

An Institutional Approach to River Basin Management: Conflict Resolution in the U. S. and South Korea

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<Contents>

- I. Conflict Resolution**
- II. The Cases: Toward Sustainability**
- III. Lessons from the Comparative Cases**

Abstract

We juxtapose river basin management practices in both the U.S. and South Korea to learn how multi-stakeholder conflicts are resolved under varying policy contexts. The cross-cultural comparison likewise enables an evaluation of conflict resolution as a means for producing socio-politically acceptable, economically sound, technologically feasible and environmentally viable delivery of safe drinking water. It is argued that conflict resolution enhances opportunities to achieve sustainability in river basin management despite very different policy and cultural circumstances. Two U.S. cases reviewed: the Delaware River Basin Commission (established in 1961) and the Susquehanna River Basin Commission (established in 1973). The two South Korean river basin cases under review are the Han and Nakdong Rivers.

KEY TERMS: river basin management, conflict resolution, sustainability.

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I. Conflict Resolution

Conflict is inherent in river basin management, wherein diverse “stakes” are held, multi-purpose resources are shared, political leaders answer to many forces both within and beyond the basin, and heterogeneous visions of the past, present and future often collide. Conflict mitigation is a core element of basin management and policy making. Murphy and Sabadell (1986) suggest that decision makers (in various countries) have at their disposal legal bases for agreements accompanied by hydrologic and economic models to produce “equitable water allocations.” The authors go on to state that the gap needing to be filled is a tool for testing the *political* aspects of proposed solutions to conflicts. The authors propose a theoretical model to address this issue by measuring the impact of individual country’s political decisions upon the negotiations between them.

McGinnis et al propose that “long-term watershed planning requires rebuilding a community-based infrastructure that can support important social and bioregional networks and partnerships” (1999: 1). These authors concede the importance of a formalized process of collaborative decision-making and conflict resolution. Their suggested decision making model focuses on three issues: reliance upon scientific information; neutral facilitation and mediation (including issue audits); and public participation. Based on actual data from stakeholder assessments conducted in North Carolina, Smutko et al. (2002) indicates how individual interests or preferences affect stakeholder participation. A factor such as level of uncertainty can increase the need for collaboration but can, at the same time, decrease willingness to engage. Conversely, the need for collaboration can decrease as clarity increases while willingness to engage may increase as the problem becomes clear. Other factors like risk and urgency of decision show a positive relationship between need for collaboration and willingness to engage. In sum, Smutko et al. conclude that citizens are more likely to get involved when they perceive an issue to pose some type of threat to their well-being.

Leach and Pelkey (2001) looked at how to make watershed partnerships work by reviewing the empirical literature on the subject to generalize what has been learned and suggest paths for future research. After reviewing a compilation of 37 studies on the issue, they were able to draw out 210 conclusions that were further simplified into 28 themes. Through a factor analysis carried out using Sorensen’s similarity index, Leach and Pelkey were able to explain 95 percent of variance in themes based on four broad factors. Factor 1, resources and scope, explains 24% of variance and suggests odds of a successful outcome are enhanced when a partnership has adequate time, abundant resources, and a limited scope. Factor 2, flexibility and informality, explains 21% of variance and stresses the fact that a

partnership's strength is its ability to provide a flexible, informal alternative to traditional forms of resource management. Factor 3, alternative dispute resolution, explains 33% of variance (including funding) and describes methods that partnerships can employ when participating in negotiation or resolution processes. Factor 4, institutional analysis and development, explains 17% of variance and uses a "rational actor" model of collective action to explain why some communities overcome the desire to "free ride" and effectively manage common resources.

Building on the findings of Leach and Pelkey, we investigate how conflict resolution can enhance opportunities to achieve sustainability in river basin management. Conflict resolution, for the purpose of this paper, is characterized as an institutionalized method of mitigating conflicts through transparent, democratic and participatory "social transactions" or "trade-offs." Sustainability is defined here as a measure of the potential to enhance current and future water quality and quantity (W) in a given river basin through balanced consideration of social-political equity (E), ecological viability (E) and economic development (E), or WE^3 . Conflict is considered to be resolved when WE^3 is balanced.

Conflicts in regional river basin management can arise among coalitions representing economic, environmental and socio-political interests as shown in Figure 1. Coalitions can be formed in private and/or public entities when their members share interests. One root cause of conflict can be when upstream efforts to achieve economic goals are detrimental to downstream stakeholders' water quality and quantity. Conflict resolution is a process of addressing such differences among stakeholders aims (WE^3) so that the outcome is sustainable water. "Sustainable water" is defined here as socio-politically equitable, economically efficient, and ecologically viable water management outcomes.

