A Community-Based Approach for the Environmental Conservation Policy in Korea : Focusing on the Water Quality Improvement Movement of Daepo-chon Residents[1)]

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요 약

본 연구에서는 낙동강 하구의 대포천에서의 주민운동을 분석하여 지역사회가 주도하는 환경운동이 특정 조건이 충족된다면 성공적인 환경관리를 할 수 있는 대안이 될 수 있음을 보여준다.

지역사회기반 환경보호(Community-Based Environmental Protection)는 다양한 명칭으로 표현되고 있으나 지역주민의 주도 하에서 환경보호 및 개선을 이룩하는 것으로 지속가능한 사회를 달성할 수 있는 유용한 환경관리 방안으로 이론적인 지지를 받고 있다. 이 방법은 정부의 강압적인 규제보다 효과적일 수 있으며 지역사회의 다양한 욕구와 환경문제를 동시에 고려하게 되는 장점도 있다. 그러나 이러한 지역기반환경운동이 실재 전개되어 성공하는 경우는 흔하지 않다.

그런데 낙동강 하류의 대포천 사례는 지역주민의 환경규제반대운동이 결국에는 주민의 자발적인 수질개선운동으로 발전하여 실질적인 수질개선효과를 창출하였다. 뿐만 아니라 낙동강특별법의 제정 시에 제도화되어 수질환경정책의 발전에도 기여한 특별한 사례이다. 본 연구는 대포천 사례를 우리 나라 수질관리정책의 종합적인 체계와 연계시켜서 살펴보면서 대포천 인근지역주민의 수질개선운동의 단계적 전개과정을 살펴보고 이 운동이 성공할 수 있었던 요인을 분석하고 있다.

Keywords : Community-based approach, Environmental Protection, Water quality improvement, voluntary movement, Nakdong river

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1) The Original version of this paper was presented at the ASEM symposium on "Toward Good Practices in Public Participation for Sustainable Development" (June 10-12, 2002. Bangkok, Thailand).

Ⅰ. Introduction

The Ministry of Environment, the local residents and government on April 3, 2002 signed a voluntary agreement on improving and preserving water quality of the Daepo-chon (stream) of the Nakdong River system in Korea. It is the first voluntary agreement between the government and local residents on the water quality conservation issues. The agreement is seen as signaling a significant transition from a traditional regulation toward a more collaborative approach to environmental protection in Korea.

Many of today's environmental problems cannot be solved only through traditional direct regulation of government. There is a consensus that a more decentralized and cooperative framework is needed to address the issues such as non-point source pollution, preventing ecological degradation and scientific uncertainty(John, 1994). Furthermore, environmental disputes require coordination across multiple stake-holders with conflicting interests, which also challenges legitimacy and effectiveness of the top-down solution.

Community-based environmental protection (EPA, 1999), communal governance or common-property regime(McKean, 1992 ; Ostrom, 1990 ; Runge, 1986 ; Wade, 1987) have enjoyed widespread support in recent years. It represents the growing tendency in environmental policies towards a bottom-up approach, while reducing government intervention and regulation. These place-based approaches emphasize that in some circumstances, local people can take the initiative and develop options customized to their own needs and desires for resolving environmental problems.

In this article, we will use the community-based management framework to analyze the case of Daepo-chon water quality improvement at, where voluntary efforts of local residents have led to bottom-up changes in drinking water management policy as well as water quality improvement of the community itself. In particular, in this study we will examine the factors that contributed to its success and make policy recommendations for the relevance of its expanded replication.

II. Community-based Environmental Protection : A Theoretical Overview

1. Backgrounds of a Community-Based Approach

The command-and-control approaches have achieved enormous improvements in environmental quality by controlling point-source pollution. However, in many cases, it has revealed additional environmental challenges, which distinguish from those of the earlier decade(John, 1994 ; EPA, 1999). The sources or causes of pollution are often individual behaviors and choices, rather than the actions of a few dozen large corporations.

It is very difficult to implement the regulatory model when there are large numbers of polluters and when it is difficult to monitor each polluter's contribution to environmental problems(John, 1994). The shift of the pollution issues from the production processes to the consumption behaviors such as household waste reduction, and household energy and water saving make the regulatory approach more vulnerable.

Nor is regulation, which is focused on specific results such as clean air and water, and safe disposal of waste, usually adequate to protect ecosystems in danger. Endangered ecosystem problems are quite complex and characterized by a great deal of scientific uncertainty and risk. The causes may have to do with a complex accumulation of degradation in water, land, or air quality. The solutions require an emphasis on pollution prevention, preservation and planning of which impacts cut across environmental media, rather than end-of-pipe fixes and remediation.

Furthermore, not all parts of the country have the same problems or need the same solutions. Environmental problems are local and unique to a region or an area and require tailored solutions, rather than a one-size-fits-all solution(EPA, 1999). Top-down regulation may need higher transaction costs for its implementation and monitoring especially when there needs bargaining among a diverse set of stake-holders.

The idea of sustainable development links the economy and the environment and requires major shifts in the way governments approach to the issues of environment and development. As economic and social impacts are inextricably linked to the environmental impacts, environmental values should be incorporated into decisions about economic goals, rather than treated as a constraint. Addressing sustainability of the community needs a more holistic approach encompassing the long-term welfare of humanity and of ecosystems as well.

Fragmented and coercive approaches cannot effectively address these challenges, which resulted in exploring alternative approaches, examining the role of stakeholder participation including government, localities, and local people, etc., and better ways to balance environmental and economic values.

2. Concepts and Natures of a Community-Based Approach

The place-based and community-driven approaches vary widely depending on the context of literature-for example, community-based environmental protection, common-property regime, communal management, civic environmentalism, watershed approach etc., just to name a few.

Community-based environmental protection(CBEP) of EPA emphasizes collaborative and holistic environmental decision making tailored to meet the needs of specific communities in their efforts to address the remaining environmental challenges(EPA, 1999). Common property management or communal governance in the context of property rights, highlights the existence and potential of user-governance and local-level systems of common-pool resource management (Hanna et al., 1996). Civic environmentalism is another embodiment of challenging the command-and-control model. It tends to focus on more non-regulatory tools and recommends more integrated and bottom-up approaches to overcome fragmentation and confrontation(John, 1994).

