage from lakes.

■ **Securing sustainable and stable life conditions for the dwellers:**

In Korea's most of rural areas, the elderly people account for the large portion of the population, and the dam surroundings are also in this similar situation. Thus, on top of efforts to help increase the dwellers' income, we need very much to develop cultural and welfare systems for these economically inactivated elderly people. Pursuant to the Dam Surroundings Support Act, the current cultural and welfare projects for the dwellers are categorized into welfare and cultural projects under the reshaping projects, and welfare promotion projects, educational projects and supplementary projects under the support programs. Since each of these projects include diverse types of detailed projects, and also the Support program Consultative Committee can determine support programs for the dwellers, the current system is not deemed to need to be amended. Moreover, since funds for support programs and reshaping projects have increased, efforts should focus on not only preparing new reshaping measures but also the effective operation of the existing system. However, the method for operating the system only needs to be improved.

As indicated above, the effective operation of the existing system is deemed to be important like the introduction of new systems to expand the cultural and welfare infrastructure. To that end, we should pay attention to the following two aspects. We need to take effective measures to continue to invest certain portions of the support program costs in improving the dwellers' welfare benefits. We also need to reshape related regulations to allow the affected dwellers in the dam construction to effectively benefit from the welfare system.

5. CONCLUDING REMARKS

Although Korea has built many types of dams under her development plan, but still has a national demands for dam construction. However, dam construction becomes more restricted due to its negative impacts. These depressing impacts can be categorized into ones related to natural environments, and the others related to local dwellers. Impacts on natural environments are very much discussed with a growing concern for the environment, but impacts on the dwellers in the areas concerned are neglected even by related experts. To address these problems, Korean government has conducted support programs for the surroundings of multipurpose dams since the middle of 1990s. With the institution of the Act on Support for Dam Construction Areas and Surroundings, etc. in 1999, the government has pushed support projects for the dwellers and reshaping projects of the dam surroundings. Despite the introduction of the system aiming to support and reshape dam surroundings, however, the dwellers have not felt that they really obtain substantial benefit

from the government's support, which indicates that the existing system needs to be reshuffled and reshaped. Therefore, effective measures need to be introduced to minimize negative impacts of dam construction on the surroundings and dwellers, and to strengthen the foundation for dam construction. K-water surveyed the problems related to current supporting programs, and found improvement measures for dam surroundings and local residents. It will be expected that the programs be more effective for the dwellers to improve the dwellers' welfare and life conditions.

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