Payments for Environmental Services in the Catskills: A socio-economic analysis of the agricultural strategy in...

PAYMENTS FOR ENVIRONMENTAL SERVICES IN THE CATSKILLS:

A Socio-Economic Analysis of the Agricultural Strategy in New York City's Watershed Management Plan

Prepared for the PRISMA-Ford Foundation Project
on Payments for Environmental Services in the Americas

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CONTENTS

ACRONYMS

BMP	Best Management Practice
CAFO	Confined Animal Feeding Operations
CFFC	Catskill Family Farms Cooperative
CREP	Conservation Reserve Enhancement Program
CWC	Catskill Watershed Corporation
CWT	Coalition of Watershed Towns
DOH	New York State Department of Health
EOH	East-of-Hudson River
EPA	United States Environmental Protection Agency
FAD	Filtration Avoidance Determination
MOA	New York City Watershed Memorandum of Agreement
NRVP	Natural Resources Viability Program
NRC	National Research Council
NRDC	Natural Resource Defense Council
NYC BWS	New York City Board of Water Supply
NYC DEP	New York City Department of Environmental Protection
PES	Payments for Environmental Services
PIP	Practice Incentive Payment
SFP	Small Farms Program
SIP	Signing Incentive Payment
SDWA	Safe Drinking Water Act
SWTR	Surface Water Treatment Rule
USDA	United States Department of Agriculture
WAC	Watershed Agricultural Council
WAP	Watershed Agricultural Program
WOH	West-of-Hudson River

EXECUTIVE SUMMARY

The challenge of providing its citizens with a clean, abundant, and inexpensive supply of drinking water has been an on-going chapter in the history of New York City. For more than two hundred years the City government struggled to provide its rapidly expanding population with a sufficient quantity of water. It was not until 1965, after reaching out to the headwaters of three distant watersheds and constructing one of the most celebrated water supply systems in modern history, that the City's water managers were able to quench the thirst of nine million water consumers. In 1990, New York City officials were faced with yet another challenge: devising a management plan that protected the largest surface water supply system in the world from the increasing danger posed by point-source and nonpoint-source water pollutants. After several years of intense negotiations among numerous actors, a watershed management strategy was devised in 1997. The new plan, officially known as the New York City Watershed Memorandum of Agreement (MOA), places the City once again at the forefront of watershed management. Among other accomplishments, the MOA commits New York City to a long-term strategy that empowers farmers in watershed communities with the economic resources to enhance the quality of the City's water supply.

For decades watershed farmers have protected the rural quality of their communities, protecting the land from commercial development and, in many instances, maintaining and enhancing its natural capacity to filter-out pollutants that would otherwise contaminate water supplies. In economics, this service is known as a 'positive externality:' the farmers produce something of value yet do not receive any economic compensation (*i.e.* improved water quality is a desirable good but it is produced outside the realm of the market). The MOA provides an institutional arrangement that allows for the 'internalization' of the positive externality. It provides the funding and legal-framework for programs that provide farmers with economic rewards in return for maintaining and enhancing agricultural practices that maintain the quality of New York City's water supply. Though it was not explicitly designed as such, the agricultural strategy employed in the MOA can be understood as an arrangement that provides farmers with payments for environmental services (PES).

This report was prepared for a hemisphere-wide project entitled "Payments for Environmental Services in the Americas." Sponsored by the Ford Foundation and administered by Programa Salvadoreño de Investigación Sobre Desarollo y Medio Ambiente (PRISMA), the initiative explores the opportunities, challenges, and risks associated with PES mechanisms in rural farming and indigenous communities. The objective is that the insights gathered from the undertaking will assist in the design of policies that not only increase the provision of environmental services, but also help to alleviate rural poverty. Most of the research for this project has focused on environmental payments mechanisms in Latin America where, one could argue, the need to build natural assets and alleviate rural poverty is greatest. Given the innovative institutional arrangement, large scale, and high stakes involved in the New York experience, however, it was deemed that a case study of the City's agricultural package would be a valuable addition and contribute to the overall aims of the project.

In addition to an introduction and conclusion, this case study is divided into five chapters. Chapter one describes the case setting. It discusses how New York City has historically met its water needs, first reaching out the Croton watershed and then to the neighboring Catskill and Delaware River watersheds. The City was ruthless in acquiring land for its water supply system; its callous behavior has scarred the memory of many watershed residents. In the predominantly poor and agricultural region of the Catskill and Delaware River watersheds, many community members still harbor bitter feelings. It is thus, little wonder that they exploded in anger in 19990 when New York City's Department of Environmental Protection tried to impose new land use regulations that would have severely limited agricultural opportunities in the watershed areas. The City, responding to new water quality standards issued by the United States Environmental Protection Agency, hoped that the new restrictions would help it avoid the exorbitantly expensive costs of constructing a filtration system for water originating in the Catskill and Delaware watersheds. The refusal of watershed residents to cooperate, however, forced the City to negotiate an agreement that was less antagonistic. First, the negotiations produced the Watershed Agricultural Program in 1991, followed by the more comprehensive MOA in 1997. Together, the Watershed Agricultural Program (WAP) and the agricultural initiatives included in the MOA can be described as a PES package.

Chapter two discusses the various components of the PES package. The centerpiece of the package is the Watershed Agricultural Program. As a voluntary, locally-administered, and New York City-financed initiative, WAP has received widespread support from both watershed farmers and most actors concerned with the quality of New York City's drinking water. In essence, the program uses City funds to implement management practices that protect New York City's water supply. Though its explicit objective is to maintain and improve water quality, WAP also has the potential to improve the economic well-being of watershed farmers. Participating farmers often receive technical and managerial assistance, new farming equipment, and infrastructure improvements to their agricultural operations. Other components of the PES package include a Conservation Reserve Enhancement Program that pays farmers to remove sensitive streamside lands from agricultural production, a Whole Farm Easement Program that rewards farmers for their long-term commitment to sustainable agriculture, a Natural Resources Viability Program that offers marketing assistance to farmers participating in WAP, and a Catskill Family Farms Cooperative that provides the capital equipment and the organizational structure for produce farmers to achieve economies of scale and market power. Though focused on individual farmers, the components of the PES package could be described as having a territorial vision. They have coalesced watershed farmers to working towards a common landscape vision where agriculture is directly linked to the protection of water quality.

Chapter three explores the socio-economic impact of the PES package on farmers in the Catskill and Delaware River watersheds. Farmers cite a number of reasons for participating in WAP, including the opportunity it affords them to become a better steward of the land and to be held harmless from future land use regulations. The most

often cited reason for participating in the program, however, was to make structural improvements to the farm and increase its economic viability. The program has been rather successful in this respect. WAP has improved the economic well-being of 45% of participating farmers and has had a neutral impact on another 50% of watershed farms. The economic benefits have not been equally distributed, however, as the program is inherently biased towards large-scale dairy farmers. Nonetheless, most farmers are satisfied with the program.

Farmers' satisfaction with the PES package may stem, in part, from the many non-pecuniary benefits engendered by the strategy. In addition to generating economic benefits, the strategy has improved farmers' ability to protect water quality, thereby reinforcing their image as environmentalists; it has improved their psychic well-being by protecting them from land use regulations and allowing them to take greater pride in their farming operations; it has provided them with a territorial voice, empowering them to define how sustainable agriculture is practiced in their local community; and it has helped to strengthen and improve valued social relationships, thereby augmenting their social capital. At the same time, however, it has also divided the agricultural community: the unequal distribution of benefits has created jealousies that have split a seemingly unified agricultural community.

In addition to exploring the socio-economic impacts of the PES package on the watersheds' agricultural community, chapter three also reviews some of the environmental critiques of WAP. The critiques are relatively few. Perhaps the most pressing concern is that the voluntary nature of the program may allow the farms with the most egregious environmental practices to continue polluting the watershed. The critiques also suggest that the program increase the role of science in the agricultural strategy and provide greater levels of monitoring. Overall, the program has received a favorable environmental review.

The final chapter analyzes the results of this case study, linking the specifics of New York City's watershed management plan to more general questions regarding PES mechanisms. The objective is to abstract from the specifics of this particular example to offer more general conclusions that can assist in the design of PES strategies in other areas. Seven insights are presented. First, the state can play multiple roles in the design of PES mechanisms. In many circumstances government bodies will have to serve as a catalyst, spurring the relevant stakeholder groups to act. They may also need to serve as a negotiating agent for their constituency and/or mediate a solution among various stakeholder groups. Second, PES mechanisms may not be viable without significant levels of financial support. Third, one low-cost alternative, however, is to provide marketing support that allows farmers to tap into niche markets. Fourth, technical support may be crucial for advancing the legitimacy and effectiveness of PES mechanisms, though it should be utilized in junction with—rather than in place of—local knowledge. Fifth, simply employing a landscape vision that encompasses an entire ecosystem may be insufficient for achieving environmental objectives. Different stakeholder groups generally have competing visions of a given landscape; strategies that respect local visions of the landscape and promote a territorial economy are more

likely to achieve the environmental and economic objectives of PES. Sixth, there are costs and benefits associated with the inclusion/exclusion of certain stakeholder groups from the PES design process; when local groups are allowed to appropriate the design and administrative process, they are likely draw upon their existing social capital. Finally, while it is economically efficient to distribute benefits solely on the basis of where they will achieve the greatest environmental return in the short-run, the strategy may work against the long-term objectives of PES. It may accentuate economic inequalities and cultivate animosities among potential environmental allies. A distribution strategy that tempers concerns for an efficient distribution of funds with an interest in economic equality is more likely increase the provision of environmental services and alleviate rural poverty.

New York City has long been at the forefront of watershed management. Its recently designed management strategy reinforces that distinction. By providing financial assistance to watershed communities in return for promoting water quality, the City has demonstrated the important link between economic well-being of rural actors and the provision of natural resources. The connection is highlighted in the agricultural components of the City's watershed management plan. The program not only recognizes the important role that agriculture can play in protecting water quality, it provides economic rewards to watershed farmers for providing environmental services. Though it certainly has limitations, overall the program appears to protect environmental quality while improving the economic position of rural farmers. Indeed, it offers valuable insights that can improve the design of PES mechanisms in both the developed and developing world.

INTRODUCTION

New York City maintains one of the most celebrated water supply systems in the world. For more than a 150 years, its residents have enjoyed drinking water of such purity that it is often referred to as the 'champagne of tap water.' Obtained from three upstate watersheds, that water is transported to the City via a complex of reservoirs and long distance aqueducts that, at the time of its construction, was heralded as an engineering marvel and has since served as the model for numerous urban water systems throughout the United States. In the 1990s, New York City reinforced its identity as the vanguard of water management. This time, however, its recognition is not the result of any technological feat *per se*. Instead, it is the product of a social institution: a new watershed management strategy that links the water quality protection to the socio-economic objectives of distant watershed communities. The agricultural components of the City's management plan are particularly intriguing in that they actually provide farmers with economic rewards in return for their provision of important environmental services. As such, the strategy may not only improve the quality of New York City's water supply, it may also play an important role in the alleviation of rural poverty. This study evaluates the agricultural components of the City's watershed management plan as a progressive mechanism that provides payments for environmental services.

Providing nine million people with access to clean, abundant, and inexpensive drinking water, New York City's water supply system has long been the subject of international praise and admiration. The City first gained recognition for its water supply in 1842, when it tapped the Croton River Watershed in its rural hinterlands. Consisting of a 50 ft high and 270 ft long impounding reservoir, a 40-mile covered masonry aqueduct, and a 35-acre receiving reservoir, the gravity-driven system was heralded as an engineering marvel. Unprecedented since the Roman Empire, the City's supply system became the prototypical long-distance water transfer system. It has served as a model for many major urban centers in the United States, including Boston, San Francisco, Los Angles, and even future expansions of New York City's own water supply.

Over the years, as New York City grew, so did its water needs. Between 1883 and 1905 the Croton River system underwent a number of expansions. The City's water managers soon discovered, however, that the single watershed was insufficient to satisfy its ever-increasing needs. In 1907 they reached out to the remote Catskill watershed and, in 1938, to the even more distant headwaters of the Delaware River. In each of these expansions, New York City utilized the same technology of gravity-powered aqueducts that it pioneered with its initial explorations into the Croton River watershed. When it was completed in 1965, New York City could lay claim to the largest, and some would argue the best, urban water supply system in the world.

More than 150 years after the completion of the first Croton River system, New York City is setting yet another precedent in water management history. This time, however, rather than demonstrating techniques that increase the *quantity* of water that is supplied to urban centers, the City is illustrating the importance and possibility of maintaining the *quality* of surface water

supplies. In January 1997, New York City initiated a unique and innovative long-term management plan that, via creative institutional arrangements, advances the socio-economic objectives of residents living in distant watershed lands while protecting the quality of the City's water supply.

The impetus for New York City's watershed management plan was the Surface Water Treatment Rule issued by the United States Environmental Protection Agency (EPA) in 1989. The rule, in essence, requires all municipalities to filter public water obtained from surface sources unless stringent public health criteria are met and an approved watershed management strategy that minimizes risks to the water supply is in place. For New York City, the costs of filtration would have been prohibitively expensive. The City readily acknowledged the need to filter water from the Croton watershed. Constructing a filtration system for water originating in the Catskills and Delaware River systems, however, was estimated to cost up to $6 billion; another $200-$300 million per year would be necessary for operation and maintenance (NYT, 1996). Faced with the exorbitant cost of filtering its water supply, New York City instead chose to devise a $1.5 billion environmental protection plan.

New York City's watershed management plan is the product of seven years of intense and often heated negotiations between New York City, upstate watershed communities, the New York State Department of Health, several non-governmental environmental organizations, and the EPA. The agreement commits New York City to a long-term strategy that combines land acquisition, new watershed rules and regulations, and financial assistance to watershed communities to promote environmental quality and their local economies. A cornerstone of the agreement is a package of initiatives designed to improve the economic viability of agriculture in watershed communities.

Agriculture has long been a defining characteristic of the neighboring Catskill and Delaware River watersheds. By the 1800s farming had become a principal commercial enterprise throughout the region; most of it was dairy farming. The area was once a prosperous butter-producing region (Evers, 1993). In recent years, however, watershed farmers have been struggling. As the real price of dairy products has fallen, the number of farming operations in the Catskill and Delaware River watersheds has steadily declined (WAC, 1997). The area's farmers are now among the poorest residents in the State of New York. The economic fragility of the watersheds' agricultural sectors has important ramifications for New York City's water protection efforts.

Relative to residential land use or other forms of development, low-density agriculture presents the least danger to water quality. In more urbanized areas, water quality is threatened by the presence of wastewater treatment plants and runoff from roads, lawns, and golf courses. Agriculture, on the other hand, has the potential to maintain many of the land's natural buffering and filtering capacities. Indeed, for this very reason New York City has identified agriculture as the 'preferred' land use in watershed areas.

Despite agriculture's designation as the preferred land use in the watersheds, if not practiced properly it can be a potential nonpoint pollution source. Water quality may be jeopardized through cropland drainage or fields receiving applications of manure fertilizer, barnyard runoff,

and soil erosion. Due to their precarious economic situation, many farmers in the Catskills and Delaware River watersheds are unable to implement practices that control these pollution risks; those farmers who are forced out of business often sell their lands to commercial developers. Thus, a priority of New York City's watershed management plan is twofold: to improve the economic viability of agriculture in the Catskill and Delaware Watersheds and to implement environmentally sound practices on watershed farms.