There are similarities and differences among them but they share a common understanding that in some cases, top-down and centralized regulation by the government is less effective and efficient due to asymmetric information and strategic behavior of stakeholders which consequently often aggravates the situation rather than solve the problems(Koh, 2001a).

Because the physical characteristics and social institutions governing the natural resources are unique to specific areas, each community will have its own unique approach to addressing problems according to local priorities (Wayland and Lewicki, 1998). They also reflect the observation that communities are able to organize on their own to protect the environment and design a variety of mechanisms to regulate themselves with low cost, without being forced to do so by the government. Despite various characteristics, each of community-based approaches is focused on a defined geographic area or the community and

promotes stakeholder participation(EPA, 1999).

In this article we use the term 'a community-based approach' for a holistic and collaborative approach with the emphasis on community participation to environmental policy.

3. Core Components of the Community-based Approach

1) Focused on a Defined Community's Initiative

The definition of a community is diverse but in general, people composing a community have beliefs and values in common, the relations among them are direct and stable, and mutual monitoring and sanctions are possible(Ostrom and Schlager, 1996 ; Taylor, 1982). The community may be defined not only in geographic or political terms but also in symbolic terms.

People are more likely to support protecting waters to which they feel a connection rather than the more abstract notion of broadly protecting the environment. As they have more accurate knowledge over environmental characteristics, share norms and conflict-resolution mechanisms as well, monitoring and sanctioning may be undertaken not by external authorities but by themselves. Monitoring is a by-product of their own strong motivations to environmental protection(Ostrom, 1990).

2) Multiple Stakeholder's Involvement

A community-based initiative builds local capacity to address community concerns by enabling people to interact with each other through undertaking watershed protection related tasks(Adler, 1995). The rationale for arguments about the benefits of community participation should not just be an instrumental one, namely that the project concerned will be more successful. The goal of genuine participation is to improve the quality of participation instead of its quantity(Maser, 1996).

A community-based approach emphasizes an open, collaborative decision-making process that all stakeholders within a community work together and share responsibilities to identify environmental concerns, set priorities and implement comprehensive solutions. The

definition of a stakeholder means the full range of people who are interested in, are affected by, or could affect activities related to community-based environmental protection efforts(EPA, 1999). It includes governmental agencies at all levels, businesses and industry, environmental NGOs, residents of a defined geographic area or nonresidents who have a common interest in the community's sustainability.

Stake-holder involvement is not about informing, consultation and placation categorized as degrees of tokenism(Arnstein, 1969).[2] A community-based approach seeks citizen control(Arnstein, 1969), self-mobilization(Pimbert and Pretty, 1995), or self-governing (Jeong, 2000) where local people organize themselves and initiate and undertake action on their own behalf with no external assistance.

Successful participation via community-based approach results in 'capacity building' and 'empowerment' to address qualities of the community in the long run. Vesting the shared rights in those who live nearest the natural resource enhances the incentive to protect the resource at the lowest enforcement costs(McKean, 1996).

3) A Bottom-up Environmental Fix

No single set of tools could deal with the particular problems in managing each of the broadly similar, but distinctly different, systems(Ostrom, 1990). A community-based approach seeks to bring the most appropriate public, private, and non-regulatory tools to bear in a community by integrating regulatory and non-regulatory approaches, along with natural resource planning and management efforts(EPA, 1999).

Communities may organize and develop more effective solutions to their concerns, with or without assistance from regulatory agencies. The community is less isolated from local people and quicker to respond to local issues than the government. Centralized expertise frequently fails to respond to specific local conditions due to the lack of knowledge about the local condition.

Much of the essential information has to do with the willingness and motivations of the local communities to carry out their role of the activities necessary for addressing the

2) Arnstein's ladder of participation is quoted frequently throughout the literature of community participation and empowerment, but is also a useful model to apply to the participatory research process itself. Arnstein's ladder has eight 'rungs' from Manipulation at the bottom to Citizen Control at the top.

problems (Ascher and Healy, 1990). A community-based approach accepts that communities can identify the most needed and appropriate tools for their environmental concerns. It challenges the idea that it is always "experts" who know the best about solutions to environmental problems. Indigenously built initiatives stay alert and flexible to particular circumstances.

On the other hand, a variety of tools such as technical assistance, public education and training, assistance programs, and information sharing may help communities address the problems and find solutions which reflect the specific attributes, physical, social, and cultural, of the community. Communities must, as a necessity for shared involvement, be fully informed about their options and the likely consequences of their decisions.

4) Integration of Environmental, Economic and Social Goals

Community-based approach is not focused on a specific environmental medium or problem of the community but takes an integrated and systematic approach, which involves environmental issues and the quality of life as well. Community's initial collective action to protect the environment may start with addressing a single issue like clean water but people progressively recognize connections among the issues within their community.

And this leads to the shifts of time horizon from solving only the immediate problems to pursuing long-term sustainability of the community. A community-based approach considers environmental protection along with human social needs and works toward achieving sustainability, fostering linkages between economic prosperity and environmental well-beings(EPA, 1999).

4. Roles of Governments in the Community-Based Models

The political or physical boundary of community and members of the community may change over time, which makes persistent commitments to environmental protection difficult. The case studies show that people who moved from other communities are not motivated enough to commit themselves to environmental activism.

Moreover, a community-based solution is often dependent on authority granted from central or local government powers(Mccay, 1996 ; Ostrom and Schlager, 1996). The

probability that community-based approach will succeed would be higher, if the larger regime facilitates local self-organization by providing accurate information about ecosystems as well as providing arenas in which participants can engage conflict-resolution processes and mechanisms to backup local monitoring efforts.