To analyze a WE^3 approach, conflict resolution cases are examined using two U.S. and two South

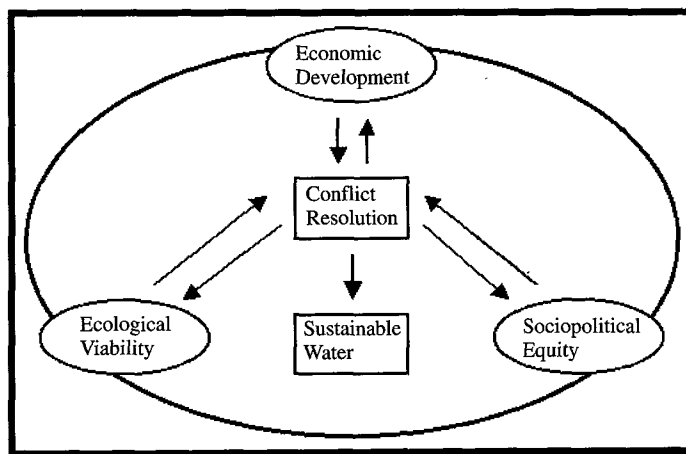


Figure 1. In Institutional Framework of WE^3 : Toward a Sustainable Regional River Basin Management

Korean river basins. After a brief introduction of a sustainable river basin management framework, Delaware River Basin (established in 1961) and Susquehanna River Basin (established in 1973) are first reviewed and then two South Korean cases, Nakdong River Basin and Han River basin, are evaluated. Comparative evaluations of both U.S. and South Korean cases are offered on the basis of the WE³ framework at the end of the paper.

II. The Cases: Toward Sustainability

1. The Delaware River Basin

On October 27, 1961, for the first time since the nation's birth, the federal government and four states (Delaware, New Jersey, New York and Pennsylvania) joined together as equal partners in a river basin planning, development and regulatory agency named the Delaware River Basin Commission (DRBC). The Delaware River, 330 miles in length, directly affects an area of over 13,539 sq. miles. Due to the high population density along the river, approximately 10% of the population of the United States relies on obtaining drinking water from the Delaware River Basin. Since 1961, the DRBC, represented by the governors of the 4 participatory states and a federal designee, has been charged with the duties of water quality protection, water supply allocation, regulatory review (permitting), water conservation initiatives, watershed planning, drought management, flood control, and recreation (DRBC website, 2002). Given the number of stakeholder interests that exist throughout the watershed, it is not uncommon for the DRBC to come into conflict with local citizens and advocacy groups.

The Conflict

In 1966, the Pennsylvania Department of Forests and Water, the U.S. Department of Agriculture Soil Conservation Service, and the counties of Bucks and Montgomery in Pennsylvania prepared a joint study and report on water supply in the Neshaminy Creek Basin. The report considered the construction of a series of ten flood-control and/or multipurpose dams on the Neshaminy Creek and its tributaries and two pumping stations, one at Point Pleasant and the other at Yardley. Water was to be used for public use at Chalfont, Pennsylvania. The fundamental concept and project were approved by the Delaware River Basin Commission (DRBC) on October 26, 1966 (Delaware Water Emergency Group, et al., 1981).

In 1974, the Nuclear Regulatory Commission granted a construction permit to the Philadelphia Electric Company (PECO) for the Limerick nuclear generation plant. The permit contained a provision for withdrawal of water from the Delaware River at Point Pleasant, and transportation of it through the use of transmission lines and the natural water course of the Perkiomen Creek Watershed to the plant as additional cooling water. In 1981, the DRBC approved the Neshaminy Water Resources Authority's

(NWRA) and PECO's application for the projects, which represented final approval for the construction of the pumping station, the conduits, and the water-treatment facilities, as originally contemplated in 1966. The DRBC's approval of the Point Pleasant pumping station project caused an environmental coalition to rally against the proposed projects. The proposed discharge of river water into the relatively clean headwaters of two Bucks County streams caused outrage, as did the use of water resources for cooling purposes of nuclear facilities. However, one of the most contested aspects of the projects was the use of a 'negative declaration' to accept a project. From the point of view of PECO and NWRA, all environmental issues were fully considered in prior environmental impact statements, and present facilities authorized by DRBC approvals merely downscale the size of previously approved projects. Because the smaller size will have less adverse impacts on the environment, the defendants asserted that the negative declaration was fully justified.