The cornerstone of New York City's agricultural strategy is the Watershed Agricultural Program (WAP). The objective of the voluntary program is to standardize and improve environmental practices on watershed farms. New York City covers all costs associated with the implementation of practices on participating farms; practices include structural improvements to the farms, purchasing equipment for farmers, and providing farmers with operational and management assistance. Farmers who participate in WAP are eligible to partake in a number of other water-quality initiatives that enhance their economic well-being: the Conservation Reserve Enhancement Program pays farmers for removing sensitive streamside land from agricultural production; the Whole Farm Easement Program compensates farmers for forgoing the development rights to their land; the Natural Resource Viability Program offers marketing assistance for watershed farmers; and the Catskill Family Farms Cooperative provides the capital equipment and organizational body necessary for produce farmers to achieve economies of scale and market power.

Though the primary objective of the agricultural program is to continue providing New York City residents with a clean, abundant, and inexpensive supply of water, the strategy also generates real economic rewards for the watershed's agricultural community. Infrastructure improvements, marketing support, management assistance, and cash payments all help to improve the economic well-being of watershed farmers. Given that those rewards are provided in return for protecting the quality of New York City's drinking water, the agricultural package is, in essence, providing payments for environmental services (PES).

The objective of this paper is to evaluate the agricultural components of New York City's watershed management plan as a PES mechanism. In addition to examining the impact of the package on the economic well-being of watershed farmers, this study will explore the distribution of the benefits within the agricultural community. While the agricultural program is obviously targeted towards achieving environmental goals, it may also be contributing to yet another social objective: poverty alleviation. Indeed, farmers in the Catskill and Delaware River watersheds have been identified as one of the poorest demographic groups in the State of New York. It would, however, be naïve to assume that *all* watershed farmers are poor.

New York City's agricultural plan is the product of a unique juncture in social history. It has been customized to the City's own resource needs and the particular environmental and socio-economic qualities of the Catskill and Delaware River watersheds. Nonetheless, the lessons gathered from this case study offer valuable insights that could improve the design of PES mechanisms in other parts of the world. The lessons may be particularly relevant in the so-called 'developing world' where most governments are faced with the dual challenge of protecting natural resources and alleviating economic poverty. Given that New York City's agricultural strategy targets some of the poorest actors in the state, it might be construed as a *progressive*

PES mechanism and, therefore, particularly relevant to the design of environmental payments systems in the Third World.

Key Concepts

In order to make the lessons of the New York experience more universal, this paper employs five key concepts. First, it focuses on the *institutions* that comprise New York City's PES package. Institutions can be understood as the socially devised constraints that structure human interactions (Peet, 1999: 57-59). They are laws, regulations, and informal conventions such as norms of behavior and codes of conduct. Institutions are designed to constrain human interactions and to bring about socially desired results. As such, institutions might be thought of as 'rules for the game.' Simply establishing the rules, however, does not necessarily guarantee that the intended outcome will result, for how a particular game or social interaction takes place is largely dependent upon the players' *interpretations* of the rules. In addition to identifying the particular institutions supporting New York City's watershed management plan, this case study will describe the historical and social setting from which the rules evolved and, ultimately, shaped the interpretations of the relevant actors.

Second, this case study will portray payments for environmental services as a *process*. Rather than simply presenting the before and after effects of the economic rewards, the dynamics of how each particular payment is provided will be described. This approach will augment the understanding of the PES institutions since one's interpretation of an awards mechanism is largely dependent upon the process whereby the awards are distributed.

Third, a distinction of each of the relevant *actors* will be made. New York City's watershed management plan was the product of negotiations between various stakeholder groups. Identifying the actors and their motivations is crucial to understanding why the final PES package took the form that it did.

Fourth, natural resources will be described as part of a *landscape* vision. Humans construct a landscape by looking at their natural surroundings through particular lens of values and beliefs; those values and beliefs, in turn, help to identify a particular set of resources or to create a specific symbolic environment (Greider and Garkovich, 1994: 1). Given that human groups often possess differing sets of values, a single physical space can have many socially constructed landscapes, each representing the motives and expectations of a different group. Thus, landscapes are inherently connected to actors: each stakeholder group will have its own particular understanding of a given physical space or ecosystem.

Finally, this case study will employ the concept of *territory*. Like landscapes, territories are socially constructed. Territories, however, go beyond landscapes by describing how humans interact with their natural surroundings. Territories, in other words, do not distinguish humans from nature, but rather identify them as component processes of a larger system. As such, a territory is a multifunctional space where human activities and natural processes share a symbiotic relationship. By recognizing the social aspects taking place within a given resource space, the notion of territory stresses endogenous processes of innovation and gives priority to local visions of the landscape.

Utilizing these five concepts—institutions, process, actors, landscape, and territory—this case study offers two stories. First, it details the specific history, design, and impacts of New York City's agricultural package. Second, it allows one to abstract from the details of this specific case study to draw more generalized conclusions. The later story is particularly useful in that it offers valuable insights that can facilitate the design of PES mechanisms in other areas of the world. It should be remembered, however, that it is derived from a contextual account. To be successful, the designers of progressive PES strategies should always be considerate of the historical and cultural context of the given resource area.

CHAPTER 1: CASE SETTING

In 1626 Peter Minuit 'purchased' Manhattan Island from an indigenous Algonquian-speaking tribe. In exchange for beads and trinkets that were later valued at the amount of $24, the Dutchman acquired what was to become the heart of New York City and, ultimately, one of the most valuable pieces of real estate in the world. He also acquired a property with a limited on-site supply of fresh water.

Surrounded by brackish estuaries, the early settlers of New York City obtained their drinking water from privately owned wells, publicly maintained draws, and a spring-fed pond known as the 'collect.' The water table aquifer that fed these sources was sufficient to provide the City's residents with clean water for nearly a century. By 1750, however, water drawn from many of the wells had become foul and dirty, the collect had come to be known as the 'very sink and common sewer' where people dumped their slop buckets and dead animals, and a bitter debate about water quality began to erupt (Finnegan, 1997: 586-7).

As the complaints about New York City's water supply mounted, so did the City's population. In 1790 there were 33,000 inhabitants in New York City (Weidner, 1974:17). Ten years later that number had nearly doubled to 60,000; by 1830 there were 200,000 people living in Manhattan (NAS, 2000: 45). The rapidly expanding population significantly increased the demand that was being placed on an already strained water supply. Though it was generally considered to be a private—rather than a public—service in the early nineteenth century, the City government was increasingly pressed to find a solution to its water ills. Numerous strategies utilizing the local water supply were suggested, a few were implemented, but none were sufficient long term—let alone intermediate term—solutions (see Weidner, 1974). Fires that wracked the City in 1828 and 1835 underscored the importance of an expanded water source. In desperation, New York City turned to its rural hinterlands.

On November 10, 1832, the New York City Fire and Water Committee of the Common Council retained Colonel DeWitt Clinton, Jr. to study the water crisis and propose a solution (Weidner, 1974: 28). Less than a month and a half later, on December 22, 1832, Colonel Clinton made his report. The solution that he proposed was extraordinary, both in terms of its size and cost: he recommended tapping the Croton River 40 miles north of the city. Ultimately, his proposal called for the construction of the world's first long-distance urban aqueduct since the Roman Empire (Platt *et. al*., 2000). While it was estimated that Clinton's proposal would cost several million dollars to complete (NAS, 2000: 47),[1] he maintained that it would provide an 'inexhaustible' supply of relatively pure water (Weidner, 1974: 29).

The proposal to tap the Croton River sparked the interest of civic leaders and politicians from both the New York City and New York State governments. (The federal government was not involved in the project). In 1834 the New York State Legislature, upon the request of the City's

[1] At $12 million, the total cost of completing Clinton's plan far exceeded his original estimate of $2.5 million (Weidner, 1974: 47 and 31).

Common Council, appointed a permanent Board of Water Commissioners. Among its most important powers, the newly created Water Board was authorized to raise the necessary capital for the project and empowered to acquire water rights and land in the Croton watershed by condemnation (Finnegan, 1997: 590). The state legislature's decision to vest the City with the power to regulate land use in watershed communities was seminal. Not only did it allow for the construction of one of the most celebrated water systems in modern history, it marked the beginning of a long history of tension between water managers from New York City and residents of upstate watershed communities. Ultimately, it set in motion more than a century of acrimony, political battles, and legal actions.

By tapping a source far outside of City boundaries, Clinton had hoped to avert the legal battles that had marred earlier attempts to expand the water supply (see Weidner, 1974). He was not, however, able to completely avoid the issue. Residents of the Croton watershed were infuriated by City's attempts to remove them from their land; opposition to the City's powers of condemnation coalesced almost immediately. Their efforts were largely fruitless, though, and the condemnations progressed at a rapid pace (Finnegan, 1997: 591-4). By the end of 1838, the City had acquired all of the land necessary to build its new water system.

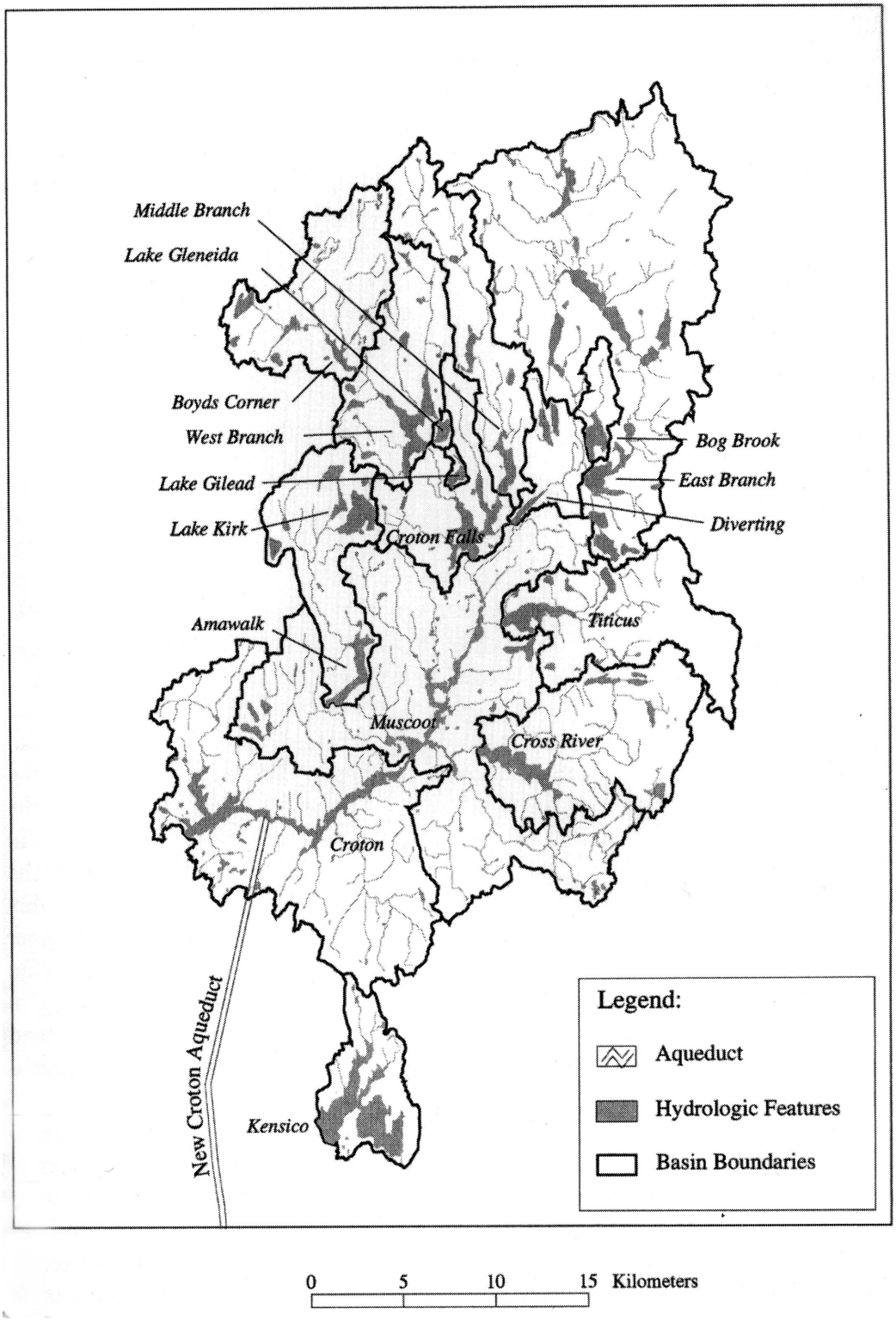
The relatively easy process of acquiring land allowed for a timely construction of the Croton system. The completion of the dam and aqueduct in 1842 was an occasion of much pomp and circumstance. The arrival of water to New York City on the Fourth of July was celebrated with the firing of canons, the ringing of church bells, and a five-mile parade that was viewed by 'thousands of jubilant spectators' (Weidner, 1974: 46). For the first time in its history, New York City had an abundant supply of water.

The Croton River Project entailed a number of what were, at the time, engineering marvels: a 600-million-gallon reservoir, a 40-mile covered masonry aqueduct, a 1,450 foot-long 'high-bridge' to convey the aqueduct across the Harlem River and into Manhattan, a 35-acre receiving reservoir, and a four-acre, masonry-walled distributing reservoir on the present day site of the New York City Public Library (Platt *et. al*. 2000). Indeed, its completion marked the emergence of New York City as a 'modern' city (Weidner, 1974). The water system was the prototypical long-distance water transfer system. It served as a model for many major urban centers in the United States, including Boston, San Francisco, Los Angles, and future expansions of New York City's own water supply.

Expanding the Water Supply

Despite Clinton's assurances that the original Croton system would adequately meet New York City's water needs for generations to come, demand soon outstripped supply. Clinton's forecast of the City's rapid population growth through 1870 was fairly accurate (Weidner, 1974). What he failed to predict, however, was the invention of the water closet and flush toilet—two developments that dramatically increased per capita water consumption—and consumers' 'prolific' waste of water (Finnegan, 1997: 594). Beginning in 1883, the Croton system underwent a number of expansions, including a new aqueduct in 1892 and a massive new Croton River dam in 1905. With the addition of several smaller dams, the present day Croton River

FIGURE 1: THE CROTON WATER SUPPLY SYSTEM



Courtesy of the NYC DEP

system—which consists of 12 reservoirs and three controlled lakes—was completed in 1911. (A map of the current Croton system is shown in Figure 1).

Providing a potential maximum supply of 336 mgd, the Croton System exceeds the total water supply available to many major metropolitan areas in the United States (NAS, 2000: 50). Nonetheless, it was still unable to keep pace with New York City's rapidly expanding population. In 1898, Manhattan consolidated with the Bronx, Queens, Brooklyn, and Staten Island, bringing an estimated population of 3.5 million people into the boundaries of Greater New York City (NAS, 2000: 50). In their search of yet another water source, the New York City Department of Water Supply turned to sources in the distant Catskill Mountains.