This, however, does not legitimize the intervention of central government. The alternative is to nest various types of governance systems, while supporting community level system and retaining its benefits(Ostrom and Schlager, 1996). Each community-based system retains exclusive jurisdiction over its own local issues and affairs, and the larger system serves as a mechanism to support and enhance the viability of community and local level systems, and to exercise authority in areas that its member systems have ceded it.

Ⅲ. Water Conservation Policy and Citizens Participation in Korea

1. Development of Water Pollution Control Policies

Securing clean and safe drinking water is one of the most significant environmental issues in Korea since the late 1980s. Most metropolitan and large cities depend on their tap water sources upon the major five rivers and their estuaries. However, water quality of these rivers worsened due to the increasing emission of industrial water pollutants by rapid urbanization and industrialization since mid 1970s.

After the establishment of the Environment Administration in 1980, the Korean government developed the water quality standards and the effluent standards for industrial sources. The Environment Administration also performed the basic environmental studies to develop the comprehensive water quality conservation plans over the five major river areas during the mid 1980s.

From the end of 1980s and early 1990s, a series of episodes broke out showing how serious water pollutions were. The most salient episode was the phenol leakage accident, happened at the Gumi industrial complex located within the Nakdong river basin in 1991. Worsening water quality of major tap water sources provoked public outcry, which marked an important turning point in water pollution policy in Korea.

Since then, the issues of conserving water quality in the five major rivers have been the

most salient environmental policy agenda. The focus of the water quality improvement policy gradually shifted to the treatment of urban sewage from the control of industrial wastewater.

The Korean government upgraded the Environment Administration to the Ministry of Environment in 1990. While the Water Quality Conservation Law enacted in 1991 provided the national regulatory context for surface water quality, how to mobilize financial resources to construct urban sewage treatment facilities also became the major policy agenda in that time.

In 1996, the Comprehensive Measures for Water Management, which followed the previous Comprehensive Measures to supply Clean Water in 1989, was developed in response to protect the tap water sources. It was a long-term water management plan which combined a 10-year water quality improvement plan and a 15-year water resources plan. These measures were distinguished from earlier ones of 1989 in that they presented financial investment planning and funding support to a specific region to achieve the defined goals.

As shown in <Table 1>, environmental expenditures have dramatically increased since the early 1990s. More than 60% of the expenditures went to water pollution areas to expand water pollution control infrastructures. In spite of government's efforts and increasing investment in the five major rivers, water quality was not drastically improved. The effect of pollution control by expanded basic environmental facilities was traded off by increasing pollutants caused by loosened land use regulation. The democratization of society and the increased environmental awareness of people brought in two contradictory demands : clean water supply and loosened land use regulation.

The government developed the Special Act for Watershed Water Quality Conservation in 1997 in order to overcome the limitations of the existing measures and to meet strong demands of people for safe and clean water supply. The national government's meticulous plans, however, confronted with tough resistance from residents in the upstream areas of the major rivers. They protested that the plans would deprive them of the opportunity for economic growth due to strengthened regulation.

Coping with strong protest from localities, the Korean government managed to develop the 4 special laws to improve water quality of the five major rivers. The 'Han River Law' was enacted in 1999 and the three special laws for four other major rivers in 2002.

Designed with close consultation among various stakeholders, these special laws include many new policy tools differentiated from earlier laws(Ministry of Environment, 2002).

<Table 1> Environmental Expenditures in the Public Sector

(Unit : Billion Won)

	1992	1993	1994	1995	1996	1997	1998	1999	2000
Air Pollution	21.4	22.8	30.0	30.4	36.6	38.1	40.5	39.5	78.6
Investment	2.4	2.4	4.4	4.2	9.5	9.9	11.2	10.1	51
O/M	19	20.4	25.6	26.2	27.1	28.2	29.3	29.4	27.6
Water/Soil	1,145.7	1,290.3	1,449.7	1,721.6	1,980.2	2,726.3	2,249.0	2,464.7	2,375.3
Investment	961.3	1,082.70	1,167.00	1,339.30	1,552.40	2,246.60	1,763.50	1,942.90	1,860.60
O/M	184.4	207.6	282.7	382.3	427.8	479.7	485.5	521.8	514.7
Waste	696.7	826.2	961.3	1,094.9	1,266.5	1,469.5	1,661.3	1,799.1	1,631.3
Investment	193.5	256.6	303.8	355.4	383.8	423.2	532.8	553.9	292.6
O/M	503.2	569.6	657.5	739.5	882.7	1,046.30	1,128.50	1,245.20	1,338.70
Noise/Vibration	14.2	17.7	16.9	19.1	21.8	26.6	13.5	11.3	4.8
Investment	6.2	5.7	4.6	6.4	7.2	10.3	6.6	5.6	1.8
O/M	8	12	12.3	12.7	14.6	16.3	6.9	5.7	3
Others	33.5	34.3	43.7	77.1	72.4	77.8	83.6	83.4	86.8
Investment	2.1	1.4	8.1	26.3	22.6	23.9	17	15.8	12.2
O/M	31.4	32.9	35.6	50.8	49.8	53.9	66.6	67.6	74.6
Total	1,910.3	2,188.9	2,498.6	2,928.1	3,366.9	4,327.1	4,032.5	4,380.6	4,158.8
Investment	1165.5	1348.8	1487.9	1731.6	1975.5	2713.9	2331.1	2528.3	2218.2
O/M	744.8	840.1	1010.7	1196.5	1391.4	1613.2	1701.4	1852.3	1940.6

Source : The Bank of Korea, 2001, *Estimates of Environmental Pollution Control Expenditures in the Year 2000. http://www.bok.or.kr.*