Litigation was used by citizens to challenge the validity of approvals granted by the DRBC because they believed that the "negative declaration" was a failure of DRBC to have an updated environmental impact statement (EIS) prepared. On the other hand, the defendants asserted that every environmental impact had been fully studied and was carefully considered by DRBC in the environmental assessment prepared for the present applications. There was more than adequate public notice and participation, all appropriate governmental agencies had been notified, and the responses of the agencies were carefully considered prior to the approvals. The judge overseeing the case concluded the proceedings by stating, "Under the circumstances of this case, the decision of DRBC approving the applications of NWRA and PECO by way of a 'negative declaration' and without preparing another final environmental impact statement (FEIS) was a reasonable determination based upon the facts presented to it" (quoted in Delaware Water Emergency Group, et al., 1981). Thus, in 1983, construction of the Point Pleasant pump began after two decades.

Following the beginning of construction, the opposition only became stronger. In 1983, Del-Aware Unlimited emerged as the leader of opposition to the project. They were able to get a non-binding referendum question on the ballot in Bucks County (whose taxpayers would front the money to build the system) as to whether the constituents supported the construction. A 56% to 44% vote killed the Point Pleasant pump. Also included in the vote, the Bucks County electorate ousted the county commissioners who supported the project and replaced them with a majority of officials who had spent years fighting to stop the pump through the courts (Carluccio, 1987). Consequently, the new commissioners appointed anti-pump members to the NWRA of Bucks County, which had originally contracted to build the pump, and the executive director of Del-Aware Unlimited, Tracy Carluccio, became executive secretary of the NWRA. In 1984, the NWRA shut down the project, but proponents for the project filed suit to have the

construction contract enforced and the project reopened. The suit was settled in 1987 when a judge ruled the contracts valid and ordered construction resumed (Stevens, 1987).

The Outcomes

Backed by litigation efforts, the Point Pleasant pumping station project was legally determined to be environmentally safe and thus, upheld the decision of the DRBC to allow the construction of the project. In 1987, construction of the Point Pleasant pump project resumed after three years and the arrest of more than 200 demonstrators violating court injunctions prohibiting interference at the construction sites. Ten objectors, ranging in ages from 20-67, were jailed for contempt, 2 of them going on water-only fasts. "Dump the Pump" became the slogan of anti-pump demonstrators who felt that forestland would be destroyed and were against the inter-basin transfer of water over land (Carluccio, 1987). As the project was completed in 1994, the Bucks County Commissioners sold the finished Point Pleasant pumping station to North Penn and North Wales Water Authorities in Montgomery County for \$55.2 million (Lazar and King, 1994).

Sustainability Implications

While some aspects of the WE³ model have been resolved in the Point Pleasant pumping station project, some stakeholders believe the ecological component remains in doubt. It can be said that the use of the station itself is one aspect of the project where sustainability is found: 1.) the station provides safe drinking water to 150,000 customers in the growing regions of Bucks and Montgomery counties (Partners, 2003; North Wales Water Authority, 2003); 2.) the station meets its required withdrawal limits as determined to be sufficient to preserve the environmental integrity of the area; and 3.) the Limerick Nuclear power plant is supplied by the station which produces electricity for over 1 million homes with 2,268 net megawatts (PECO, 2003). However, the pumping station has been argued to cause erosion of the banks of both the Perkiomen and Neshaminy Creeks, to which water is transferred, causing changes to the natural habitats of living organisms. In addition, a 95 mgd intake will entrap fish and other organisms. Some believe that the use of potable water for the production of nuclear powered energy is unsustainable, and thermal pollution remains a concern.

The level of sustainability of a project outcome depends on the extent to which balanced WE³ through conflict resolution has been achieved. Without opportunities for public participation in the conflict resolution process, the Point Pleasant outcome would have been considered less sustainable. A few sustainability implications, however, can be pointed out in the case of the Delaware River Basin with respect to conflict resolution: 1.) active public participation started in the implementation stage rather than in the planning stage; 2.) initial approval was based on the EIA required by the National Environmental Policy Act which is basically an expert-driven approach; and 3.) litigation was a major

mechanism to resolve conflicts which is less public-driven.

2. The Susquehanna River Basin

The Susquehanna River is the largest river lying entirely in the United States that flows to the Atlantic Ocean. With a 27,510 square mile watershed that includes parts of the states of New York, Pennsylvania, and Maryland, it accounts for nearly one-quarter of the freshwater supply into the Chesapeake Bay. On December 25, 1970, the Susquehanna River Basin Compact was signed into a law by the United States Congress and the state legislatures of New York, Pennsylvania, and Maryland. It established the Susquehanna River Basin Commission (SRBC) as an agency to coordinate state and federal water resource efforts. The Commission is charged with developing and implementing water resource plans, policies, projects, and facilities necessary to carry out the purpose of the compact. It conducts water resource investigations, surveys, and studies, and initiates legal action where appropriate (SRBC website, 2002). There are a number of large hydroelectric projects on the lower Susquehanna that form large, multi-use reservoirs. One of these is Conowingo Pool, a 15-mile long reservoir formed by Conowingo Dam, 10 miles north of the river's mouth in the state of Maryland.