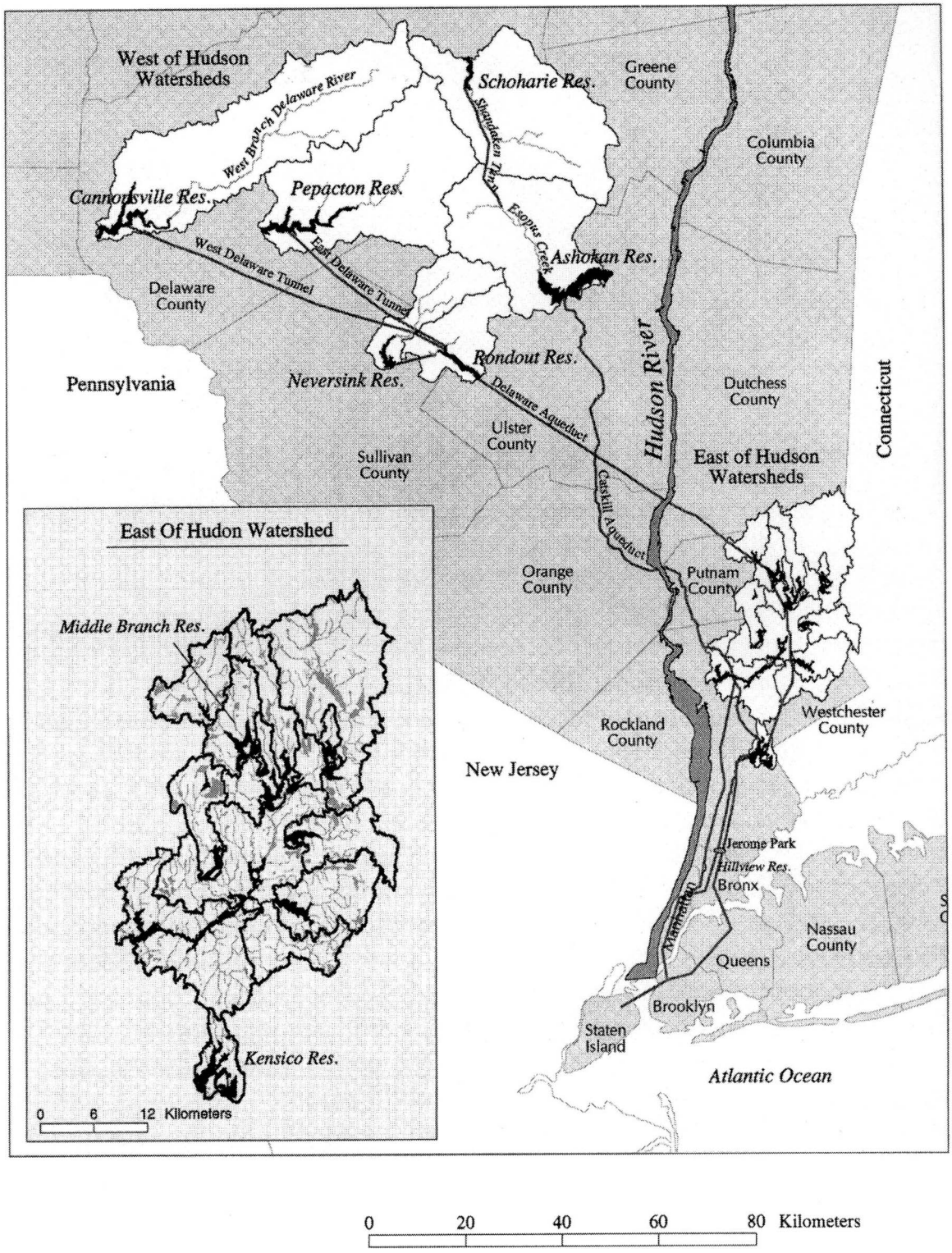
Located roughly 90 miles northwest of New York City and on the opposite side of the Hudson River, tapping the Catskill watershed would require yet another feat of engineering. Between 1907 and 1929, the City acquired the water rights and constructed the Schoharie and Ashokan reservoirs in the Catskill Mountains. An 18-mile aqueduct carried water from Schoharie to Ashokan via the Esopus Creek (Stave, 1998: 104); a 92-mile Catskill aqueduct then conveyed water from Ashokan to the City, crossing the Hudson River by means of a high-pressure inverted siphon (Platt, *et. al*. 2000: 10). When the Ashokan Reservoir and the Catskill aqueduct were completed in 1917, the New York City Board of Water Supply lauded it as 'daring and magnificent,… absolutely without technical precedent. It may be said that the Catskill aqueduct is in a class by itself, and no other aqueduct, ancient or modern, approaches it in size and capacity' (NYC BWS, 1918: 112 *c.f.* Stave, 1998: 106).

New York City's celebration of technology and engineering—and its related dependence upon far-away water sources—did not end with the completion of Catskill water supply. In 1928, one year before the Catskill system was even completed, the City began preparations to reach out to the even more distant headwaters of the Delaware River. Adjacent to the Catskill watershed, but separated by the 3,000-4,200 'High Peaks' area of the Appalachian Plateau, the Delaware watershed is located more than 100 miles northwest of New York City.

Construction of the Delaware River system began in 1937. Its completion was delayed by the financial woes of the Great Depression and World War II, yet the City held fast to its plan. When it was completed in 1965, the project consisted of four reservoirs and an 85-mile long aqueduct that drained into the Kennisco Reservoir in the Croton Watershed north of New York City. (A map of the entire New York City water supply is shown in figure 2[2]). For more than 35 years, the Delaware River watershed has proved to be both a clean and plentiful source of water for the seemingly insatiable thirst of New York City.

[2] In total, New York City's water supply consists of 19 reservoirs and three controlled lakes; water is transferred to the City via several hundred miles of large-diameter aqueducts and some 6,000 miles of water mains (Stave, 1998: 98). About 95% of total City consumption is delivered by gravity (NAS, 2000: 63). Overall, it is the largest and, some would argue, the best water supply system in the world in terms of quality, reliability, and innovative management (NAS, 2000: 45; World Resources, 2000-2001).

FIGURE 2: THE NEW YORK CITY WATER SUPPLY



Courtesy of the NYC DEP

Land Acquisitions and Legal Institutions: A History of Animosity

The importance of the water obtained from the Catskill and Delaware watersheds cannot be understated. Combined, they provide approximately 90% of the water consumed by nearly nine million people living in Greater New York City and surrounding communities.[3] Reflecting its supreme quality and taste, New York City's drinking water is often referred to as 'the champagne of tap water.' In terms of engineering, the system is often invoked as the prototypical urban water supply.

Despite these commendations, the Catskill/Delaware system has had its share of critics and opponents. Not the least of whom are the watershed residents themselves. Constructing the reservoirs and aqueducts that provide New York City residents with a clean, reliable source of water greatly disrupted the lives and livelihoods of thousands of people living in upstate watershed communities. To obtain the land for its water system, the New York City government not only evicted local residents from their land, but they did so in a manner that is consistently described as malevolent and utterly lacking in respect for the emotional bonds that watershed residents had established with their land (*e.g.* Finnegan, 1997, Stave, 1998, Steuding, 1989). The process created deep wounds that have been slow to heal. The history still scars the memory of many watershed residents and has soured relations between the City government and watershed residents for nearly a century.

New York City obtained its authority to regulate land use practices in the Catskill and Delaware watersheds lands from the New York State Legislature in 1905. Named after its proponent, New York City Mayor George McClellan, the McClellan Act of 1905 authorized the City government to buy land or use eminent domain to acquire land to construct its reservoirs. Land condemnations in the Catskill watershed began almost immediately after its passage.

The haste of New York City officials to obtain a cheap water supply engendered a great deal of resentment in watershed communities. Empowered by the McClellan Act, New York City took possession of land parcels—including the owners' dwellings—within as few as ten days after condemnation. In addition to evicting local residents from their land on short notice, property valuations were quite low. Some families were ousted from their homes for as little as $250 (Steuding, 1989). While residents were entitled to challenge appraisal values *ex post*, the hearings were often prolonged, contentious, and hostile. As Finnegan (1997: 604) reports, the City had the audacity to debate whether a "quiet sylvan brook" was worth more than a "murmuring brook;" on one occasion it presented testimony maintaining that a particular property was worth less because it was located "on the dirty side of the street." The disrespect and caprice exercised by the City resulted in strained—if not bitterly hostile—relations with local residents.

[3] Nearly all of New York City's water is obtained from external sources. The most recent addition, the Delaware River system, provides about 50% of the City's water supply; another 40% is obtained from the neighboring Catskill Watershed. The Croton Watershed—the system that was supposedly going to provide New York City with water 'for generations to come'—now supplies about ten percent of the City's water. A small, almost negligible, amount of water consumed in the southeastern portion of Queens is obtained from an underlying aquifer (NAS, 2000: 62). In total, the existing water supply provides 7.4 million people living in New York City—along with some 1.5 million visitors, workers, and residents of neighboring communities—with 1.4 billion gallons of water per day (Stave, 1998).

Though no numbers are available, the evictions displaced thousands of Catskill/Delaware inhabitants from their homes and communities. Construction of the Ashokan Reservoir alone resulted in the dismantling of 12 villages and hamlets and led to the relocation of seven more (Stave, 1998). According to one former resident, "New York City just washed us away;" a common refrain at the time was that "although the City had brought jobs and money, it had taken the heart of the land, the most desirable part, and left the inhabitants the rim" (Steuding, 1989: 101). The stories of how New York City took advantage of the watershed community are widespread and have been kept alive through both oral accounts and popular writings (*e.g.* Steuding, 1989). Their prevalence helps to explain why many Catskill/Delaware residents are unenthusiastic—if not resentful—of the City's water supply system.

Upon completion of the Delaware River system, the presence of New York City in the three watershed areas reduced significantly. With the dams and aqueducts for their water system in place, most City officials returned home. Efforts to acquire new land were halted and City inspectors rarely ventured north to survey the watershed regions. As Finnegan (1997: 609-610) describes, the City's policy in the Croton, Catskill, and Delaware watersheds evolved into one of "benign neglect."

Although the McClellan Act of 1905 authorized the City to protect its drinking water with land use regulations in the watershed areas, it failed to exercise this power. In 1954, when the City finally decided that new control measures were necessary, the state laws in New York had changed. The State Public Health Law of 1953—implemented in part as means of protecting the rights of upstate watershed communities—required that the New York State Department of Health (DOH) approve all new land use regulations in the area. As a result of this new check on the New York City's power, water managers were only able to get two and one half pages of "woefully inadequate provisions" on the books (Finnegan, 1997: 610).

With the industrial growth and the rapid expansion of suburbia in Post World War II America, New York City was unable to properly protect its water supply. Not only was the City unable to properly regulate land use activities in the watersheds, but also its land holdings around reservoirs and tributaries were insufficient. Growth and industrial development occurred in all three water systems, but especially so in the Croton watershed. Privately owned buffer lands that once protected water quality in the watershed disappeared; by the late 1980s some areas had no buffer at all (Finnegan, 1997). In addition to eliminating the forests and wetlands that hitherto served as natural water filters, the impervious surfaces associated with residential and commercial development allowed larger quantities of poor quality water to flow directly into the reservoirs, stressing the water supply with additional pollutants.

A New Crisis: Water Quality

As New York City allowed the quality of its drinking water to deteriorate, federal water quality standards became increasingly more stringent. In 1974 the U.S. Congress passed the Safe Drinking Water Act (SDWA). The law, intended to protect public health by regulating the nation's drinking water supply, authorized the Environmental Protection Agency to set national health-based standards for drinking water to protect against both naturally occurring and human-

produced contaminants that may be found in drinking water. For more than a decade, New York City was in compliance with the water treatment regime originally prescribed by the SWDA. In 1986, however, Congress amended the SWDA, tightening drinking water standards and generating new provisions for water supply systems. To implement this new legislation, the EPA issued the Surface Water Treatment Rule (SWTR) in 1989. The law requires all municipalities that obtain their water from surface sources to construct a water filtration plant unless two conditions are met: (1) The water must consistently meet federal drinking water standards; and (2) the water supplier must show that it can prevent water quality degradation through an 'adequate' watershed protection program.

The financial implications of the SWTR for New York City were enormous. Constructing a filtration system for the Catskill and Delaware systems was estimated to cost as much as $6 billion; another $200-$300 million a year would be necessary for operation and maintenance costs (NYT, 1996). The installation cost alone was the equivalent of the City's annual capital budget (Ray and Heidlebaugh, 1996: 4). Combined with the $690 million that would be necessary to construct a filtration system for the Croton watershed, the SWTR presented New York City officials with both a fiscal and political nightmare.

Constructing a water filtration system for the Croton system was unavoidable. Increasing suburban development in the area had long rendered the quality of water from the area as questionable; as early as 1971 the City was exploring the option of constructing a filtration plant as means to rectify the taste and odor problems associated with Croton water (Stave, 1998: 177-8). In 1992 the DOH mandated that the New York City Department of Environmental Protection (NYC DEP) filter the water originating in the area. The Croton filtration system is scheduled for completion on March 1, 2007 (NAS, 2000: 59).

While City officials readily acknowledged the necessity of a filtration plant for the Croton watershed, they were determined to avoid building a similar system for water originating in the Catskill and Delaware watersheds. Instead of constructing a filtration plant that even the EPA agreed would be excessively expensive (NAS, 2000: 25), the DEP pursued the option of obtaining a filtration waiver. As previously mentioned, municipalities could avoid filtering their surface water supplies if—in addition to meeting federal drinking water standards—they developed an approved watershed management plan. Water managers from New York City interpreted this as exercising the power that was vested them by the McClellan Act of 1905: imposing new land use regulations upon watershed communities.

In September 1990, scarcely a year after the SWTR was promulgated, the NYC DEP produced a Discussion Draft of revised Rules and Regulations for land use in the Catskill and Delaware watersheds. Among other things, the draft proposed establishing 500-1000 foot buffers around watercourses and reservoirs and restricted activities such as the siting and construction of septic systems (NYC DEP, 1990b). Farmers were to prevent the flow from barnyards from discharging to surface water. The proposed regulations restricted a variety of developments, including the construction of roads, parking lots, and storage facilities for hazardous substances. The City also suggested that it would acquire more land in the watershed and, under the most extreme scenario, prohibit "all developable land from development" (Pfeffer and Wagenet, 1999).

Needless to say, the proposed regulations were met with strong opposition from watershed communities. At his first public meeting in the watershed, the commissioner of the NYC DEP was confronted with more than 600 angry people who were there to demonstrate their opposition (Ray and Heidlebaugh, 1996: 9). Residents maintained that the Discussion Draft would create economic hardship both by requiring them to spend money to comply with the regulations and by restricting economic opportunities such as business expansion and home development. They believed that New York City residents would benefit at the expense of watershed communities and that the rules implicitly suggested that they were poor stewards of the land. Ultimately, they decried the draft Rules and Regulations as yet another action by an imperialist City that disrupted their lives, mined their communities for water resources, and consistently failed to provide adequate compensation.

While constructing the debate that surrounded—and to some extent, still surrounds—the draft Rules and Regulations as a conflict between New York City water consumers and upstate watershed residents makes for an easy story, it fails to capture the many stakeholder groups that were involved and their particular actions and motivations. There were, in fact, many factions participating in the debate, each with a specific agenda and each helping to shape the final outcome (Stave, 1998). This study will focus on a particular subset of the actors involved. Specifically, it will focus on farmers from the watershed communities and the New York City Department of Environmental Protection. To a lesser extent, it will also examine the roles played by the New York State Department of Health, non-governmental environmental organizations, and the New York State Department of Agriculture and Markets. The following section—which provides a brief description of the geographic, demographic, and socio-economic features of the Catskill and Delaware watersheds—will facilitate an understanding of why these particular stakeholders were chosen for this study and provide some insight into their respective motivations.

Description of New York City's Water Delivery System

Although New York City's water supply consists of three distinct watersheds, it is often characterized as two systems. The Catskill and Delaware River watersheds are often lumped together as the west-of-Hudson (WOH) system, or, in a name that is evokes the rugged terrain of the area, the Catskill Mountains. The Croton watershed is often referred to as the east-of-Hudson (EOH) system. The division reflects both geographical and socio-economic differences.

Located 40 miles north of New York City and on the same side of the Hudson River, the EOH system is significantly more urban than its WOH counterpart. Since it was first tapped by New York City in 1842, the Croton watershed has transformed from an area that was once characterized by a small number of large-scale farming operations to one dominated by commercial and residential developments. Beginning in the 1950s, the population of this once rural area exploded; over the past five decades the population has nearly tripled in size (NAS, 2000: 82). In 1990 there were 132,000 people living in the 375-square mile watershed, translating into 352 people per square mile (NAS, 2000: 59).