2. Citizen Participation in the Water Quality Policy Development

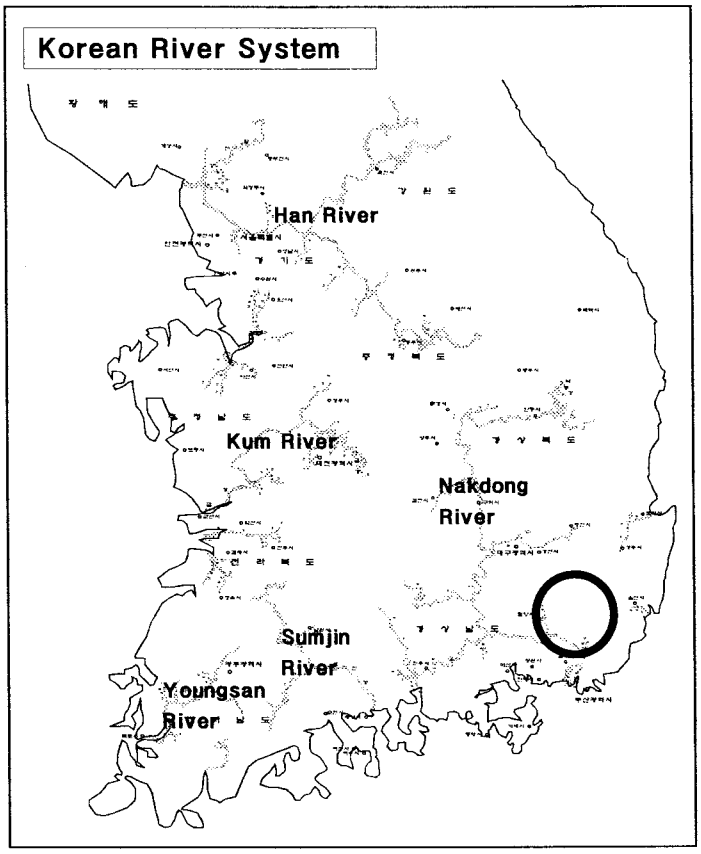
The citizen involvement in the development of water quality conservation policy started with the increasing distrust on the quality and safety of tap water since the mid 1980s. Although there was extreme suppression on any social movement by military dictatorship until the late 1980s, health concerns from the serious deterioration of tap water sources brought out activities of residents such as petition, protest, demonstration, etc..

Along with the collapse of military dictatorship in the late 1980s and the occurrence of various environmental accidents in the early 1990s, citizen participation in the environmental policy

process has been rapidly expanded. With the moods of democratization, a lot of environmental NGOs have organized to influence development-oriented government policy.

During the 1990s when Korean society had great momentum for political democratization, the Korean government adopted many citizen participation mechanisms in various environmental policy areas, including water pollution control policy(Jeong, 2000). However, most of these mechanisms are designed to promote public relationship and receive policy advices from environmental experts.

Institutionalized citizen participations initiated by national government have gradually expanded to local governments. The introduction of local autonomy in the mid 1990s has provided an additional impulse to the evolution of citizens participation in the environmental policy process. Many local governments have developed their own Local Agenda 21 organizing its own Citizens Association in the process since the late 1990s.



<Figure 1> Korean River System Focused on 5 Major River

In 1999, Korea enacted the Act for Water Quality Improvement and Community Support for Han River Basin through close consultation and bargaining among various stakeholders. Two years later in 2002, the same but much labored process gave finally birth to the Acts relating to Water Resource Management and Community Support for the four major rivers-Nakdong, Geum, Yeong San and Sumjin Rivers.

The attempt to develop the 4 special laws to improve water quality of 5 major rivers have a momentum to develop the community-based, bottom-up approaches to water quality protection as following chapters will show.

3. Core Contents of 4 Special Acts for 5 Major Rivers

The enactment of 4 Special Acts for 5 major rivers marked the transition of Korean environmental policy towards a more collaborative and systematic approaches moving away from the past strict regulatory approaches. These laws have the following characteristics.

First, the laws are the results of collaborative efforts committed by various stakeholders to enhance water quality. Despite conflicting interests and divergent perspectives of residents in upstream and downstream, urban and rural areas, and mainstream and tributary regions, the consensus was reached through numerous meetings and dialogues among the Ministry of Environment, local governments, environmental NGOs, religious groups, experts and resident representatives(Ministry of Environment, 2002).

Second, the focused area of water quality management is switched from an administrative jurisdiction to watershed and each act reflects different local conditions. The watershed-based approach can address overlapping and conflicting responsibilities of several local governments over a single body of water. With limited authority and functions, each Watershed Management Committee has the mandate of coordinating all major water resource management policies and conflicting interests between upstream and downstream local governments.[3)]

Thirdly, the laws move away from the end of pipe to a more preventive approach including land use regulation. Areas covering about from 300m to 1km surrounding the

3) The Committee consists of the Minister of Environment and consisting of heads of local and provincial governments, the Vice-Minister of Construction and Transportation, the President of the Korea Water Resource Corporation, etc..

water source or dams are designated as a riparian buffer zone. In the riparian buffer zone, the construction and location of certain facilities such as restaurants, livestock buildings, and factories are strictly refrained. The restriction is also imposed on the use of pesticides and fertilizers in both public and private lands near the rivers to address non-point source pollution. In case city mayors or county executives do not designate water source protection area, provincial governors will have the authority to enforce it.

Lastly, a cost-sharing system based on the Beneficiary Pays Principle is introduced to finance increasing demand for environmental facilities and to compensate the economic loss of upper river residents accrued from the stricter land use regulation. In this system, the water use charges imposed on downstream residents are used to support the upstream residents in compensation for disadvantages due to land use restrictions, in part to fund the series of infrastructure investments and buying lands for riparian buffer zones, etc. The fund will function as an active compensation mechanism for water quality improvement efforts of the upstream residents and for the sustainable development of the community in the long run (Koh, 2001b).

Ⅳ. A Study on the Residents Movement of Daepo-Chon Water Quality Improvement

1. General Description

The area of case study, the Daepo-chon(stream) belongs to the Nakdong River system, the east and south coast watershed and supplies water to approximately 13 million residents of South and North Kyongsang Provinces. The Nakdong River is 521.5㎞, which is the longest but has the least annual precipitation of 1,137mm among five major rivers. The quality of water in the Nakdong River is normally at the second of five grade scale, but it falls to third and fourth during the dry season. Frequent droughts and drinking water pollution accidents in 1991 and 1994 have left the largest river basin in the nation averaging from 1ppm in BOD to as high as 5.5ppm along various points.