The Conflict

The City of Baltimore first constructed an intake structure at Conowingo Pool in 1966 to withdraw and divert up to 137mg of water per day. Since that time, the City used Conowingo only intermittently during periods of low-flow and drought (SRBC Conowingo Information Sheet, 2001). In 1993, the City announced its intention to expand use of Susquehanna River water after agreeing to a deal to sell up to 30mgd of water to Harford County, Maryland. In 1994 the Susquehanna River Basin Commission notified the City it needed approval from the commission to expand their current intermittent use pattern. Baltimore questioned the commission's authority in this matter, citing the Maryland Reservation to the Susquehanna River Basin Compact in disagreement. This section of the compact confirms the right of the mayor and city council of Baltimore to construct and operate water facilities in a manner that most benefits the city and its service area (Susquehanna River Basin Compact, 1972). The Commission cited Section 3.10 of the Susquehanna River Basin Compact where it states no project affecting water resources in the basin may be undertaken without submitting plans for approval to the SRBC.

In July 1994, both parties agreed to attempt to reach a solution that addresses the impacts of large water withdrawals from the river during low flows. In 1997 Baltimore completed a study of its water system's ability to adjust to reduced river withdrawals during low flows and indicated the need for a second study on the water quality impacts of withdrawing water during high flows. Since the Commission and the City were unable to reach agreement on a set of interim low flow requirements

pending completion of the second study, no settlement was confirmed at that time (Cairo, 2003).

A public hearing was held on April 14, 1998 in York, Pennsylvania to discuss potential impacts of future withdrawals by Baltimore from the Conowingo Pool. Forty different interest groups (including City officials) attended to provide insight and opinion. One month later, the Commission issued a final determination listing potential projects that, if undertaken by Baltimore, would be subject to SRBC review and approval. One of the determinations subject to the SRBC approval was the sale of Susquehanna River water to Harford County (including implementing the 1993 agreement between Baltimore City and Harford County for raw water supply) or to any other county or entity not presently served by the City's system (SRBC Press Release, 2000).

Baltimore, displeased with the regulatory nature of this determination, appealed to the United States District Court of Maryland in 1998. On March 30, 2000 the federal judge ruled in favor of SRBC (SRBC Press Release, 2000). Baltimore appealed this ruling to the United States Court of Appeals for the 4th Circuit. Before handing down a ruling, the court agreed to temporarily suspend litigation in hopes of an out of court settlement being reached. After the two sides reached a tentative agreement in July, SRBC commissioners approved the settlement on August 9, 2001 (SRBC Press Release, 2001).

The Outcomes

As a result of the settlement, Baltimore was authorized to withdraw up to 250 mgd for use within its service area. During periods when river flows drop below QFREC levels, Baltimore was limited to a 30-day average of 64 mgd with a peak single day rate of 107mgd. (QFREC rates are flow levels established by the Federal Energy Regulatory Commission related to the operation of Conowingo Dam.) If the Commission declares a drought emergency, the City is required to impose mandatory restrictions on its customers that are consistent with the Maryland Drought Monitoring and Response Plan. In this sense, the SRBC drought emergency powers remain intact with this settlement (SRBC Settlement Agreement, 2001).

Baltimore must carry out a number of water conservation measures as a result of this agreement. Within 18 months of the effective date of the settlement, they must implement a review of the water conservation measures currently in effect throughout the service area. Within 48 months, the City must implement water conservation measures consistent with SRBC conservation standards. Also, Baltimore is to conduct a monitoring program so that records and documents regarding daily withdrawal quantities are readily available if needed by the Commission. Meters capable of measuring the quantity of water diverted from the Susquehanna must be installed and maintained to ensure an error of no more than 5%. Calibration and repair records should be maintained and made available to the Commission on request. In periods of low flow or drought, these records may be requested more frequently.

This settlement agreement legally affirms SRBC's authority to regulate the City of Baltimore's withdrawals and diversions of water from the river. With approval of the agreement, Baltimore was provided with long-term certainty regarding the availability of water from the Susquehanna River. They could enter into a 1993 raw water supply agreement with Harford County without sacrificing overall productivity in their service area. The SRBC was recognized as a regulatory authority responsible for the effective environmental management of basin resources. The City cannot legally increase their use of Susquehanna River water without approval from the Commission.

Sustainability Implications

Both positive and negative results are evident in the outcome of this conflict. Baltimore will considerably increase its use of river water, increasing the stress on the multi-use reservoir and possibly diminishing flows to the Chesapeake Bay. However, water conservation measures and withdrawal limitations (for drought emergency periods) mandated by the agreement are significant victories. Baltimore must comply with SRBC advisories and modify their resource use during low flow periods. *Although more water will be consumed, preventative requirements for critical time periods will ensure availability and sustainable use of basin resources.* Metering and water conservation measures outlined in the agreement will considerably enhance the overall efficiency of the City supply system.