Accompanying this growth in population, there has been a disappearance of forests and wetlands. In place of these natural water filters, housing developments, parking lots, roads,

industrial sites, and golf courses have arisen, all of them posing major threats to the quality of reservoir water.[4] Despite its deteriorating environmental quality—or, perhaps, because of it—residents of the Croton watershed are relatively affluent. In 1989, median household incomes in EOH counties ranged from $49,000 in Westchester County to $54,000 in Putnam County, making it one of the wealthiest areas in the State of New York (U.S. Census, 1990).

In sharp contrast to the Croton water supply, the 1,600 square-miles of watershed in the WOH system are sparsely populated and characterized by a relatively poor agricultural community. When this area was first tapped for water in the early twentieth century, there were approximately forty-one inhabitants for every square mile of land. Little has changed since then. In fact, the number of people living in the watersheds in 1990 exceeded the population estimate for 1860 by just 235 people (NAS, 2000: 82). Today, there are approximately 66,000 people living in the WOH system (Stave, 1998).

The topography of the Catskills—characterized by steep rocky, mountains with shallow soils and valley bottoms and floodplains with a larger deposit of soils—has greatly influenced land use in the area. Nearly three-quarters of the total land base in the WOH system remains forested. Another 15% of the land is dedicated to agriculture, making it the single largest industry in the area (WAC, 1997: 4). At less than 2%, high density residential and commercial development account for a relatively small proportion of land use in the Catskill/Delaware watersheds (Stave, 1998: 156).[5]

The WOH system contains land from five New York counties: Delaware County, Greene County, Schoharie County, Sullivan County, and Ulster County. None of the counties are located entirely within the watershed. Roughly one-third of the total land from the five counties is within watershed boundaries, ranging from 7% of the land from Sullivan County to 56% of the land from Delaware County (Stave, 1998: 152). Only 13% of the counties' inhabitants live on watershed lands (Stave, 1998: 153).

Despite New York City's dependence upon the WOH system, in and of itself the City owns very little land in the area. New York City holds less than 7% of the land in the system; about half of it is located beneath reservoirs. As part of its Catskill Forest Preserve, New York State controls another 20% of the land. Nearly three-quarters of the watershed land is under private ownership and thus may yield contaminants from agriculture or other land use activities. Though the McClellan Act of 1905 authorizes the NYC DEP to regulate activities on private land, public opposition and the Public Health Law of 1953, which requires that all land use regulations be approved by the New York State DOH, have muted its power. As will be discussed shortly, the DEP, together with the watershed communities, is developing a more cooperative approach to land use management that, among other things, includes voluntary land acquisitions and the purchase of conservation easements.

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[4] Twelve of the thirteen reservoirs in the EOH are now classified as eutrophic (NAS, 2000: 83). The quality of the Croton water supply—particularly its color and odor—has decreased over the years.

[5] Because this development tends to be concentrated in stream valleys, however, it can have a disproportionately large—and negative—influence on water quality. Agriculture can also represent a potential cause of nonpoint-source pollution. Water quality may be at risk from cropland drainage, barnyard drainage, and soil erosion. If properly controlled, however, these pollution risks can be substantially reduced, allowing farmers to play a positive role in maintaining water quality.

Agriculture and Poverty in the Catskills

Agriculture is one of the most—if not *the* most—defining characteristics of the Catskill/Delaware watersheds. Next to forested land, agriculture ranks as the highest land use in the area. Local people identify themselves as residents of a farming community; they talk of how agriculture—combined with tourism[6]—forms the basis of their regional economy. Though only one percent of the watershed's residents claim farming as their principal occupation (Stave, 1998: 162), there is a significantly larger number of part-time farmers in the Catskills and many more people are employed in agricultural related services. A common refrain in the area is that "A farmer's dollar turns over seven times."

In 1997 there were 2,200 farms operating in the five counties of the Catskill/Delaware system (USDA, 1999); approximately 40% of those farms were located within the boundaries of the two watersheds.[7] The most significant agricultural land use is centered in the valley bottoms of the Delaware River watershed. As illustrated in Figure 3, farms are relatively evenly distributed across this watershed, with many found close to major water tributaries. Moving east, into Greene, Schoharie, and Ulster Counties—where the terrain is more mountainous and the soil is of relatively poorer quality (NAS, 2000: 389)—farms become more sparsely distributed. As detailed in Table 1, one-third of the farms in watershed counties are located in Delaware County. As Figure 3 suggests, however, the district may host an even larger proportion of the farms located within the watersheds' boundaries.

Table 1: Number of Farms in Watershed Counties

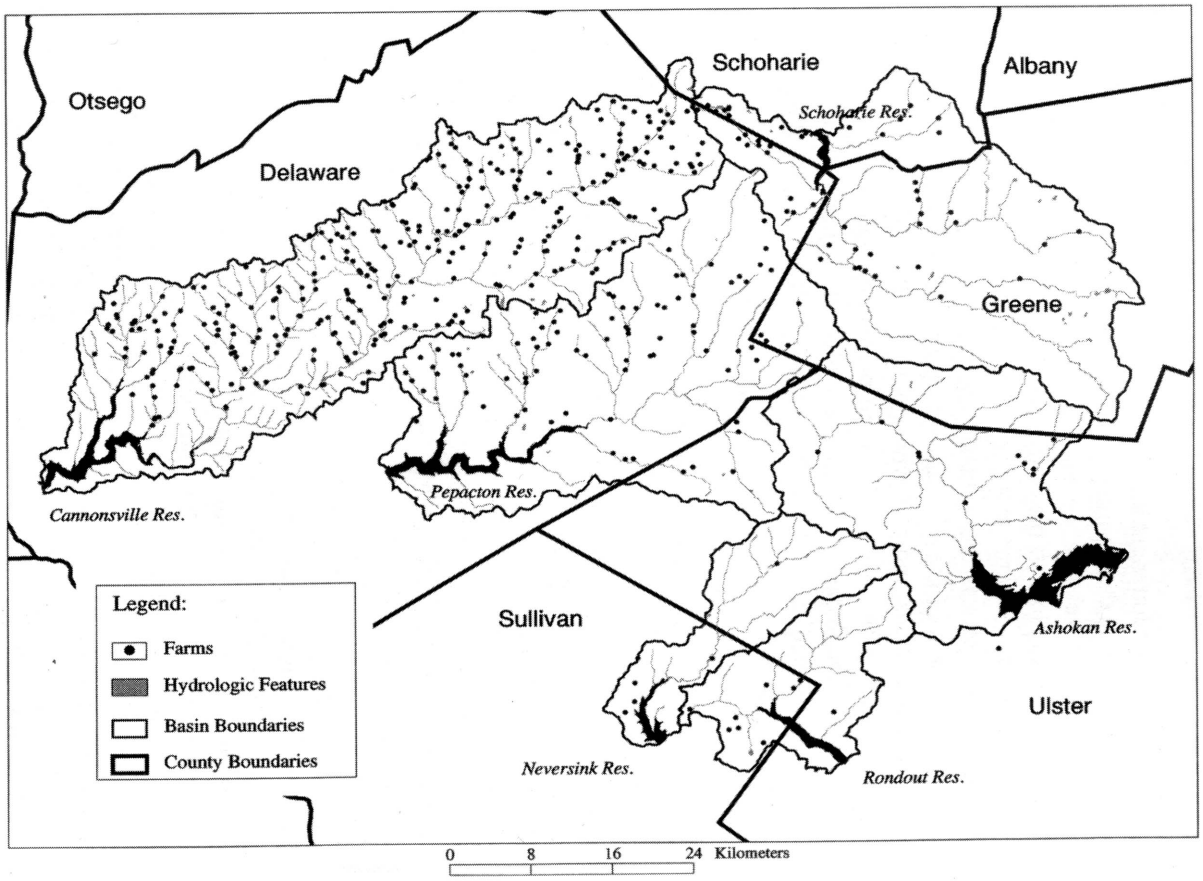
County	Total Number of Farms	Percent of Farms in Watershed Area
Delaware	717	32.6%
Greene	244	11.1%
Schoharie	518	23.6%
Sullivan	311	14.1%
Ulster	409	18.6%
Total	2,199	100.0%

Source: USDA (1999)

[6] It is difficult to distinguish the two sectors since, as many residents claim, the Catskills' agricultural character is an important component of the area's tourist appeal.

[7] It is important to note the distinction here between watershed boundaries and political boundaries. Though five counties make-up the watershed area, the two sets of boundaries do not exactly coincide. Very little data is available that distinguishes the socio-economic characteristics of watershed residents from their neighbors. Unless stated otherwise, the data presented in this section refers to the five watershed counties. While this is not an exact representation of the watershed, it provides a good portrait of the Catskills region as a whole.

FIGURE 3: FARM LOCATIONS IN THE CATSKILL/DELAWARE WATERSHED



Courtesy of the NYC DEP

About 90% of all farms in the WOH system are dairy farms. The industry became firmly established in the Catskills during the 1800s when railroads linked the region to lucrative markets in the Hudson River Valley and New York City. As early as 1854, the Town of Andes was a prosperous butter-producing region; Delaware County as a whole was reputed to produce high-quality butter (Stave, 1998: 143). In addition to dairy cows, a variety of other livestock can be found in the area. Poultry, beef cattle, veal calves, and sheep are all present in significant numbers (NAS, 2000: 391). Many farms in the region also support crop production and contain significant tracts of forest. In total, field crops account for three-quarters of agricultural acreage in Delaware County (Stave, 1998: 156).

Though agriculture is a defining characteristic of WOH economy, most farmers in the area have other sources of income. As detailed in Table 2, only 39% of the farmers in watershed counties claim farming as their principal occupation. There are approximately 850 farms within the watershed boundaries; only 350 of those farms earn more than $10,000 in gross annual revenues. A survey of watershed farmers earning more than $10,000 in annual gross revenues revealed that roughly one-fourth of those operations earn less than $20,000 per year (see Table 3). The low

Table 2: Principal Occupation of Farmers in Watershed Counties

County	Farming	Other Occupation	Total
Delaware	309	408	717
(Percent)	(43)	(57)	(100)
Greene	71	173	244
(Percent)	(29.1)	(70.9)	(100)
Schoharie	205	313	518
(Percent)	(39.6)	(60.4)	(100)
Sullivan	121	190	311
(Percent)	(39)	(61)	(100)
Ulster	149	260	409
(Percent)	(36.4)	(63.6)	(100)
Watershed Area	**855**	**1,344**	**2,199**
	(39)	**(61)**	**(100)**

Source: USDA (1999)

Table 3: Gross Annual Income of Surveyed Farms

Gross Annual Income	Number	Percent
$10,000 - $20,000	16	25.3%
$20,000 - $30,000	4	6.4%
$30,000 - $40,000	1	1.6%
$40,000 - $55,000	2	3.2%
$55,000 - $70,000	4	6.4%
$70,000 - $100,000	10	15.9%
More than 150,000	26	41.2%
Total	63	100.0%

level of income suggests that most watershed farmers—as in the Catskills region as a whole—are also employed in other endeavors.

Farmers in the Catskills often refer to themselves as poor. In recent years, they claim, the falling price of dairy and other agricultural products has made it particularly difficult for them to earn a living. Indeed, during the five-year period from 1992 to 1997, the average market value of agricultural products sold in watershed counties decreased by 9% (see Table 4). During the same time period, the average *net* cash return from agriculture fell in three of the five watershed counties; in Delaware County, returns fell from an already low $13,682 in 1992 to $11,582 in 1997 (see Table 5). While it is important to remember that most farmers have other means of income, that does not necessarily imply that they are not poor. At $26,000 per year, the median household income in watershed counties is only 78% of the median household income for the State of New York (U.S. Census, 1990); more than 12,000 of the roughly 66,000 watershed residents live in poverty (Stave, 1998).[8] Given the importance of agriculture to the regional economy, one might suspect that a significant number of farmers are among the Catskills' poor.

Negotiation as a Process

When the NYC DEP issued its first draft of proposed Rules and Regulations in 1990, it was confronted with strong resistance from watershed residents. One group that was particularly vocal in its opposition was the watershed's agricultural community. The volume the of farmers' complaints stemmed not only from the large number of farmers and farm-related workers in the area, but also from the disproportionately large effects that the proposed Rules and Regulations would have upon agriculture in the region. The farmers were quick to mobilize and they were able to enlighten City officials to the positive role that agriculture could play—and had historically played—in protecting water quality. They argued that rather than placing additional hardships on an already struggling agricultural sector, the City would be more likely to achieve its water quality goals if it provided the farmers with the economic and technical assistance necessary for them to improve their environmental practices. As a result of their timely action and convincing logic, watershed farmers were able to come to a relatively quick compromise with the DEP. Other stakeholder groups from the watershed were less able to persuade the City of their contributions to water quality and, as a result, were much slower to come to an agreement. This section discusses the processes that lead to the eventual agreements, focusing principally upon the negotiations between watershed farmers and the NYC DEP.[9]

Though the proposed Rules and Regulations would have negatively impacted the lives of many watershed residents, the agricultural sector would have been one of the most dramatically affected. Among other things, the Discussion Draft proposed 500-1,000 foot buffers around waterways and reservoirs. Watershed farmers would have limits placed on where they could store animal wastes and artificial fertilizers, discharge the wastes from their barnyards and feedlots, and spread manure and artificial fertilizers. Farmers would also be required to construct

[8] Poverty is defined as annual earnings of $10,963 or less for a family of three.

[9] For a more thorough description of the process that led to an agreement between the NYC DEP and other watershed interests, see Finnegan (1997) and Pfeffer and Wagenet (1999). See Ray and Heidlebaugh (1996) for a more in depth discussion of the negotiations between New York City and the watershed's agricultural community.

TABLE 4: AVERAGE MARKET VALUE OF AGRICULTURAL PRODUCTS SOLD IN WATERSHED COUNTIES

County	1992	1997	Percentage Change
Delaware	$71,457	$60,666	-15.1%
Greene	$36,497	$35,988	-1.3%
Schoharie	$57,541	$52,071	-9.5%
Sullivan	$66,894	$75,126	12.0%
Ulster	$117,564	$103,368	-12.0%
Watershed Area	$72,225	$65,879	-8.8%

Source: USDA (1999)

TABLE 5: AVERAGE NET CASH RETURN FROM AGRICULTURE IN WATERSHED COUNTIES

County	1992	1997	Percent Change
Delaware	$13,682	$11,582	-15.3%
Greene	$17,711	$14,883	-16.0%
Schoharie	$28,063	$21,056	-25.0%
Sullivan	$30,022	$43,354	44.0%
Ulster	$49,991	$65,545	31.1%
Watershed Area	$26,505	$28,622	8.0%

Source: USDA (1999)

dikes around grazing areas so as to prevent stormwater from carrying surface runoff into waterways.[10]

Intended or not, the buffer zones would have severely limited agricultural opportunities in the watershed. Recall from Figure 3, that most farms in the Catskills are located near major water tributaries. Barnyards and dairy barns were originally built next to the streams so that the water could be used to keep milk cold. (That and the surrounding mountains were too rugged to support agricultural activity). The Delaware County Soil and Water Conservation District estimated that the setback requirements proposed in the Discussion Draft would have taken more than one-third of the cropland in Delaware County—the area where agriculture is most concentrated—out of production (Ray and Heidlebaugh, 1996: 8). One farmer maintained that the buffer widths would have prevented him from farming nearly one-half of his land.