Daepo-chon is a local river which is located in the downmost stream of the Nakdong River. The area is characterized by four water pumping stations. including Maeri with the capacity of 1 million~1.5 million tons/day and Moolgum with the capacity of 600,000

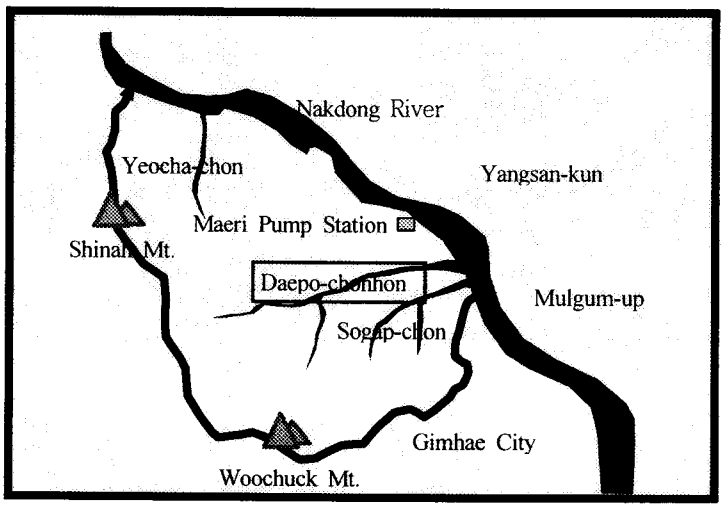
tons/day which serve as water supply source of the City of Gimhae and the Metropolitan City of Busan. Daepo-chon is 8.9km long and 3,098 residents of Sangdong village are living in the basin. As shown in <Table 2>, the main pollutants of Daepo-chon come from 136 small manufacturing factories. and livestock industry in which 111 farm houses engage. Until 1997, numerous water polluters, such as 10 towns with 4,300 population, livestock industries, factories and restaurants near Daepo-chon have degraded water quality.

<Table 2> General Description of Daepo-chon

location	length	width	basin area	pollution source		
				population	livestock farmhouse	factories
Sangdong village in Gimhae City	8.9km	30-70m	45.8㎢	3,098	111	136

Source : Gimhae City Committee and Sangdong Village Committee for Water Quality Improvement, 2002, p.53.

The government's plan to enforce the regulation in the area triggered voluntary mobilization of local people to improve water quality. The BOD level of the river improved to level I from level Ⅲ-Ⅳ and endangered fish and clams reappeared. The case of Daepo-chon is a good example that the community's resistance movement against regulation developed into self-governance addressing environmental problems and long-term well-being of the community as well.



<Figure 2> The Case Area

2. From Resistance to Self-governance for Water Quality Issues[4)]

The progress of collective action in Daepo-chon can be divided into five stages: 1) outside threat to the residents' economic interests, 2) residents' resistance movement to secure their interests, 3) residents' voluntary efforts to improve water quality, 4) securing confidence and consensus from outside players, 5) institutionalization of the community-based model.

1) Stage 1 : Outside Threat on the Residents' Common Interest (Before Feb. 1997)

In 1997, the Ministry of Environment announced the enactment of the Special Act for Watershed Water Quality Conservation to improve water quality of the five major rivers. Along with the law the ministry also planned to designate 10 villages including Sangdong village of Gimhae City as Tap Water Source Protection Zone (hereafter, TWSPZ). The designation of Sandong village as the TWSPZ is a way to enhance water quality of the Nakdong river whose water quality is one of the worst among 5 major rivers. If an area is designated as a protection zone, it would have to confront with strict land use restrictions.

2) Stage 2 : Residents' Resistance Movement to Secure Their Interests (From Feb. 1997 to July 1997)

The government's plan provoked an immediate protest of related upstream stakeholders nationwide. Residents of Daepo-chon also organized the Committee along with other communities in the neighborhood to resist being designated as the TWSPZ and protested against the Act itself. They requested the government to withdraw the act and to provide compensation measures for residents of regulated areas. They also joined with communities along the Han River watershed in publicizing unfairness of the act. The protest successfully finished in July 1999, with the promise of the government that it would postpone enactment until consensus across multiple stakeholders was reached.

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4) The progress of community participation in Daepo-chon is based on interviews, related daily newspapers and documents.

3) Stage 3 : Residents' Voluntary Efforts to Improve Water Quality (From August 1997 to December 1998)

Along with opposition activism against the Act, the residents in Sangdong village decided to take initiative to save Daepo-chon before government's strong regulation put in effect. The Committee against designation of the TWSPZ was developed into the Committee for Improving Water Quality (CIWQ, hereafter Committee), which was composed of village leaders, representatives of social organizations and businesses, and other groups. The Committee emphasized economic damages and inconveniences anticipated from the potential regulation to promote community commitments to the clean-up project of Daepo-chon. Some of the Committee actually visited the neighbor community which was already designated as the TWSPZ to experience virtual impact of regulation on the community.

War against water pollution was launched and all the residents were encouraged to participate in the efforts to improve water quality. The Committee developed the water protection program and started with cleaning up the bottom of the river on a regular basis to which about 4,000 residents made commitment. It was also widely recognized that the end-of-the-pipe cleaning activities alone were not sufficient to achieve intended goals and that preventive measures to reduce pollutants discharge were needed. Residents of Sangdong village put into practice environmental guidelines in everyday life such as reducing usage of synthetic detergent and operation of washing machines, saving water, etc..

Although increasing number of small manufacturing factories were the significant pollution sources of Daepo-chon, they had little interest in cleanup movement of the community. Polluting factories were also forced to clean the responsible section of the river by the Committee. They also raised 30 million community fund for supporting activities to address water issues to which every household contributed allotted money.