Significant to this case is the extent to which public participation and stakeholder involvement was included in the resolution process. Although the dispute eventually ended in litigation, the resolution process leading up to this point was completely participatory. The public hearing held in York, Pennsylvania in April 1998 was an important example of how SRBC involved the public in this resolution process. Having been unable to reach an agreement with City officials, the Commission held this hearing as a way to inform stakeholders about the issues surrounding the conflict. By acting on the opinions of river basin stakeholders, we believe SRBC's position in this conflict was strengthened. It is not inappropriate for Baltimore to challenge the regulatory authority of the Commission. Both sides had apparently valid legal claims. *Once the citizen-based determination was issued, however, the City's position became weakened.* All aspects of WE³ seem to be balanced in this case. Water conservation measures provide ecological harmony, while the participatory nature of the resolution process ensures social equity and accounts for all economic concerns.

3. The Nakdong River Basin

The management of water quality in the Nakdong River Basin is a crucial issue that affects the people and the industry in the region. The Nakdong River is the longest river in South Korea, flowing through two provinces (Gyeongsangbuk and Gyeongsangnam) and two large cities (Daegu and Busan). The

population in the river basin is about 13 million, with over 90% receiving their drinking water from the river. Big cities and industrial complexes in its upper and midstream areas represent significant water pollution threats, especially affecting the people in Busan and Gyeongsangnam Province who draw water from the river downstream. The BOD at Mulgeum, the location for drawing water for downstream use, is 3.5-5.0mg/l which is much higher than the Han River and the Geum River whose BODs are 1.1-1.6mg/l at their main drawing locations, Paldang and Daechung. The central government created a comprehensive river basin management plan in 1992, investing 3 trillion won (US\$2.5 billion) for the improvement of water quality in the Nakdong River. However, the government had difficulties in reconciling fundamental measures such as land use regulations due to economic development needs in upper and midstream regions of the basin.

The Conflict

The water quality of the Nakdong River continued to deteriorate from the 1970s as urbanization and industrialization in the upper and midstream regions proceeded. In response, Busan City and Gyeongsangnam Province began to demand strong regulations for the improvement of water quality. This demand became stronger with the occurrence of two serious water pollution accidents in the early 1990s and the plan to construct the Wichon industrial complex in the midstream area. The Wichon industrial complex, aimed at boosting the economy of Daegu City in the midstream area, and this project brought about organized opposition from communities in the downstream area, especially Busan City. The water quality issue and the Wichon industrial complex plan became the hottest issue in the 1990s in this basin.

The Ministry of Environment (MOE) began to devise various measures to resolve the conflict. The measures included adoption of the total load management system (TLMS) and a water use charge collected from downstream residents that is to be used for upper and midstream needs. MOE held over 100 meetings, hearings and seminars over the policy measures. All stakeholders, such as the central government officials (including MOE), local government officials, representatives of local communities, civic groups, specialists, and business representatives, participated in the meetings, hearings and seminars. Several times, residents used force to prevent the hearings from being held. Eventually, a consensus for improving water quality of the Nakdong River was made through a tough negotiation process. A comprehensive plan was finalized under the agreement among up and downstream areas on December 30, 1999. "The Act Relating to Water Resource Management and Community Support for the Nakdong River" was drafted to back up the agreement, and was presented to the National Assembly in June 2000.

The Outcomes

The MOE-initiated Nakdong River bill initially encountered heavy resistance in the National Assembly due to differences in positions of the congressmen who represented each area. The conflict between upstream and downstream intensified and the bill was almost discarded. MOE, and to some extent environmental NGOs, thought there was no alternative other than this bill. They tried their best to persuade communities in upstream and downstream areas and the congressmen representing those areas. Thanks to their efforts, the bill was passed and put into practice in January 2002. This became a permanent institutional framework for ending conflicts between upstream and the downstream that had lasted almost 10 years, and for improving water quality of the Nakdong River.

TLMS has been enforced in all areas of the Nakdong River, seeking to harmonize preservation and development by allowing regional development to be carried out in an environment-sensitive manner so that the desired water quality improvements are realized. Under the system, pollutant sources are managed so as to keep the total amount of pollutants in the watershed under a certain level (total allowance). Riparian buffer zones have also been designated in the upstream area to prevent water pollution from unregulated land use development. Within this 500m wide zone on both sides, any constructions of restaurants, lodging facilities, saunas, multi-family housings, factories and barns has been banned.