Farmers in the WOH system were already struggling. Falling prices for dairy products and tax and land use policies that discourage agriculture had contributed to a declining number of farms in the region (WAP, 1994). By taking quality land out of production, the setback distances

[10] As one watershed official explained to me, the proposed dikes were impractical: "If you build dikes around a field you don't have a field anymore. What you have is a pond… The people in New York City who wrote the agricultural regulations had no practical experience. The only thing that they knew about farming was what they had read in books."

would have threatened the farmers' very economic existence. The risk was only compounded by the implicit costs of the program. In the fields, livestock need regular access to water. Keeping animals out of the streamside buffer areas would have required farmers to install costly fencing and bridges for stream crossings, as well as the installation of alternative watering systems. Farmers claimed that the expenses of complying with the regulations combined with reduced agricultural land ultimately threatened their already marginal livelihoods. Indeed, one study estimated that 75-80% of the 200 dairy farms in Delaware County would be forced out of business if the regulations were imposed (Markert and Moon, 1991).

The agricultural community in the watershed reacted swiftly and angrily to the Discussion Draft. The very day after the regulations were released, the Delaware County Soil and Water Conservation District hosted an emergency meeting to devise a strategy for their repeal. Farmers in the watershed were furious. As one farmer noted, "You could sense the anger and possibility of violence in the air." Farmers were threatening to load their shotguns and to let their dogs attack the city inspectors and water police who were to enforce the regulations. There was also a broader movement towards individual non-compliance with the proposed regulations, with farmers flatly stating that they would refuse to adhere to the City's rules.

While the agricultural community's reaction to the proposed Rules and Regulations was driven by largely by a concern for its economic well-being, there were other motivating factors. The farmers were also concerned about maintaining their lifestyle and community values. Rules imposed from afar challenged their local autonomy and denied them of a voice in defining their local landscape. As one farmer explained:

> We had our own mini-Boston Tea Party up here. We said, 'Wait, hold the phone. You're not going to do that. You're not going to shove those down our throats.' We just put-up resistance.

The rules also suggested that the farmers were poor stewards of the land. Identifying themselves as environmentalists who worked with and understood their local surroundings, many members of the agricultural community resented this implication. They claimed that if they did pollute the water they did so only because they did not have sufficient economic means to implement environmentally friendly practices. Moreover, they reasoned that by forcing many of the farmers out of business, the proposed Rules and Regulations would only encourage commercial and residential development to take their place and that this, in turn, would pose a greater threat to water quality. Thus, the farmers concluded, rather than make it more difficult to practice agriculture in the watershed, the City would do better to provide them with the economic and technical support that would enable them to protect water quality. The farmers concluded that they were not necessarily polluters and that, under an alternative institutional arrangement, their role as the providers of valuable environmental services could be enhanced.

The NYC DEP readily acknowledged the farmers argument and determined that, relative to other forms of development, agriculture was indeed the 'preferred land use' in the watershed. At the same time, however, the City was apprehensive about committing funds to agriculture in the watershed and unsure how such a management plan could be

structured. Nonetheless, the City was under pressure. The farmers' threat of individual non-compliance would have made it expensive and difficult—if not impossible—to enforce the regulations (Ray and Heidlebaugh, 1996: 13). Faced with a December 1991 deadline from the DOH, the DEP was forced to negotiate.

At the prodding of the watershed's agricultural community, the New York State Department of Agriculture and Markets, the agency that is charged with regulating and protecting the state's agriculture, offered to mediate a resolution. In December 1990, only three months after the NYC DEP issued its proposed regulations, a twelve-member *ad hoc* Task Force was convened. The Task Force's objective was to explore non-regulatory alternatives for protecting and maintaining the quality of New York City's water supply while helping to sustain the economic viability of farming as a preferred land use in the watershed. The task force was chaired by the NYC DEP commissioner, Al Appleton, and facilitated by the New York State Department of Agriculture and Markets' Dennis Rapp. Other committee members included individual farmers, public health officials, and agricultural agencies such as the Farmers Preservation Alliance and the New York State Grange.[11] The Task Force was supported with a Technical Support Group of approximately forty members who provided "expertise in the natural and agricultural sciences" (NYC DEP, 1991: 2).

On December 31, 1991, after twelve months of frequent, intense, and often heated discussions and negotiations, the *ad hoc* Task Force released its policy recommendations. In a document that is often referred to as the "Brown Book," the Task Force recommended that the City withdraw the agricultural regulations proposed in the 1990 Discussion Draft and outlined an alternative watershed management strategy known as Whole Farm Planning (NYC DEP, 1990). According to the Task Force, the strategy, which was to be promulgated under an initiative known as the Watershed Agricultural Program (WAP), "satisfactorily addresses the City's objectives for drinking water quality protection and compliance with federal and state rules and standards as well as the farming community's concerns for sustaining and enhancing the agricultural economy and way of life" (NYC DEP, 1990: iii). The basic premise of the program, the details of which will be discussed in the following section, was that a healthy agricultural economy in the region protects water quality by preventing agricultural land from being converted to uses that pose greater threats to water quality. Rather than forcing land use regulations upon the Catskill's agricultural community, WAP is a voluntary and locally administered program whereby City funds are used to implement environmentally friendly practices on watershed farms.

Though it was not sufficient enough for the City to obtain a long-term filtration avoidance determination (FAD) from the EPA, the agreement between the NYC DEP and the watershed's agricultural community helped to buy the City time. Coinciding with the announcement of the Watershed Agricultural Program in 1991, the DOH temporarily waived the SWTR requirement that New York City filter its water supply. The WAP represented a step in the right direction. In and of itself, however, it was not an adequate watershed management plan. There were still many other stakeholder groups in the watershed that had yet to come to an agreement with the DEP.

[11] For a complete list of the members on the *ad hoc* Task Force and their affiliated organization, see Appendix A.

At the same time that the Watershed Agricultural Program was taking shape, a voice for watershed residents who were not affiliated with agriculture was beginning to develop. Under the guidance of the Delaware County Board of Supervisors, watershed residents formed the Coalition of Watershed Towns (CWT). The goals of the Coalition, which consisted of thirty-three town and all five county governments, were three-fold: first, the CWT wanted a guarantee that New York City would compensate watershed communities for the direct and indirect costs of its water protection program; second, it fought to ensure that the regulations did not prevent reasonable community development; and finally, the Coalition challenged the City to make the regulatory process 'fair' and to limit the regulations to the minimum needed to protect water quality (Stave, 1998: 185-6). The Coalition proposed to use a combination of litigation, negotiation, community protests, and media events to meet its goals.

Within six months after its formation, the CWT had acquired a sizeable war chest to finance its cause. In addition to some $200,000 pledged or collected from towns, businesses, and individuals, State Senator Charles Cook had secured a $100,000 appropriation in the state budget to aid the Coalition (Stave, 1998: 185). The details of the negotiations that followed are beyond the scope of this study.[12] Suffice it to say that after six years of intense, passionate, and at times seemingly futile debate, mediation by the state governor's office allowed for an agreement to be reached on January 21, 1997. Signatories to the agreement included New York City, New York State, the EPA, the Coalition of Watershed Towns, some 40 watershed communities and five conservation organizations (the Catskill Center for Conservation and Development, the Hudson Riverkeeper, the Trust for Public Lands, the Open Space Institute, and the New York Public Interest Research Group).

The resulting New York City Watershed Memorandum of Agreement (MOA) outlines the City's management plan for a potable water supply. It is notable both in terms of its size and content. The mammoth agreement, which comprises nearly 1,000 pages of texts and attachments, commits New York City to a long-term watershed management program that combines land acquisition, new watershed rules and regulations, and financial assistance to watershed communities to promote environmental quality and their local economies. The MOA incorporates and expands the aforementioned Watershed Agricultural Program, adopting many initiatives that were simply mentioned as suggestions in the original "Brown Book." The plan, which will cost approximately $1.5 billion over a ten year time period, earned New York City a temporary filtration avoidance determination (FAD) for the Catskill/Delaware water supply until April 2002. While the price tag of the MOA is certainly steep, it represents a substantial cost savings relative to the construction of a multi-billion dollar water filtration system. Indeed, $1.5 billion allocated to the ten-year management plan is roughly equivalent to what the City would have spent on five years of operating and maintaining a filtration system for the WOH system, let alone the initial $6 billion construction cost.

[12] For more detailed accounts, see Finnegan (1997), Pfeffer and Wagenet (1999), and Stave (1998).

CHAPTER 2: AGRICULTURAL INITIATIVES IN THE MOA—A PES PACKAGE WITH A TERRITORIAL VISION

Within the MOA are a number of programs targeted at farmers in the Catskill/Delaware watershed. Collectively, they reflect the sentiment that a healthy agricultural economy in the watershed can positively affect water quality. The flagship of the agricultural initiatives is the Watershed Agricultural Program. Using funds from New York City, the objective of the program is to implement environmental practices—ranging from infrastructure improvements to technical and marketing assistance—on watershed farms. WAP is locally administered and individual participation is voluntary. Farmers who join the program are eligible to participate in a variety of other water-quality initiatives that enhance their economic well-being. Among the initiatives that support—and work in conjunction with—WAP are a Conservation Reserve Enhancement Program (CREP) that pays farmers for removing land from agricultural production; a Whole Farm Easement Program that compensates farmers for forgoing the development rights to their land; a Natural Resource Viability Program (NRVP) that helps to develop markets for the products of watershed farmers; and a Catskill Family Farms Cooperative (CFFC) that provides the capital equipment and organization necessary for produce farmers to achieve economies of scale and market power. Collectively, the agricultural initiatives of the MOA can be understood as a PES package that rewards watershed farmers for their contributions to maintaining the quality of New York City's drinking water. The rewards are both pecuniary and non-pecuniary, as the package also generates intangible benefits such as improved social capital, enhanced self-esteem, and a voice in defining how the local environment is managed. The PES package might be described as having a 'territorial' perspective. Rather than imposing New York City's vision of the landscape upon the watershed community, it respects the local understanding of the Catskills and empowers residents to interact with their surrounding environment in ways that are culturally meaningful yet ecologically sound.

The Watershed Agricultural Program

The Watershed Agricultural Program was the centerpiece of the policy recommendations offered by the *ad hoc* task force on agriculture and New York City's watershed regulations. As outlined in the 1991 Brown Book, the program was founded upon four guiding principles: 100% cost sharing from the City; voluntary participation of watershed farmers; local administration; and strong scientific grounding. Relative to other forms of development in the watershed, the task force—and thereby the NYC DEP—officially identified agriculture as the *preferre*d land use in the Catskill region. To encourage the viability agriculture in the watershed, WAP tailors pollution control to both the particular characteristics of the farming operation and the individual farmer's economic objectives.

When New York City recognized agriculture as the preferred land use in the watershed, it did so from a purely water quality perspective. Relative to residential land use or other forms of development, low-density agriculture presents the least danger to water quality. However, agriculture also represents a potential nonpoint pollution source. Water quality may be

Table 6: Members of the Whole Farm Planning Team and their Contributions

Member	Role in the Whole Farm Planning Process
Farmer	The focus of the Watershed Agricultural Program. Participation is voluntary.
USDA Natural Resources Conservation Service	A source of technical and scientific expertise for WAP, especially regarding BMPs. Has a long history of commitment to locally-led conservation efforts.
Soil and Water Conservation Districts	Grassroots organizations created by each individual county in New York State during 1950s. Mission is to supply technical expertise to farmers on soil and water conservation issues.
Cornell Cooperative Extension	Provide technical and managerial expertise to assist farmers in meeting their missions and objectives. A part of New York State's land grant university, Cornell University.

Source: NAS (2000); WAC (1997)

jeopardized through cropland drainage or fields receiving applications of manure fertilizer, barnyard runoff, and soil erosion. The Watershed Agricultural Program attempts to control these risks without burdening the agricultural community with the costs of pollution control.

Each farmer who chooses to participate in the WAP receives a Whole Farm Plan. As the name implies, a Whole Farm Plan is a comprehensive strategy for controlling potential sources of pollution at the individual farm. The principal objective of the plan is to design and implement Best Management Practices (BMPs) that address pressing environmental concerns yet remain compatible with the farmer's business objectives. Each plan is developed by a planning team that consists of the farmer and representatives from the local Soil and Water Conservation District, the U.S. Department of Agriculture's Natural Resources Conservation Service, and the Cornell Cooperative Extension. The contribution of each member to the planning process is described in Table 6.

A guiding principle of the Watershed Agricultural Program is local leadership. As recommended by the Brown Book, the program is administered by a community grassroots organization known as the Watershed Agricultural Council (WAC). Currently, the council's Board of Directors consists of twelve active farmers, three retired farmers, two local agribusiness leaders, and the Commissioner of the NYC Department of Environmental Protection. Many farmers and watershed officials cited the local leadership provided by WAC as the principal strength of the watershed management plan. They contrasted it to regulations that would have been imposed

upon them from 'outsiders,' noting that it gave them a 'voice' in defining how their local environment was managed. With a $6.5 million annual budget for the year 2000, WAC is New York City's largest provider of contracted services (WAC, 2001).[13]

In addition to local leadership, a second cornerstone of WAP is voluntary participation. This was among the most contentious issues addressed by the *ad hoc* task force (Ray and Heidlebaugh, 1996: 35-39). Initially, the City was adamant that all farmers be required to participate in WAP. Watershed farmers, on the other hand, were firmly opposed to mandated participation and demanded that they be given a choice. The farmers claimed that if they were forced to participate in the program, they would be less enthusiastic about the program and that, over time, they would be less likely to adhere to their Whole Farm Plan. Instead, the farmers suggested that exemption from land use regulations be contingent upon a certain percentage of farmers participating in the program. Voluntary participation would give them a greater voice in the design of their Whole Farm Plan, they claimed, ensuring that the plans were designed in accordance with their specific farm objectives and truly customized to their unique situation. This, in turn, would provide participating farmers with a greater sense of 'ownership' in the plan, encouraging their continued compliance (WAC, 1997: 45). After nearly stalemating the negations, the City and farmers agreed to a principle of 85% voluntary participation: so long as 85% of the watersheds farmers had signed-up to participate in WAP by 1997, the watershed's agricultural community would be exempt from future land use regulations.[14]

A third principle of the Watershed Agricultural program is 100% funding. Many watershed farmers lack the economic resources necessary to implement a Whole Farm Plan on their farming operation. To ensure sufficient participation and to guarantee the viability of agriculture in the watershed, New York City agreed to fully fund WAP. In addition to financing the administration of WAC, the City fully funds the development of each farmer's Whole Farm Plan, scientific support for managing on-farm pollution sources, and the implementation of all structural changes and management according to the approved plan. Thus, the agricultural community does not bear any of the financial costs associated with the implementation of Whole Farm Plans. As will be discussed below, the opportunity to make City-financed improvements to their farms has provided sufficient motivation for many farmers to participate in WAP.

In addition to the principles of local leadership, voluntary participation, and a fully funded program, WAP was also founded upon the notion that the program should be firmly grounded in 'science.' When designing its policy recommendations, the *ad hoc* task force relied heavily upon the information and insights provided by a technical support group. Among other things, these 'experts' helped the task force to better understand the hydrological, agricultural, and public health aspects of an effective watershed management plan. Scientific experts from Cornell University and other organizations continue to play an important role in the design and evaluation of Whole Farm Plans (WAC, 1997: 15). With funding usually supplied by NYC

[13] Not all of the budget was allocated towards the Watershed Agricultural Program. The Council also administers a number of other programs, including the Conservation Easement Program and the Watershed Forestry Program. In 2000, nearly $1.8 million was spent on whole farm planning, $2.4 million on BMP implementation and construction, and $560,000 on administration.

[14] As later negotiated in the 1997 New York City Watershed Memorandum of Agreement (MOA), the EPA made New York City's filtration avoidance determination contingent, in part, upon 85% of watershed farmers participating in WAP.

DEP, these scientists have studied the transport of pollutants and hydrology of the Catskill/Delaware watershed. This has allowed WAP to apply customized research findings to actual farm practices (NAS, 1997: 389-391).