Two monitors were employed to detect violation of pollution sources along Daepo-chon. In addition, three voluntary monitoring teams each composed of six people patrolled around the area to watch possible pollution accidents, especially around mid-night. The number of violations detected by the Committee accounted for 36.1% of the total (Gimhae City Committee and Sangdong village Committee for Water Quality Improvement, 2002).

Persistent monitoring helped preventing pollution.

These voluntary efforts of residents finally produced tangible results by upgrading water quality from the fourth level of BOD in 1997 to the first level in 1998.

4) Stage 4 : Securing Confidence and Consensus from Outside Players (From January 1999 to December 2001)

The community's self-mobilization focused on addressing immediate problems and actual improvement of water quality has drawn confidence from many other stake-holders and neighboring communities. This helped build broader partnerships with the government, local and central, and other communities. Local environmental awareness was incorporated into a community's long-term decision-making along with the recognition of the larger water system Daepo-chon is embedded in.

The successful story of Daepo-chon reproduced another self-governance for environmental protection in other neighbor communities. The Committee for Water Quality Improvement (CWQI) was organized individually in 4 communities along Hwapo-chon of Gimhae city which is much longer(16km) than Daepo-chon, and populated with more than 50,000 people. The Association composed of 5 Committees including Daepo-chon provides a decision-making framework encompassing economic development of the communities as well as water quality issues.

<Table 3> Local Government's Financial Assistance to Daepo-Chon Area

(unit : thousand won)

	'97	'98	'99	'00	'01	'02. 3
food waste treatment equipment	-	-	5,432	-	-	-
monitoring employee	-	7,500	7,500	7,500	7,500	7,500
village sewage system	-	-	-	-	448,000	-
sewage treatment equipments	-	-	150,000	15,000	63,000	343,000
subsidy for the Committee	-	-	-	4,000	4,000	4,000

Source : extracted from Gimhae City Committee and Sangdong Village Committee for Water Quality Improvement, 2002, p.32-33

In 1998, assessing tangible performance of voluntary efforts, central and local authorities began to pay attention to the community's potential to organize themselves to deal with

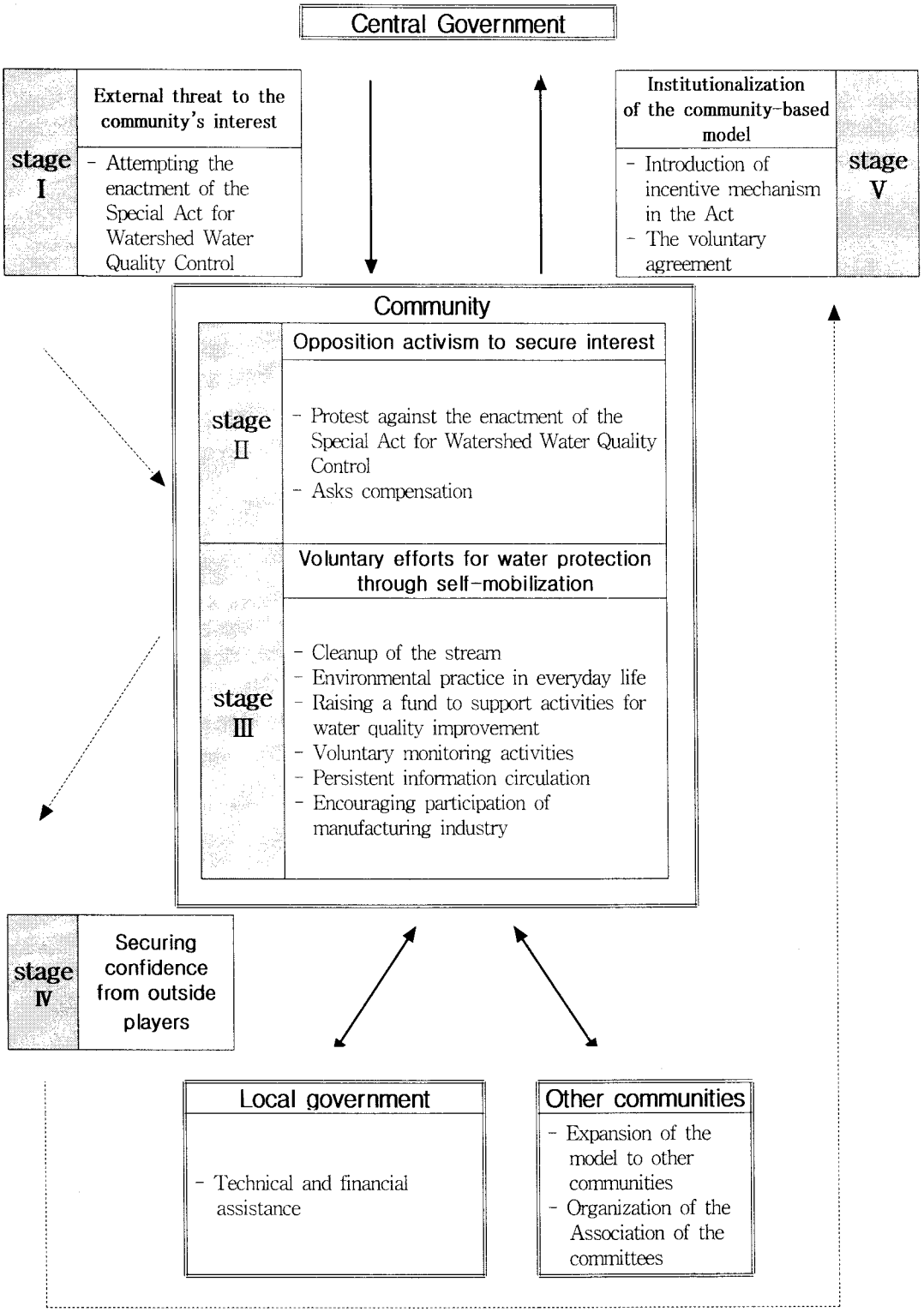
water pollution. Gimhae city provided financial and administrative assistance within a framework of community's self-governance. In order to address water pollution problems due to food waste, the treatment equipments were installed for households and restaurants located near the river. Gimhae city also granted subsidy for employment of monitors, which was originally financed from the community fund, and for the Committee activities(<Table 3>).