Water use charges have been levied on, and collected from, downstream users to secure revenue for upstream community support and water quality improvement projects. However, users in water source management areas and other areas designated by presidential decree are exempt from having to pay the water use charge. To efficiently coordinate the imposition and collection of water charges, community support projects and other important policies concerning the watershed, a Watershed Management Committee (WMC) was established. WMC is composed of the Minister of MOE, mayors and governors of the Nakdong River Basin area, and the President of the Korean Water Resources Corporation. The WMC determines the rate of water use charges. The Watershed Management Fund derives its revenue from the collected water use charge, donations from non-governmental parties, loans, and earnings from investing the fund. The Fund is used for purchasing riparian buffer zones and other lands and implementing community support projects. The Fund also contributes to the establishment, operation and maintenance of environmental infrastructure, and the operation of water pollution prevention facilities.

Sustainability Implications

The Nakdong case showed that it was very difficult for the central government, local governments, political parties, or the National Assembly to resolve conflicts between the upstream and downstream

communities through institutional solutions or policies. A solution that would satisfy both regions was politically too risky to be with one side due to the resistance of the other side. Accordingly, the resolution of the problem was delayed for almost 10 years, and the conflict exacerbated as the problem remained unsolved. Despite several major confrontations, MOE, civic and religious groups, specialists and representatives from the regions were finally able to find a road to coexistence after holding numerous meetings and discussions. The breakthrough was finally possible because all stakeholders were committed to the common goal of reviving a dying river.

The Nakdong River's water quality management projects stand as a sustainable outcome of how confrontations and conflicts can be resolved through dialogue and cooperation among all stakeholders. Both TLMS and water use charges succeeded in realizing sustainability by harmonizing development needs with water quality preservation on a permanent basis. Ecological viability is accounted for while economic issues are resolved. Both measures have also been successful in terms of equity, providing compensation for upstream sacrifice.

4. The Han River Basin

The population in the Han River Basin is about 24 million, nearly half of the entire population of South Korea. The Han River has the largest basin area in South Korea and includes three provinces (Gyeonggi, Gangwon and Chungcheongbuk) and two cities (Seoul and Incheon). Most of the population is concentrated in the downstream area (Seoul and Gyeonggi Province) and only 9.1% live in the upstream areas. This makes for much easier water quality management compared to that of the Nakdong River. The main sites of water intake from the Han River are Paldang Lake (7.7million ton/day, 2.03 billion gal.) and Jamsil (6.32million ton/day, 1.67 billion gal.). The government designated part of the seven cities and provinces in the upstream areas as "Area for Special Measures for Water Quality Management" (2,102km²) and has regulated the construction of restaurants, lodging facilities, and wastewater discharges since 1990. In addition, the government invested 3.81 trillion won (US\$3.2 billion) for the improvement of water quality in this region from 1993 to 1998. Despite such aggressive management strategies, water quality in the Han River Basin continued to be a significant problem throughout the decade.

The Conflict

Water quality of the Paldang Lake, which is the water source for 20 million people in the metropolitan area of Seoul, had become progressively worse in 1990s. The BOD of the Paldang Lake was 1.0mg/l in 1990. This rose to 2.0mg/l in the spring of 1998. Great pressure was placed on the government to come up with special measures to cope with the problem. In May 1998, the central government decided that

new special measures should be taken for the improvement of water quality of the Han River and began to prepare a special plan. Communities in the upstream area regarded the measures as the introduction of new regulations and opposed them fiercely.

As described above, the government regulated the land use of the area above the Paldang Lake, redefining several special actions to promote water quality protection. Accordingly, communities in that area have held the view that they are victims of the “power of Seoul.” They have believed that their development is being sacrificed for the water supply needs of downstream communities. They made it clear that they could not accept additional regulations. Their opposition movement got stronger, taking some organizational forms. They even stopped by force the hearings prepared by the government for collecting the opinions of the local people.

The Outcomes

MOE, aware of the position of the upstream communities, prepared “The Special Measures for the Water Quality Management of the Han River” based on a proposed “win-win spirit for upstream and downstream.” The measures required upstream communities to use land in a manner that preserves water quality. Downstream areas are required to shoulder the financial burden that corresponds to restrictions placed on upstream users. By taking this reciprocal approach, the policy promotes a cooperative relationship between upstream and downstream. The approach has become so effective that it is now the prototype of special plans for other river basins.

The government developed its Special Measures by collecting the comprehensive opinions of specialists, residents, civic groups, and local governments. However, confirmation of the Special Measures was delayed due to the strong opposition of upstream residents. As the issues in the dispute were settled by continued dialogue between the government and upstream residents, the Water Management Policy Mediation Committee (chaired by the Prime Minister) could formally adopt the Special Measures. To provide enduring legal support of the Measures, the Special Act of the Han River was enacted by the National Assembly in February 1999.