Three Phases of WAP

Although the Watershed Agricultural Program is an integral part of the Memorandum of Agreement and thus New York City's filtration waiver, the program was well established before the 1997 signing of the MOA. To date, there have been two phases to WAP; a third stage is soon to begin.

The first phase of the Watershed Agricultural Program began in September 1992. This was only nine months after the *ad hoc* task force had suggested the creation of such a program and outlined its structure in its 1991 policy recommendations. Phase I was a pilot phase: New York City committed $4 million to establish the Watershed Agricultural Council and to design and implement Whole Farm Plans on ten demonstration farms.

Upon the completion of Phase I, watershed farmers, the New York City DEP, and the New York State DOH had all deemed the Whole Farm Planning approach a success. In October 1994 New York City pledged $35.2 million over a five-year period to make WAP available to all watershed farmers. The only requirements for participation were that the farmers cultivate land within the watershed boundaries and that they earn a minimum of $10,000 in gross annual revenues. Originally Phase II was intended to last through October 1999. WAC did not exhaust its funds during this time period, though, and the phase was given a two-year extension. At the time of this writing, the Watershed Agricultural Council and NYC DEP were in the process of negotiating a Phase III that would begin in October 2001.

The objectives for Phase III are quite ambitious. As expressed by the DEP's program manager, funds would not only be allocated to complete the implementation of plans approved during Phase II, but the agency is also considering a number of enhancements to the program. The DEP will also allocate funds to support any revisions that need to be made in existing Whole Farm Plans, to monitor the current agreements, and to possibly provide for the costs of maintaining current BMPs. Originally, the DEP had hoped to implement a ten-year agreement. Planning for Phase III, however, became tangled in the fact that New York City's current filtration avoidance determination (FAD) from the EPA expires in April 2002. The City's budget office is unwilling to commit to a long-term plan until the current FAD negotiations are complete.

Developing a Whole Farm Plan

As summarized in Table 7, the Whole Farm process consists of eleven steps. The process is designed to address the priority nonpoint-source pollutants in the watershed: *cryptosporidium parvum*, *giardia lamblia*, and phosphorus (WAS, 1997: 13). Livestock generate the pathogens *cryptosporidium parvum* and *giardia lamblia*; many BMPs that are being implemented in the Catskill/Delaware watershed are designed to manage manure on farms. Phosphorous inputs typically occur in animal feed and fertilizers; outputs typically include animal waste, plant materials, and fertilizer that fail to penetrate the soil (NAS, 2000: 393). Given that these three

Table 7: Steps in the Whole Farm Planning Process

Step	Description
1	Identify the farm's short- and long-term mission, objectives, business plan, and resources.
2	Inventory and analyze water, soil, air, plant, and animal resource information.
3	Determine the priority water quality issues on the farm relative to the established priority pollutants for the watershed.
4	Identify alternative practices that address priority water quality issues and are compatible with the farm's mission and objectives.
5	Determine the expected effects of the alternative practices on water quality, soil, plants, and animals.
6	Identify the appropriate practices that satisfy the program's water quality criteria.
7	Quantify he economic and management effects of the alternative practices.
8	Select and integrate the practices to be included in the Whole Farm Plan. Submit the plan to the Soil and Water Conservation District and the WAC for approval.
9	Develop tactical and control plans to ensure successful implementation of the approved Whole Farm Plan.
10	Implement the Whole Farm Plan.
11	Assist, monitor, and evaluate the implementation of the Whole Farm Plan and evaluate progress towards addressing priority environmental issues and towards the farm's mission and objectives.

Source: WAC (1997)

pollutants are closely associated with livestock operations, WAP is targeted primarily towards dairy and cattle farms. Operations without farm animals generally receive less attention and, as will be discussed later, less funding for their Whole Farm Plan.

Economic Considerations

According to the Watershed Agricultural Council, there is a "proud determination to sustain and strengthen the remaining family farms" in the Catskills region (WAC, 1997: 4). To ensure that participation in the Watershed Agricultural Program does not undermine this resolve, farmers' economic concerns are an important component in the design of Whole Farm Plans.

The initial step in the design of each plan is to identify the farmer's objectives and document a business plan. Both short- and long-term goals are identified, allowing for the design of a Whole Farm Plan that provides the farmer with the flexibility to evolve with a dynamic agricultural sector. Later in the design process, the various BMPs that address a particular pollution concern are evaluated according to seven economic criteria (WAC, 1997: 44):

1) Compatibility with the farmer's mission, objectives, and goals
2) Whether the practice maximizes farm profit
3) Impact of the practice on labor efficiency
4) Management intensity and complexity
5) Whether the practice requires that the farmer have capital equipment that is not provided by WAP
6) If the practice minimizes WAP expenditures
7) Impact of the practice on required operation and maintenance

Early in Phase II, an attempt was made to quantify the economic and management effects of the Whole Farm Plan on the farmer. The impact of each BMP on net farm income was measured via a partial budget analysis. As one Whole Farm Planner noted, however, this step was abandoned during the initial year because "there wasn't anything that was causing a striking disadvantage to the farmers." He explained that Whole Farm Plans generally entailed the construction of a concrete barnyard and that that had "very large potential benefits—particularly in terms of improved cow health—that would offset any small negative impacts that might occur from other Best Management Practices."

Assessment is the final step in the Whole Farm Process. Plans are evaluated according to their impact on both water quality and economic goals. This stage often leads to revisions in the Whole Farm Plans. The plans may fail to meet existing objectives or, as is frequently the case, the farmers may have altered their business plans. Some farmers decide to change the size of their operation while others decide to produce a different type of product. With 119 Whole Farm Plans revised in 2000 (WAC, 2001b: 6), WAP prides itself on its ability to adapt the plans to an ever-changing agricultural sector. As one WAC official noted, "If we were static, we'd both (the farmers and WAC) be out of business."

Potential Economic Benefits of Participating in WAP

The New York City Department of Environmental Protection touts the Watershed Agricultural Program as "the first upstate/downstate collaboration to link water quality protection goals with an economic objective: *preservation* of the watershed's farming economy" (NYC DEP, 2000; emphasis added). It is important to remember, however, that the principal objective of the program is not to alleviate the relative poverty of watershed farmers, but rather to protect and maintain the quality of New York City's water supply. In the policy recommendations that outline the foundation of WAP, "sustaining and improving the economic viability" of agriculture in the watershed is identified as only a "collateral," or subordinate, objective (NYC DEP, 1991: iii). Moreover, as indicated by the consistent use of the terms "viability" and "preservation," the program is not necessarily geared towards improving the economic well-being of farmers in the watershed, but rather towards facilitating their continued existence.

In theory, WAP does not reward farmers for maintaining the quality of New York City's water supply, it only mitigates the economic burden of implementing environmental practices that help to control nonpoint-source pollution. The reality, however, is that WAP has the potential to improve the economic well-being of farmers. In addition to providing technical assistance to farmers, Whole Farm Plans often entail structural improvements that increase both the net worth and the productivity of farming operations. Many farmers and watershed officials also note that participation in WAP allows farmers to avoid the cost of complying with state and federal environmental regulations, providing them with a relative advantage to farmers outside of the watershed who must bear the cost of making improvements on their farms. This section identifies some of the potential economic benefits that can be accrued by farmers participating in WAP.

Structural Improvements: Best Management Practices are designed to reduce the risk of water contamination from priority pollutants. While they may entail a simple change in management practices (*e.g.* record keeping) oftentimes they are accompanied by structural improvements to the farm or the purchase of new equipment.[15] Fully funded by New York City, these practices not only increase the net worth of watershed farms, they also have the potential to improve the productivity of the farms and the health of the farm animals. Consider, for example, one of the more common BMPs: the construction of concrete barnyards. Prior to WAP, most dairy cows in the watershed were exercised in muddy barnyards. Spring rains would often wash the mud into waterways, carrying with it contaminating pathogens such as *cryptosporidium* and *giardia*. In addition to threatening water quality, the muddy barnyards also endangered animal health. Dragging their udders through the mud, many cows developed an infection known as mastitis. Others suffered from falls or hoof problems. According to watershed farmers, incidences of these problems have fallen significantly with the construction of concrete barnyards. By allowing farmers to properly dispose of animal wastes, the $60,000-$80,000 barnyards were constructed in order to control potential sources of water contamination. At the same time, however, they have significantly improved the health of farmers' cows, ultimately improving the profitability of their farms.

Nutrient Management Plan: Another BMP generating economic benefits for watershed farmers is the development of a nutrient management plan. Nutrient management plans were the most widely implemented BMP in 2000, accounting for 15% of all practices put into operation (WAC, 2001). Many farms in the watershed have a surplus of nutrients. A nutrient management plan attempts to balance the overall nutrient status of the farming operation, ensuring that nutrients such as phosphorous and nitrogen are efficiently used in a manner that both protects water quality and the production of feed and animal products. Oftentimes, WAC helps farmers implement the practice by purchasing manure spreaders for them, augmenting the net value of their farms. Moreover, the more efficient use of nutrients allows farmers to purchase less fertilizer, produce a higher quality animal forage, and decrease their purchases of imported animal feed, ultimately reducing their overall costs. As one dairy farmer commented, "Nutrient management plans have made us much more competitive in this tough situation where milk prices have dropped… Hey, you got to save a buck any place you can without decreasing production."

[15] For a complete list of BMPs implemented in 2000, see Appendix B.

In an attempt to improve nutrient management plans in the area, the Watershed Agricultural Council recently initiated a pilot phase of a Nutrient Management Credit Program on ten watershed farms. The program will explore options to help farmers acquire additional equipment that is necessary to carry out their nutrient management plans. One farmer expressed guarded optimism towards the program, noting that it "has the potential for economic rewards, however, it will see limited success under the current guidelines."

Reduced Cost of Complying with other Regulations: In addition to holding the agricultural community harmless from future NYC DEP regulations, participating in WAP may reduce the costs that farmers would incur by complying with land use restrictions imposed by other government agencies. The EPA, for example, is currently revising its Confined Animal Feeding Operations (CAFO) Regulations. The revisions will require large farming operations to control potential sources of agricultural pollution through practices such as manure storage and nutrient management plans. Having Best Management Practices already in place, watershed farmers will be relieved of the costs of compliance. While most farmers in Catskill/Delaware region are admittedly small enough to escape the CAFO Regulations, they will not be exempt from the Animal Feeding Law that will go into effect in 2009. Essentially, the law will require that farms throughout the nation have a Whole Farm Plan. Having a City-funded plan already in place, farmers from the Catskills region will have a substantial economic advantage over farmers in other areas of the country.

Potential Economic Costs of Participating in WAP

While the Watershed Agricultural Program has the potential to improve the economic well-being of farmers in the Catskill/Delaware region, it also has the potential to generate economic costs. Most watershed residents and farmers believed that it would, at the very least, have a non-negative impact on the economic status of agriculture in the watershed. Nonetheless, are a few scattered concerns and complaints.

One concern is that the adoption of BMPs creates additional operation and maintenance costs for the farmers. This concern is rarely mentioned, though. In fact, numerous farmers claim that the Whole Farm Plans have actually *improved* the efficiency of their operations.

A second concern is that participation in WAP will require some farmers to purchase equipment at their own expense in the future. As part of their Whole Farm Plans, the Watershed Agricultural Council purchased new equipment (*e.g.* manure spreaders) for some farmers. The purchases, however, were one time purchases. Under their operation and maintenance agreements, farmers are responsible for replacing the equipment once it becomes inoperable.[16]

A final concern is that WAP has harmed farmers in the area by reducing the value of their land. As one farmer complained, "They've ruined my farm, just by coming in here (the watershed). Now I have no resale value to it whatsoever." His fear was that nobody would want to purchase land in the watershed due to the threat of regulations on agricultural land and the existing

[16] It was rumored that New York City was considering funding purchases of replacement equipment in Phase III of WAP.

regulations on other types of land use. As a local realtor explained, however, this is not a legitimate fear; WAP has had no noticeable impact—positive or negative—on real estate values in the Catskills.

Small Farms Program

Participation in WAP is limited to watershed farmers with at least $10,000 in gross annual revenues. Indeed, given that large farming operations are more likely to produce priority pollutants, this was a way of ensuring a lower cost/benefit ratio. By focusing on the larger farms, WAP achieves a greater amount of pollution control per dollar spent.

Nonetheless, there are some 500 farming operations in the watershed that do not earn sufficient revenues to participate in WAP. The combined pollutants generated on these farms pose a genuine risk to water quality. To combat this threat, the WAC is soon to initiate a Small Farms Program (SFP). Implementing Whole Farm Plans on smaller farming operations, SFP is similar to WAP. Participants will be eligible receive technical assistance and be able to participate in most of the related programs that reward farmers for protecting water quality. (One notable exception, to be discussed below, is the Whole Farm Easement Program). Due to limitations in funding, however, SFP will only finance structural improvements on the farms that pose the greatest risk to water quality. Few, if any, SFP participants will receive new barnyards, fencing, bridges, or capital equipment such as manure spreaders.

Targeted towards farmers with $1,000 - $10,000 in gross annual revenue, the Small Farms Program still excludes subsistence farmers and those without a "commercial intent." More than 120 farmers have already expressed an interest in SFP. Based on their environmental evaluation, five or six farms will be chosen to participate in the program's initial pilot phase; watershed officials hope to start implementing practices on those farms later this year.[17]

Related Components of the PES Package

When it first proposed the Watershed Agricultural Program in 1991, the *ad hoc* task force recognized that although certain Best Management Practices had the potential to generate economic benefits for participating farmers, many of those supposed benefits would not be realized for years to come. In and of itself, it was reasoned, WAP would not provide the incentives necessary for the voluntary program to be a success. Thus, the task force recommended that an incentive system be developed that would "compensate producers for their management time lost during the planning phase of the Whole Farm Program" (NYC DEP, 1991: 8).

Rather than proposing a specific incentive package, however, the Task Force branded the issue as "complex" and suggested that it be "allowed to evolve over time" (NYC DEP, 1991: 9). Funding for the package was eventually allocated under the MOA in 1997. Nonetheless, many aspects of the incentive system are still being formulated. While New York City officials

[17] Because the Small Farms Program is in it early stages, officials at the Watershed Agricultural Council declined to provide me with contact information for small-scale farmers in the watershed. They did not want me to "create expectations" or make the farmers "feel uncomfortable about participating."

maintain that they have "an interest in the economic well-being of farmers," watershed farmers complain that "they still put water quality way above the economic well-being of the farmer!!" Taking a more conciliatory approach, one WAC official explained, "New York City is not necessarily opposed to economic viability, they just don't understand their role. The challenge is showing them what can be done and to get them more enthused about it." Indeed, a number of locally-led programs have been initiated in recent years. Four of them—the Conservation Reserve Enhancement Program, the Whole Farm Easements Program, the Natural Resources Viability Program, and the Catskills Family Farms Cooperative—illustrate the important role that New York City can play in promoting the economic well-being of watershed farmers.

Conservation Reserve Enhancement Program

The Conservation Reserve Enhancement Program (CREP) is a federally funded program that pays farmers to remove streamside land from agricultural production. The United States Department of Agriculture (USDA) initiated CREP as a nationwide program in 1997; currently there are twelve states, including New York, participating. The manner in which it is administered in the Catskill/Delaware watershed is unique, however, in that federal funds are complemented with New York City dollars. Thus, while CREP may improve the economic position of farmers throughout the United States, the benefits accrued by farmers in the West-of-Hudson water system can be substantial.

One WAC official described the Conservation Reserve Enhancement Program as "hugely beneficial to farmers' economic status." Indeed, he may be right. The program, which has been in place in the Catskill region since August 1998, provides farmers with an annual rental payment to convert sensitive agricultural land along watercourses into forest buffers or filter strips. Contracts range from ten to fifteen years. According to a WAC economist, the average net farm income in the watershed is less than $20 per acre. Under CREP, however, the USDA pays participating farmers $112-$115 per acre to remove land from agricultural production, representing a substantial economic benefit of approximately $93 per contracted acre.