5) Stage 5 : Institutionalization of the Community-Based Model (After January 2002)

The Ministry of Environment also supported community-based environmental protection of the Daepo-chon people moving away from regulation-oriented approach. Korean Government institutionalized the incentive mechanism to promote community participation in water protection when enacting the Act related to Water Resource Management and Community Support for Nakdong River, which was passed national congress in 2002. The act secures that the community managing water quality in accordance with the required level is exempted from regulations.

In April 3, 2002, the Ministry of Environment, local residents and governments finally signed a voluntary agreement on improving and preserving water quality of Daepo-chon (stream). The signature means that the residents' voluntary water quality protection movement has been institutionalized as a community-based environmental protection system. The agreement enables upstream local residents to receive a series of waivers from the regulatory requirements. Instead, the government provides financial and technical supports for local residents' activities to enhance watershed protection as long as the standard of water quality set by the government is satisfied. It is the first voluntary agreement made between the government and local residents as well as the first one in the area of water pollution.[5)]

5) In Korea, the voluntary agreement has been partly applied to the sectors of air pollution and toxic waste, of which the main target group is the polluting industry. Refer to Jeong et al.(2000) in detail.



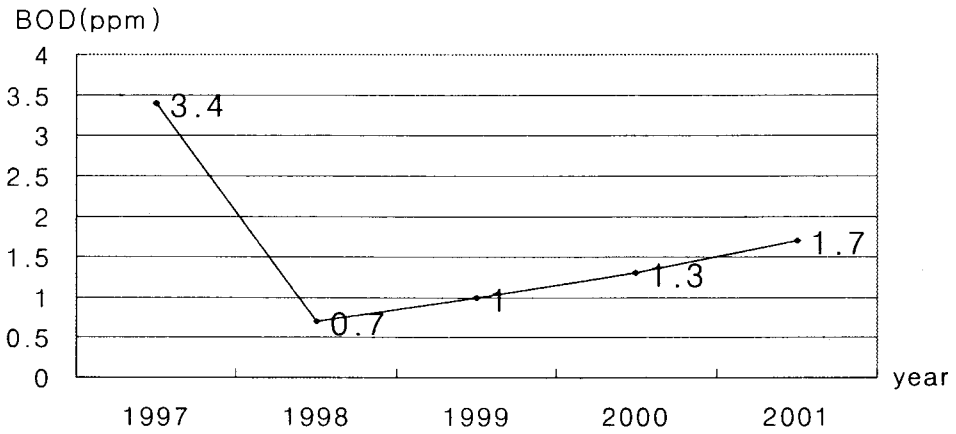
<Figure 3> The Progress of Daepo-chon's Water Quality Improvement Movement

3. Major Outcomes and New Challenges

1) Meaningful Outcomes of the Residents' Movement

The performance of Daepo-chon people could be assessed in four aspects ; environmental outcomes, capacity building of the community, bottom-up change in water quality preservation policy and replication of the model.

First, thanks to voluntary conservation efforts of local people, the water quality level of Daepo-chon has been upgraded from level III-IV in 1997 to level I in 1999. Environmental outcome is vital to enduring commitment because people must be aware of changes affected as a result of their participation. Initiated by the community, the movement of saving Daepo-chon has achieved its intended goal, 'measurable improvements in water quality'.



Source : Gimhae City, 2002, Documents.

<Figure 4> Trends of Water Quality in Daepo-chon

Second, the intangible outcome was attitudinal changes of people involved in the initiative. The initiative improved local capacity to protect water resources and promoted shared responsibility for watershed conservation and management through outreach and education. Water conservation efforts were initially confronted with opposition of some residents, who were pessimistic about the outcome and did not want to take on the inconveniences. A number of campaigns, education and newsletters succeeded in persuading

them to join the efforts. They became more vigilant of water quality through such participation and shared learning. Residents' self-governance builds a 'sense of stewardship' (EPA, 1999) and 'social capital'(Ostrom, Schroeder and Wynne, 1993 ; McCay, 1996) to address problems on their own.

Third, the residents' efforts brought about bottom-up changes in water conservation policy in Korea. The collective action was a great success, which changed the perceptions of policy makers about the effectiveness of residents' initiative to address water pollution. The voluntary agreement is significant in that local people are empowered to make decisions that affect water conservation as long as water quality goal negotiated is satisfied. In return for their efforts, the governments, central and local, grant local people financial support for their activities. The intended land use regulations has been postponed on the conditions that the water quality of Daepo-chon satisfied the standard set by government.

Fourth, the case of Daepo-chon is being bench-marked by other communities along Hwapo-chon, which is much longer and more populated, as both effective and efficient ways to enhance water quality. A single community's efforts may fail without similar efforts to address the problem in neighboring communities or within the entire watershed.

2) New Challenges to Maintain Water Quality

Despite the advances achieved and their undoubted impact on water quality, some problems remain. A major concern in the case area is the rapid increases of polluters, especially the small manufacturing business. Voluntary conservation efforts enabled the community to receive waivers from regulatory requirements but paradoxically, it encourages polluters to move into the area. In 1997 there were 326 factories located along Daepo-chon, but more than 500 in 2002. <Figure 4> shows that water quality is deteriorating.

A key problem is that small manufacturing industry is the main cause of current water pollution, but it is not easy to motivate the polluting factories toward water protection efforts. Many of them have little interest in water quality preservation, not to speak of community's sustainability. As they are small-sized and moved from larger neighboring cities because of low land prices, they do not feel attached to the community. Cooperation of polluting factories remains an unfinished task.

Another problem is the increasing number of tourists. Thanks to the heavy coverage of

mass media, Daepo-chon's successful story is getting known to the public and a growing number of people visit to Daepo-chon area for leisure activities. The large volume of wastes that the visitors left is emerging as a new pollution source harming community's clean-up efforts.