In order to prevent pollution in the Paldang Reservoir, land within 1km of the main rivers and their tributaries (500m in the case of land outside the Special Measures Zone for Water Quality Conservation) for about 80km upstream was designated as a Riparian Buffer Zone wherein the location of pollution sources is severely restricted, and a special measure was adopted that forbids damaging publicly owned forests within 5km of either bank of tributaries and main rivers upstream of the Paldang Reservoir. In addition, the government has planned to purchase land in the upstream area, creating a Riparian Forest that can mitigate pollution inflow from non-point sources.

Additionally, it was decided to implement TLMS step-by-step to reduce pollution while flexibly

accommodating demand for regional development. A water use charge system was first adopted and implemented in the Han River Basin, and it became the model for other regions including the Nakdong River Basin. The details of this system are almost the same as that of the Nakdong River. The total amount of water use charges levied in the Han River Basin is currently about 260 billion won/year (US\$220 million). Seventy billion won of this fund is spent on supporting residents in the upstream areas, and the rest is used on projects for improving water quality and the purchase of upstream land for conservation. Like the Nakdong River Basin, a Watershed Management Committee (WMC) has been established to collect water use charges and to coordinate community support projects and other important policies concerning the watershed.

Sustainability Implications

The Han River case is similar to that of the Nakdong River in which confrontations and conflicts can be resolved through sustained dialogue and cooperation of all stakeholders. The main difference between the two basins is the implementation of TLMS. While the measures for the Nakdong River included a mandatory TLMS, the measures for the Han River involve a voluntary system, which gave the local government some incentives for local development. This difference was the result of the fact that in the Han River Basin, strict regulations on land use already existed. The designation of Riparian Buffer Zones, strong regulations regarding land use, and TLMS are regarded as having assured sustainability by harmonizing development and preservation of the Han River Basin. Ecological viability was ensured while economic coexistence and equity between upper and downstream users was institutionalized through water use charges and community support projects.

III. Lessons from the Comparative Cases

Before deriving lessons from the case studies, comparisons of river basin management practices between the U.S. and South Korea are in order. It should be noted at the outset that there are differences between the U.S. and South Korean cases. The Han and Nakdong Rivers serve 70% of the population in South Korea, whereas the Delaware and Susquehanna Rivers serve only 20% of the population of the U.S. Consequently, the South Korean government's role in its river basin managements had significant socio-political implications.

In the case of the U.S., conflict mediation occurs mainly through: 1.) regional governance at the federal-interstate scale, backed by law and significant resources; 2.) heavy reliance on the court system to clarify and strengthen federal-interstate compact law; and 3.) powerful NGOs and community groups for reconciling conflicting land and water uses, as well as acting as intermediaries between government

and communities. In the case of South Korea, the approach has emphasized: 1.) the central government's role in sorting out river basin management conflicts, not addressed by law; 2.) less use of the courts compared to the U.S. cases; and 3.) heavy reliance upon compensation schemes to build community consensus.

Although the core principles underlying the U.S. and South Korea approaches vary due to differences in government and civil society, as well as culture and geography, important similarities exist. First, there is an emphasis on giving local communities an avenue for expressing their concerns. Second, a form of conflict articulation and debate is offered, rather than a simple "command and control" structure, albeit with heavy NGO influence in the U.S. and more emphasis on civil service involvement in the case of South Korea. And finally, a commitment to equitably meet the needs of both upstream and downstream users guides those in the management and mitigation process.

The results of four case studies generally support our assertion that conflict resolution enhances opportunities for balanced WE³, leading to a higher level of sustainability in river basin management. The U.S. cases- Delaware River Basin and Susquehanna River Basin- show that litigation has been the major mechanism to resolve conflict, whereas in the South Korean cases (Nakdong River Basin and Han River Basin), an administrative role (played by the Ministry of Environment) has been the dominant mechanism in conflict resolution. In both the U.S. and South Korean cases, community-based transactions in the process of conflict resolution brought about litigation or administrative initiatives. Without these community-based transactions, environmental, socio-political and economical goals of river basin management (WE³) would have been considered less sustainable.

Additional valuable lessons can be drawn from the case studies. Major conflicts, as shown in these cases, can take more than 10 years (even 20 years in the case of the DRBC) to be resolved. To minimize transaction costs and to be more effective, conflict resolution mechanisms should be institutionalized to allow for community-based transactions in the planning stage of project. Without transparent, democratic and participatory transactions, EIA, litigation, or administrative initiatives can result in less sustainable outcomes. Second, the balanced consideration of both supply-side and demand-side options is important as shown in the Delaware and Susquehanna River Basin cases. Diversions and allocations from the rivers are certain to increase in years to come. Demand-side conservation strategies can work to offset potential negative effects of such changes. Instead of participating in lengthy, expensive battles over water rights and usage patterns, the SRBC case shows how comprehensive agreements that promote conservation measures and mandate drought period restrictions can be a more effective strategy. Third, equity-driven programs are critical in the resolution of conflicts as shown in the Nakdong and Han River Basin cases. Without the benefit of law or significant regulatory authority,

MOE officials worked directly with stakeholders to ensure that an equitable solution was reached. In sum, community-based transactions, guided by the need to balance economic, environmental and social interests, can be vital to the resolution of major upstream-downstream conflicts. It appears that through these transactions, even under widely differing policy and cultural circumstances, the goal of sustainable river basin management can be secured.