In addition to annual rental payments, CREP also provides farmers with two types of incentive payments. The first type of payment, the Signing Incentive Payment (SIP), is a one-time disbursement based upon the number of years in the contract and the number of acres in the buffer zone.[18] The second type of payment, the Practice Incentive Payment (PIP) pays farmers 40% of the capital costs required by their particular CREP contract. In other words, PIP pays farmers 40% of the actual costs to install fencing, stream crossings, alternate water sources, and other practices that keep animals away from protected waterways. The USDA provides all of the funding for these incentive payments: the same benefits are available to participating farmers throughout the country. Due to their special arrangement with New York City, however, farmers in the West-of-Hudson system receive additional benefits that are not available to farmers outside the Catskills region.

Under the Watershed Agricultural Program, New York City funds the costs of capital improvements that protect water quality. Outside of the Catskill/Delaware watershed, CREP only provides farmers with a PIP that covers 40% of the costs. Thus, farmers in other parts of

[18] Signing Incentive Payment = (Number of Years in the Contract) x (Number of acres in the contract) x ($10)

the country must pay for the remaining 60% of CREP practices such as fencing and stream crossings that protect buffer zones. Given that 100% of these costs are covered in their Whole Farm Plan, watershed farmers are able to pocket the PIP as an additional incentive payment. As a result, farmers in the Catskills region receive a relatively larger financial reward for their participation in CREP than farmers from other parts of the U.S.

Prior to CREP, farmers in the watershed were unsupportive of efforts to keep their livestock away from the streams and rivers. As one planner noted, "The cows felt as though they had a God-given right to have access to the stream and the farmers thought that it was ridiculous to deny them of that right. There were a lot of emotions. It was a really difficult issue." He then described how CREP had helped to alter those sentiments and that watershed farmers were now very eager to participate in the program; WAC's CREP team is having a difficult time accommodating the demand. As of January 2001, 63 farmers in the watershed were participating in CREP with buffers planned for 700 acres of streamside land (WAC, 2001c). WAC hopes to plant 2,000 acres of buffers over the next two years and is currently working with New York City and the USDA to extend the CREP contract beyond its 2002 expiration date (WAC, 2001a; USDA, 2001).

Conservation Easements

In January 1997, as part of the mammoth Watershed Memorandum of Agreement, New York City committed $20 million to establish a conservation easement program in the Catskill/Delaware watershed. The idea of conservation easements had been proposed five years earlier in the Brown Book as a possible strategy for a "Farmland Retention Program." At the time, it was suggested that the program would operate apart from—and in addition to—the proposed incentives program. Indeed, the theory of easements is that they do not necessarily generate economic benefits, but that they simply allow the farmers to transfer their assets from one form to another. The value of easement is approximately equal to the economic return that the farmer would receive by developing the land, so the economic benefit is supposedly neutral. Nonetheless, given that many farmers would prefer to continue farming at even minimal income levels, the program actually pays farmers to continue interacting with the land in ways that they would prefer to do. Many people associated with the watershed believe that the program offers farmers an opportunity to improve their economic well-being.

The Whole Farm Easement Program, as the initiative is known, is unprecedented. Though easement programs have been established in other parts of the U.S., none of them have combined the three components of land preservation, agriculture, and water quality into a single contract. After what one participant described as a tedious five-year design process, the Watershed Agricultural Council was finally able to draft an easement agreement that advanced the interests of watershed farmers yet met the approval of NYC DEP. Among the approximately 45 watershed farmers who expressed an interest in selling a conservation easement, 10 were selected to participate in the program's initial "pilot phase." The council has made offers to purchase easement rights on seven of those farms; they hope to close those contracts in March 2002.

As part of its $1.5 billion budget, the MOA committed $20 million dollars to the Whole Farm Easement Program. Half of the funds were allocated towards the purchase of agricultural easements, the remaining half was allocated towards the purchase of easements for forested land on farms. The forest easements prohibit all forms of development on the contracted land while the agricultural easements limit land use to agricultural practices that are done in accordance with a Whole Farm Plan. Thus, given that the farmers must adhere to an approved set of Best Management Practices, only those farmers participating in WAP are eligible to sell a conservation easement to WAC. Because they generally have smaller land holdings, participants in SFP will not be eligible to sell conservation easements.

The easements are one-time transactions to be held in perpetuity by the Watershed Agricultural Council; the easements remain in force even as the property changes hands. Should the Council cease to exist, the contracts would then be held by WAC's contractor, the New York City Department of Environmental Protection. The price of an agricultural easement is calculated as the difference between the unrestricted-use value of the farm and the restricted-use value of the farm. A New York State certified appraiser determines the value of the easement; prices are non-negotiable.

Natural Resources Viability Program

The Natural Resources Viability Program (NRVP) is another component of the MOA that has the potential to generate economic benefits for the Catskills' agricultural community. The goal of the program is to increase market demand for agricultural products produced on WAP farms, thereby making sustainable agriculture more profitable. With the possible exception of the Catskill Family Farms Cooperative (to be discussed below), the initiative has seen limited success. That may soon change, however. NRVP has a new director who promises to invigorate the program—and, ultimately, increase farmers' incomes—by developing niche markets for farmers' products.

The objective of the Natural Resources Viability Program is to increase consumer demand for the products of watershed farmers. The program's director mains that agriculture is currently "drowning in a production support system." He notes that all innovation in the industry—technology, mechanization, science, and extension—has been geared towards helping farmers to produce more output. The efforts have been so successful that there is now an excess supply of agricultural goods in the U.S. His two-fold goal is to (1) expand the existing markets for Catskill agriculture and (2) create new markets where WAP farmers are able to earn a greater return on their products.

One recent initiative designed to assist Catskill farmers is the so-called "watershed cheese project." This project is particularly worthy of mention in that it would encourage dairy farmers to utilize environmentally beneficial practices while providing them with an opportunity to increase the value of their product. Participating farmers would be required to employ pasturing, a feeding technique that is apparently more conducive to protecting water quality than captive feeding methods. Farmers would also take a more active role in producing dairy products. Rather than shipping their milk to another location for processing, they would spend 3-4 hours per day making cheese. A representative from an enterprise known as the Grassland Cheese

Consortium would then buy the cheese from the farmers in order to age it and distribute it to markets. Under this arrangement, participating farmers will produce two types of value in addition to the value of the milk: (1) the value created by processing the cheese and (2) the value of generating a brand name (*viz*. Catskill watershed cheese). By capturing more of the value of the final product, the idea is that participating farmers will increase their farm revenues and, ultimately, their profits.

The Watershed Agricultural Council is currently soliciting farmers who would be willing to participate in a pilot phase of the watershed cheese program. Based on the following selection criteria, one farm will be chosen to serve as the pilot: the farmer's commitment to the project, the farmer's management skills, the size of the farmer's herd, the ability/ease of conducting tours on the farm, and the cost of placing a modular cheese-making facility on the site.[19] Another criterion that will be decisive—yet has thus far remained implicit—is that there are cows, as opposed to other types of livestock, on the farm. In order to provide an example for the greatest number of farmers in the watershed, WAC intends to produce cow cheese on the pilot farm. Farmers with sheep, goats, or other types of livestock will be excluded from participating, at least during the initial stage.

Catskill Family Farms Cooperative

Much like the Natural Resources Viability Program, the Catskill Family Farms Cooperative (CFFC) was established to increase the demand for agricultural products produced on Catskills farms. Rather than focusing on the products of dairy farmers, however, the CFFC is dedicated to tapping niche markets for vegetables and other produce cultivated in the area. The similarities between the two initiatives stems from the origin of the Cooperative: It was initiated by—and incubated within—the NRVP but then branched out on its own.

In 1998, the Watershed Agricultural Council obtained funding from New York City to establish a farming cooperative that would explore alternatives to dairy production in the watershed. In an attempt to capitalize on the proximity of watershed farms to New York City, WAC hoped to expand the demand for specialty agricultural products among the City's fine dining restaurants and other urban consumers. Due to management and funding problems that will be discussed in the following chapter, the Cooperative broke away from WAC management and incorporated on its own in January 2000. Nonetheless, the two organizations continue to share a symbiotic relationship where WAC touts CFFC as a successful development project that it initiated while the cooperative relies on its affiliation with WAC to obtain grants and loans.

Due to its association with WAC, the Catskill Family Farms Cooperative has been able to obtain capital equipment that most small-scale produce farmers would not be able to afford. To initiate the cooperative in 1998, WAC obtained a number of grants. Some grant monies were obtained from an economic development fund established under the MOA,[20] others were obtained from the USDA's Rural Business Development Program. The grants, which were technically awarded to WAC, allowed the Cooperative to purchase numerous pieces of equipment, including a

[19] In order to obtain funds for the modular cheese-making facility, WAC is applying for a Rural Business Development Grant from the U.S. Department of Agriculture.
[20] This fund, known as the Catskill Fund for the Future, will be discussed in the following chapter.

delivery truck, a forklift, a vegetable washer, and a large cooler to store the members' produce. These capital purchases have improved the efficiency of vegetable production in the watershed. Their shared use has also helped unify the cooperative's membership. In the words of one CFFC member, the equipment is 'part of the glue that brings us all together.' Providing capital equipment and organization, the cooperative helps the Catskill's vegetable farmers to achieve both economies of scale and market power.

After an uncertain start, the Catskill Family Farms Cooperative has established itself as a small yet significant component of the watershed's agricultural economy. Membership in the cooperative was initially limited to farmers participating in WAP who cultivated vegetables or other non-dairy crops. Those participation requirements changed, however, when CFFC split from WAC. Membership is now open to all produce farmers in the Catskill/Delaware region, not just those who farm within watershed boundaries. The Cooperative has also become more focused in the crops that it cultivates, focusing almost exclusively on fingerling potatoes. Most of CFFC's 23 members now grow the specialty crop, making it the single largest producer of fingerling potatoes in the nation. Collectively, the farmers have a powerful voice in determining the price of their product.

WAP and the PES Package

On the whole, WAP and the related agricultural components of the MOA can be understood as a PES package. It is a package that goes beyond merely protecting farmers from the imposition of land use regulations that would have devastated their livelihoods and way of life; it actually rewards them for maintaining the quality of New York City's water supply. The economic benefits range from infrastructure improvements on the farm to marketing assistance and cash payments. In addition to economic rewards, the package also has the potential to generate a variety of non-pecuniary benefits for the watershed's agricultural community. Participation in WAP and its related programs can help to create and reinforce the image of farmers as good stewards of the land; it also has the potential to strengthen the agricultural community's social capital, or valued social relations among community members. Ultimately, by allowing for voluntary participation and customizing Whole Farm Plans to each farmer's needs, the PES package utilizes individual participation to create a territorial—or endogenous, community-level—voice.

A summary of the potential economic benefits of the PES package and the requirements to participate each initiative is presented in Table 8. Combined, the programs can significantly improve the economic well-being of watershed farmers. The infrastructure improvements available under WAP—and occasionally SFP—can increase both the net worth and efficiency of farming operations. The programs also consult farmers on how to improve operational practices such as manure application and may reduce the cost of complying with other land use regulations. Meanwhile CREP and the Whole Farm Easements Program provide farmers with cash payments for using their land in ways that have a positive impact on water quality. CREP pays farmers for taking sensitive streamside lands out of agricultural production, agricultural easements compensate farmers for practicing sustainable agriculture, and forestry easements pay farmers to maintain undeveloped land in its pristine state. Finally, the Natural Resource

Table 8: Economic Benefits and Requirements to Participate in the Various Components of the PES Package

Program	Economic Benefits	Requirements to Participate
Watershed Agricultural Program (WAP)	Structural improvements to the farm; improved operating practices; exemption from NYC land use regulations (as long as 85% of watershed farmers participate); reduced cost of complying with other regulations.	Must farm within the Catskill/Delaware watershed; Must earn at least $10,000/year in gross farm revenue.
Small Farms Program (SFP)	Improved operating practices; exemption from NYC use regulations; structural improvements on those farms that pose significant threats to water quality.	Must farm within the Catskill/Delaware watershed; Must earn $1,000-$9,999/year in gross farm revenue.
Conservation Reserve Enhancement Program (CREP)	Cash payments for removing sensitive streamside land out of agricultural production. Contracts range from 10-15 years.	Must participate in WAP or SFP.
Agricultural Easements	Cash payment for practicing agriculture in accordance with a Whole Farm Plan (other forms of development are prohibited). Held in perpetuity.	Must participate in WAP.
Forestry Easements	Cash payment for forgoing all development rights (including agriculture) on land in the Catskill/Delaware watershed. Held in perpetuity.	Must participate in WAP.
Natural Resource Viability Program (NRVP)	Improved marketing opportunities for agricultural products, especially dairy products.	Must participate in WAP of SFP.
Catskill Family Farms Cooperative (CFFC)	Expanded marketing opportunities for vegetables and produce.	Must practice non-dairy agriculture in the Catskill region (not necessary to farm within the boundaries of the Catskill/Delaware watershed).

Viability Program the Catskill Family Farms Cooperative provide farmers with marketing support, increasing the demand for products that pose a minimal threat to water quality.

In addition to these economic benefits, the PES package has the potential to generate non-pecuniary rewards for watershed farmers. Among these benefits is that the program helps to create and reinforce the notion that watershed farmers are good stewards of the land. When New York City attempted to impose land use regulations on the watershed's agricultural community, it essentially implied that the area's farmers were poor stewards of the land who either intentionally or unknowingly polluted the water supply. The PES package, in contrast, provides farmers with the resources necessary to protect the City's water supply. By so doing, WAP and related programs have not only allowed the farmers to continue practicing agriculture in the watershed, they have also identified farmers as the providers of important environmental services: they are no longer the polluters, they are the conservationists. Thus, the PES package can empower watershed farmers to be good stewards of the land and, as a result, has the potential to improve their self-esteem.

Social capital is another intangible benefit generated by the PES package. Social capital refers to the social networks and ties that facilitate cooperation among community members. Like economic capital, social capital is an asset that has the potential to produce value and is inherently valuable in and of itself. Organizations such as the Watershed Agricultural Council and the Catskill Family Farms Cooperative help to strengthen social capital. They have the potential to improve people's 'capabilities,' or their ability to *do* certain things or *achieve* desired states of being (Sen, 1999). Like all forms of capital, farmers may be able to draw upon these valued social relations to achieve their political and economic objectives.

The PES package designed to assist watershed farmers reinforces the notion of 'territory.' It provides an avenue whereby local people have an active voice in governing the space that they inhabit and they can interact with the local environment in culturally meaningful ways. In other words, it gives them a *place* where they can be farmers, environmentalists, and residents of the Catskills. This notion of territory is partly created by the voluntary nature of the program. Farmers can be individuals and practice whatever type of farming (*e.g.* dairy, poultry, or vegetable crops) that they want on their land. They do, however, have the option to obtain a Whole Farm Plan that is likely to generate both pecuniary and non-pecuniary benefits. Should farmers choose to participate in the program, they contribute to both the image and the reality that the Catskill/Delaware watershed is a place where sustainable agriculture is practiced. By encouraging farmers to interact with their local environment in a particular way, the PES package might be described as having a territorial vision, or a vision that shows consideration for local understandings of the landscape as a place where agriculture is economically viable and ecologically sound. As a locally administered package that is customized to farmers' individual needs, it allows for endogenous processes of innovation. The menu of PES options not only respects the local vision of the landscape, it helps to make that vision possible by providing the economic resources to make that vision a more universal reality.