V. Factors Affecting the Success of the Community-Based Model

The case of Daepo-chon made a successful model to environmental protection that communities and environmental groups are trying to follow. The story marked a significance in the history of Korean environmental policy. In the section, we will assess the major factors affecting the success of Daepo-chon's self-governance in the context of community-based approach.

1. Homogeneity of the Community and Strong Partnership

The key factors of the successful collective action in Daepo-chon are mostly derived from the homogeneous characteristics of the community.

The community is homogeneous because about 90% of the population of single Sangdong village reside along Daepo-chon. People are linked by membership in the same community and therefore share common understanding about identified water problems. The defined area is not large so that people can recognize the scope of their efforts to improve water quality. Moreover, the 'facts' about the condition of the watershed are clear and uncontested and point unambiguously to a set of actions that must be taken.

The homogeneity helped to build the strong partnership among diverse stake-holders. The Committee for Improving Water Quality composed of most stake-holders in Daepo-chon area showed excellent capacity in mobilizing residents' active participation in planning, implementing and managing conservation actions themselves (Fortmann et al., 2001). The Committee composed of various stake-holders such as village leaders, representatives of the Association for Prosperity of Sangdong village and of social organizations, and business, etc. The Committee is empowered to make decisions of community concerns that affect local people's lives through multiple stake-holders' collaborative participation

2. Well-Defined Issue and Good Information Manipulation Skill

Community-movement can be unstable because the people involved in a particular project change over time. One year's efforts of local people in Daepo-chon made a great success, causing significant improvement of water quality. Potential threats and uncertainty of water pollution, however, challenge perceptions that one-shot efforts are sufficient to save water. Maintaining once enhanced water quality level is a more tough job. Local people of Daepo-chon made prolonged commitments in regular cleanup activity and consistently remained vigilant of water quality.

The Committee tried to promote the information, education and communication to enhance awareness and understandings of water condition, which encouraged all members to share responsibility for stewarding the watershed (Chong, 1991). Residents involved in numerous activities for water quality conservation continued to commit themselves long after their intended goal was achieved. The coverage of mass media also played a significant role in encouraging enduring commitment by publicizing as a meaningful model, which in turn stimulated local people's further involvement.

3. Good Action Plans and Flexibility to New Problems

The simple but well designed action plans and the flexibility to response turbulent situations are necessary for the smooth working of the voluntary system.

The action programs developed by the Committee was crucial to improve water quality and encouraged the involvement of stake-holders. All residents were mobilized to cleanup the river twice a month and practiced environmental precautionary guidelines to reduce emissions in everyday life. A monthly residents' meeting for saving water and a news letters campaign provided people with information about water conditions and issues needed to be addressed as well as to educate them to stay vigilant of the program.

There were crisis when two accidents took place in 2000 that wastewater discharged from cracked livestock wastewater storage tank polluted Daepo-chon, which almost made previous efforts of local people in vain. Confronted with the crisis, the Committee quickly organized a special inspection team to monitor untreated wastewater even at rainy days and at nights. Some place-specific solutions were also applied such as simplified food waste

treatment equipments and planting dropworts to treat sewage naturally.

4. Integrating the Environment to Economic Interests

The original motivation of the Daepo-chon residents' water quality improvement movement had its root on the protection of economic interests (i.e., fall in land prices) that could be harmed by the designation of the TWSPZ. In Daepo-chon case, that was major economic loss without clean water. The residents' voluntary activities for water quality improvement were also promoted by the residents' worry about their economic loss.

This implies the importance of integrating the environment to economic interests. Under the common economic interests, the community could organize and maintain the strong partnership. Accordingly, integration of the environmental conservation to economic motives can be a very important element of successful community-based environmental management system.

5. Importance of Local/Central Governments as a Facilitator

The case of Daepo-chon emphasizes the government, local or central, as the facilitator to enhance the capacity of the community to manage its own water system (EPA, 1999 ; John, 1994). In Daepo-chon case, the local government provided financial and technical assistance for facilities to treat sewage and food waste as well as monitoring for polluters. It also grants subsidies to support the activities of the Committee. The Ministry of Environment also appreciated self-mobilized efforts of the Daepo-chon people and made a voluntary agreement.

Confident from the success, Korean governments tries to change their roles from regulators to the facilitators. For example, Gimhae city plans to designate the entire area of jurisdiction as environmental agriculture zone until 2005. The zoning would be expected to increase residents' income through quality agricultural products and address non-point source pollution as well. The Fund financed by the water use charges will also be allocated to the projects compatible to meet the imposed water quality goals.

VI. Concluding Remarks

The Daepo-chon case demonstrates that a community-based approach is emerging as a persuasive and efficient way of addressing many environmental problems. Community-based bottom-up solutions in Daepo-chon can prove to be cost effective compared with strict regulation. The voluntary agreement reflects the shared conviction of the authorities and watershed residents that voluntary partnerships can also protect water quality as effectively as regulatory restrictions.

However, this doesn't mean that it is a replacement for traditional regulatory policies. It is rather a complement that increases the effectiveness of regulation-oriented model. Daepo-chon's self-governance is not, in fact, truly voluntary, in the sense that it operates under a more or less explicit threat of external intervention by some other governmental level. The community knows that if they do not somehow protect water quality, the regulations will be imposed, which functions as a credible threat to maintain an enduring participation of the community (Woolley and McGinnis, 1999).

Contrary to the common argument that small scale self-governance is not replicable because it is too specific and that it is fragile due to externality, Daepo-chon case shows the possibility of duplication in case some conditions are satisfied ; for example, homogeneity of community and strong partnership, well-defined issue and good information manipulation skill, well-designed action plans and flexibility of alternative choice, strong economic rewards for the environmental protection, good facilitating roles of governments, etc.

This study witnessed that residents' self environmental governance can work very effectively to protect the clean water under certain conditions. However, it should be kept in mind that local residents' voluntary participation is a necessary condition but not a sufficient condition to a successful environmental protection. The overall progress in the environmental awareness in the whole society would be the bottom line for the sustainable environmental management.

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