References

- Cairo, Richard. "Re: Baltimore Case and Settlement." Email to General Council for Susquehanna River Basin Commission. 16 Jan. 2003.
- Carluccio, Tracy. "New Jersey Opinion: A Battle to Protect the Delaware." *The New York Times*. 13 Sept. 1987. 11NJ 30.
- Delaware River Basin Commission. Accessed 26 Oct. 2002. Internet: www.state.nj.us/drbc.
- Delaware Water Emergency Group, et al. v. Gerald M. Hansler, et al. and Neshaminy Water Resources Authority and Philadelphia Electric Company*. 536 F. Supp. 26 (1981).
- Lazar, Kay and Larry King. "Bucks Plans to Sell Point Pleasant Pump." *Philadelphia Inquirer*. 16 June 1994. B7.
- Leach, William D. and Neil W. Pelkey. "Making Watershed Partnerships Work: A Review of Empirical Literature." *Journal of Water Resources Planning and Management*. November/December 2001.
- McGinnis, Michael Vincent, John Wooley and John Gamman. 1999. "Bioregional Conflict Resolution: Rebuilding Community in Watershed Planning and Organizing." *Environmental Management*, 24 (1): 1-12.
- Ministry of Environment. 2002. *Environmental White book 2002*. Seoul, Korea.
- Ministry of Environment. 2002. *Green Korea 2002*. Seoul, Korea.
- Ministry of Environment. 2001. *Environmental White book 2001*. Seoul, Korea.
- Ministry of Environment. 2000. *Environmental White book 2000*. Seoul, Korea.
- Ministry of Environment. 1999. *Environmental White book 1999*. Seoul, Korea.
- Ministry of Environment. 1999. *The Special Comprehensive Measures for the Water Quality Improvement of the Nakdong River*. Seoul, Korea.
- Ministry of Environment. 1998. *The Special Comprehensive Measures for the Water Quality Improvement of the Han River*. Seoul, Korea.
- Murphy, Irene L. and J. Eleonora Sabadell. 1986. "International river basins A policy model for conflict resolution." *Resources Policy*, 12 (1): 133-144.

- Neshaminy Water Resources Authority v. Del-Aware Unlimited, Inc., et al.* 332 Pa. Super. 461 (1984).
- North Wales Water Authority. Accessed 20 Jan. 2003. Internet: www.nwwater.com.
- Partners in PA - Partnership for Safe Water Update. Vol. 2 (1). www.dep.state.pa.us/dep/deputate/watermgt/wsm/WSM_DWM/Complian/PA-AWWA-Vol-2_No1.pdf. Accessed 20 Jan. 2003.
- Philadelphia Electric Company. Accessed 20 Jan. 2003. Internet: www.peco.com.
- Stevens, William K. "Bucks County's Long Water War: Decision Time." *The New York Times*. 12 June 1987. A16.
- Smutko, L.S., S.H. Klimek, C.A. Perrin, and L.E. Danielson. "Involving Watershed Stakeholders: An Issue Attribute Approach to Determine Willingness and Need." *Journal of the American Water Resource Association*. Vol. 38, No. 4. Aug. 2002: 995-1006.
- Susquehanna River Basin Commission. Accessed 25 October 2002. Internet: <http://www.srbc.net>.
- Susquehanna River Basin Commission. *Susquehanna River Basin Compact*. Harrisburg, PA: 1972
- Susquehanna River Basin Commission. *Settlement Agreement Between the Susquehanna River Basin Commission and the Mayor and City Council of Baltimore*. Harrisburg, PA: July 2001.
- Susquehanna River Basin Commission. *Information Sheet: Conowingo Pool*. Harrisburg, PA: August 2001.
- Susquehanna River Basin Commission. "Court Rejects Baltimore's Challenge to SRBC's Regulatory Authority." Press Release: April 4, 2000. Available: <http://www.srbc.net/press.htm>
- Susquehanna River Basin Commission. "SRBC Approves Settlement Agreement With Baltimore for Withdrawals From the Susquehanna River." Press Release: August 10, 2001. Available: <http://www.srbc.net/press.htm>