CHAPTER 3: RESULTS

The New York City Department of Environmental Protection touts the Watershed Agricultural Program as "the first upstate/downstate collaboration to link water quality protection goals with an economic objective: preservation of the watershed's farming economy" (NYC DEP, 2000). Preserving agriculture in the Catskills, however, may require more than simply exempting watershed farmers from land use regulations. Given that prices for dairy and other agricultural products have fallen in recent years (USDA, 1999), maintaining the viability of agriculture in the region may very well require that farmers receive some form of economic assistance. The aforementioned incentives package is the City's attempt to meet this challenge. Providing farmers with economic benefits in return for protecting the quality of its water supply, the City is essentially enlisting the strategy of PES.

This chapter summarizes the merits of the City's agricultural initiatives in the watershed—namely, the Watershed Agricultural Program, the Conservation Reserve Enhancement Program, the Whole Farm Easement Program, the Natural Resources Viability Program, and the Catskill Family Farms Cooperative—as a PES package. The objective is not so much to measure the environmental impacts of the package, but rather to explore the socio-economic impacts of the environmental initiatives on watershed farmers.[21] In keeping with the focus of the PES project, particular attention is given to the program's potential to alleviate poverty in the watershed's agricultural community.

These results are the product of a four-month investigation conducted from January-April 2001. Since little has been written about the socio-economic ramifications of New York City's watershed management plan, most of the data presented here were obtained from interviews and a survey of watershed farmers. Among the organizations interviewed were representatives from the Watershed Agricultural Council, the New York City Department of Environmental Protection, the New York State Department of Health, the Catskill Watershed Corporation, the Catskill Family Farms Cooperative, Cornell Cooperative Extension, the Delaware County Soil and Water Conservation District, and Cornell University. Also, with the assistance of WAC, a survey was mailed to 220 participants in the Watershed Agricultural Program.[22] (The survey instrument and accompanying letter of introduction are available in Appendix C). 72 farmers returned their surveys, for a response rate of 33%. Among those farmers surveyed, respondents were randomly—and, in certain cases, intentionally—contacted for interviews. Due to the politically charged atmosphere from which WAP evolved and—to a lesser extent—it is currently operating, the identity of all individuals shall remain anonymous.

[21] The National Research Council has thoroughly studied the environmental ramifications of New York City's watershed management plan. See NAS (2000).

[22] The survey was written with the intention of studying the impact of only two components of the PES package described here: The Watershed Agricultural Program and the Whole Farm Easements Program. The relevance—and, indeed, existence—of the other components of the package became evident during the ensuing interview process.

The results of this study—which are both quantitative and qualitative—are presented in the seven sections of this chapter. The first section discusses the widely hailed 'success' of the Watershed Agricultural Program, its participation rate, and the motivations to participate/not participate. Farmers' satisfaction with WAP, its impact on their economic well-being, and potential biases in the distribution of its economic benefits are presented in the following section. Section three reviews the Whole Farm Easement Program, discussing the general uncertainty that surrounds agricultural and forestry easements and profiling the farmers who express more interest in selling the development rights to their land. The difficulty that the Natural Resources Viability Program has had in expanding demand for watershed products is discussed in section four. Section five explores the various non-pecuniary benefits that have been generated by the PES package while section six describes some concerns expressed by watershed farmers. The final section summarizes some of the environmental critiques of New York City's management plan.

1. Success of WAP and the Motivations for Participation

Enthusiasm for the Watershed Agricultural Program is widespread. The majority of the watershed's farming community and most of those concerned with quality of New York City's drinking water are supportive of the initiative. This broad support is reflected in—and a product of—the high rate of farmer participation in WAP. As of January 2001, 91% of the 350 eligible farms in the watershed had signed-up for the program (WAC, 2001a: 1), handily exceeding the 85% necessary for farmers to avoid future land use regulations and for New York City to maintain its filtration waiver.[23]

The Watershed Agricultural Council attributes the success of WAP to what it calls informal 'kitchen meetings' (WAC, 2001d). Relying on existing social networks, farmers who are already participating in the program invite fellow farmers to attend gatherings at their homes where WAC staff and partner agencies explain the purposes and procedures of the Whole Farm Planning process.[24] According to WAC (2001d), "As a result of this farmer-to-farmer recruitment, nearly 100% of the farmers attending 'kitchen meetings' have signed-up for the program." One WAC official contrasted this situation of local leadership to a City-administered program: "If the City tried to administer this program directly, they would not have got anybody to sign-up. There is 80 years of distrust in the watershed."

Watershed farmers cite a number of reasons for participating in WAP. As shown in Table 9, the three most often cited motivations for implementing a Whole Farm Plan were to make improvements to the farm, to become a better steward of the land, and to be held harmless from future regulations.

The most popular reason for participating in WAP was to make improvements that would enhance the farm's economic viability. More than one-third of the 72 farmers surveyed for this study claimed this as a motivation for adopting a Whole Farm Plan. Indeed, many plans have included the construction of new barnyards (that typically cost aroundt $70,000), fencing, and

[23] Recall from Chapter 2 that farmers must earn at least $10,000 in gross annual revenues to participate in WAP.
[24] As will be discussed later, the success of WAP is not only a product of the existing social capital in the watershed's agricultural community. Its very success has helped to strengthen those relationships.

Table 9: Farmers' Motivations for Adopting a Whole Farm Plan

Motivation	Frequency	Percent of Farmers Surveyed·
Make improvements to the farm and enhance its economic viability	25	34.7%
To become a better steward of the land and/or improve the quality of New York City's drinking water	22	30.6%
To be held harmless from future regulations and/or avoid the costs of compliance	19	26.4%
Ensure the success of the WAP and/or the continuation of farming in the watershed	6	8.3%
A locally-led and cooperative program versus imposed regulations	4	5.6%
To be eligible to participate in the Catskill Family Farms Cooperative	2	2.8%
Other	6	8.3%

· 72 farmers were surveyed, yet some farmers listed multiple motivations for participating in the WAP. Thus, the total percentage exceeds 100%.

stream crossings. Without the support of the City, many members of the agricultural community would not have been able to afford such improvements. As one farmer explained, "The Watershed [Agricultural Program] has made several improvements that I would not have been able to do because of the low price of dairy products."

Another popular reason for participating in the WAP is that it has allowed watershed farmers to become better stewards of the land. More than 30% of the 72 farmers surveyed listed environmental concerns as their motivation for obtaining a Whole Farm Plan. As reflected in this statistic, many members of the watershed's agricultural community identify themselves as environmentalists and feel that they play an important role in maintaining the quality of New York City's Drinking water. One of those farmers explained:

> Farmers, underneath it all, are basically conservationists. We are concerned about the environment. It may not seem that way sometimes, but we are. And a lot of the projects that WAP is able to put on our farms are projects that we have been wanting to do for years.

The third most cited reason for adopting a Whole Farm Plan was to avoid future regulations. As discussed earlier, so long as 85% of the watershed's farmers participate in WAP the agricultural community will be held harmless from future regulations. To avoid the costs of future compliance, 19 of the surveyed farmers (or 26%) adopted a Whole Farm Plan. One farmer told me, "I felt as though I was most threatened by the DEP, so I signed this [Whole Farm Plan]. It did a great deal for my well-being as a farmer because now I'm protected under their umbrella." Another six farmers joined the program in order to ensure its success and the continuation of farming in the watershed.

Despite the high rate of participation in the WAP, 30 of the 350 eligible farmers in the Catskill/Delaware region have chosen not to participate. I was unable to locate these farmers; few community members know who they are. Some farmers did not think that their neighbors had joined the program. Yet when I contacted those neighbors they maintained that either their Whole Farm Plan did not entail any major revisions to their operation or that they had signed-up for the program but that WAC had not yet begun to implement any BMPs on their farms.

One WAC official explained why two farmers chose not to participate in WAP, but he would not reveal their identities. One of those farmers wanted the Council to include a mobile bridge known as a skid steer in his Whole Farm Plan. WAP policy, however, did not permit the purchase of such equipment so the disgruntled farmer chose not to participate. Another farmer had a Whole Farm Plan designed for his farm and then chose to implement it himself. Reflecting a widespread distrust of the government among watershed farmers, he did not want to receive any government funding. These are only two of the 30 farmers who have chosen not to participate in the program, though. Overall, it is difficult to determine what motivations farmers might have for refusing to join WAP.

Criteria for Success

The success of the Watershed Agricultural Program is not measured in terms of its direct impact on water quality nor its impact on farmers' economic well-being. Instead, it is measured in terms of the number of farmers participating in the program and the number of BMPs that have been implemented. As outlined in New York City's waiver from filtration, the success of the Program is measured by four criteria: (1) the number of farms participating in WAP, (2) the number of Whole Farm Plans that have been developed and approved, (3) the number of Whole Farm Plans that have been implemented, and (4) the number of Whole Farm Plans for which an annual evaluation has been completed (NAS, 2000: 394). As shown in Table 10, WAC exceeded its FAD goals in each of these areas in 2000.

Table 10: Progress 2000: Filtration Avoidance Determination

	Goals for December 2000	Accomplishments as of December 2000
Farms Signed Up	297	320
Whole Farm Plans Approved	249	251
Whole Farm Plans Commenced	174	175
Farms Substantially Complete	73	75
Annual Status Reviews Conducted	47	187

Source: WAC (2001a)

Table 11: Participant Satisfaction with the Watershed Agricultural Program

Level of Satisfaction (Score)		Frequency·	Percent
Very Satisfied	**(5)**	22	31.0%
Somewhat Satisfied	**(4)**	34	47.9%
Indifferent	**(3)**	4	5.6%
Somewhat Unsatisfied	**(2)**	7	9.9%
Very Unsatisfied	**(1)**	4	5.6%
Total		71	100.0%

Mean Level of Satisfaction = 3.88

· No Response = 1

Using participation as the criterion of success is, in part, a product of the contentious interactions between watershed farmers and the NYC DEP. It is also a product of the difficulty that can be encountered in controlling non-point source pollution. By definition, the causes of non-point source pollution are not easily identified and, therefore, not easily monitored. Evaluating the performance of BMPs and their impact on water quality is much more difficult to measure than determining the number of farms participating in WAP or the number of Whole Farm Plans that have been implemented. Nonetheless, as noted in a review of the program by the National Research Council, the voluntary nature of the program may allow some of the biggest polluters to continue contaminating New York City's water supply (NAS, 2000: 394). The Council also suggested that, although costly and imperfect, more monitoring and evaluation be implemented to measure the impact of BMPs on water quality.

Satisfaction of Watershed Farmers

Overall, most watershed farmers are satisfied with the Watershed Agricultural Program. As shown in Table 11, more than three-quarters of the farmers participating in WAP are satisfied with the program. Despite farmers' various motivations for adopting a Whole Farm Plan, their level of satisfaction with the program cannot be disassociated from the impact of the program on their economic well-being.

As illustrated in Table 12, there is a positive correlation between impact of WAP on farmers' economic well-being and their level of satisfaction with the program. Indeed, this claim is supported with a statistical analysis of the data. Using a Cochran-Mantel-Haenszel test for association and a significance level of 5%, one would fail to reject the null hypothesis that farmers' level of satisfaction with WAP is associated with the impact of the program on their economic well-being. In other words, the farmers who have received the greatest economic benefit from their participation in WAP appear to have the most positive attitudes about the program, those who have gained little or nothing from the program are generally ambivalent, and those who claim that WAP has harmed them economically are generally dissatisfied with the program.

Despite this relationship between the economic impact of the Watershed Agricultural Program and farmers' satisfaction with the program, other variables may help to explain the agricultural community's happiness with WAP. Indeed, association does not necessarily mean causation. As will be discussed in a later section of this chapter, WAP has generated a number of non-pecuniary benefits for watershed farmers. The statistical data may be lacking, but the qualitative data is abundant: farmers value many things and their economic well-being is only one of them. This is not to downplay the significance of farmers' economic concerns. It is, after all, their primary consideration for participating in WAP. Nonetheless, one should be careful not to reduce farmers' satisfaction to purely economic explanations.

2. Economic Impact of WAP on Watershed Farmers

The overall perception among farmers participating in the Watershed Agricultural Program is that it has had a positive impact on their economic well-being. As shown in Table 13, 44.3% of

Table 12: Association of Farmers' Satisfaction with WAP and the Impact of the Program on Farmer's Economic Well-Being

Level of Satisfaction with WAP	Positive Impact on Economic Well-Being	No Impact on Economic Well-Being	Negative Impact on Economic Well-being
Very Satisfied			
Frequency	16	6	0
Row Percent	72.7%	27.3%	0.0%
Somewhat Satisfied			
Frequency	13	20	1
Row Percent	38.2%	58.8%	3%
Indifferent			
Frequency	0	3	0
Row Percent	0.0%	100.0%	0.0%
Somewhat Unsatified			
Frequency	2	2	3
Row Percent	28.6%	28.6%	42.8%
Very Unsatisfied			
Frequency	0	2	1
Row Percent	0.0%	67.0%	33%

COCHRAN-MANTEL-HAENSZEL TEST FOR GENERAL ASSOCIATION:

Alternative Hypothesis (H_A):	Farmers' Level of Satisfaction with WAP is Associated with the Impact of the Program on their Economic Well-being
Degrees of Freedom:	8
Value:	23.99
Probability that H_A is False:	0.23%

Table 13: Impact of the Watershed Agricultural Program on Participants' Economic Well-being

Impact on Economic Well-being (Score)	Frequency·	Percent
Positive Impact (3)	31	44.3%
No Impact (2)	34	48.6%
Negative Impact (1)	5	7.1%
Total	70	100.0%

Mean Impact on Economic Well-being = 2.37

the farmers surveyed maintain that their participation in WAP has improved their economic status while 48.6% felt that it had had no impact. Only five of the respondents, or 7.1%, said that their participation in the program had harmed them economically. Interviews with two of these farmers, however, suggested that participation in WAP had not harmed them *per se*. One farmer was concerned about the national trend of falling prices for agricultural products. The other claimed that his participation in WAP had cost him $8,000 one year. Upon further questioning, however, it became apparent his loss was not a direct result of his participation in WAP, but rather due to poor management of the Catskill Family Farms Cooperative (to be discussed in section four of this chapter).

Potential Biases in the Distribution of Benefits

While participation in the Watershed Agricultural Program may improve the overall well-being of farmers in the watershed, it does not appear that the benefits are evenly distributed. Indeed, the farmers most likely to accrue economic benefits from the program are the larger farmers with operations that pose a greater threat of polluting New York City's water supply. Farmers with smaller operations and farmers with more environmentally friendly operations are the least likely to benefit. Thus, rather than rewarding farmers for maintaining water quality, WAP appears to reward the polluters; rather than leveling the economic playing field, the program may actually make it steeper.

According to WAP's cost guidelines, the amount of funding available for each Whole Farm Plan is dependent the size of the farming operation and its production of priority environmental pollutants (WAC, 1994). Each participating farm is rated for its potential environmental impact: the greater the risk that the farm poses to water quality, the more money that is available for the farm's Whole Farm Plan. Parallel to the environmental risk, funding is also dependent upon farm size. The size of the farm is measured by either the gross agricultural income of the farm or number of animal units, whichever results in the higher guideline.

· No Response = 2

Given these two criteria, the program is inherently biased towards livestock farmers, particularly dairy farmers. According to both the animal unit and the gross income measurements, dairy farms tend to be larger. They are also more likely to generate the three highest priority pollutants: *Cryptosporidium Parvum*, *Giardia lamblia*, and phosphorus.

From a purely economic standpoint, this bias towards dairy farms and farms with poorer environmental records is logical. Limited funds are allocated to where they will achieve the greatest marginal reductions of targeted pollutants. At the same time, however, the program essentially provides greater rewards the farmers who have done the least protect water quality. Because they do not generate priority pollutants, for instance, vegetable farmers are less likely to have any practices implemented that would improve their economic well-being. As one farmer complained, "I've even had some of my Whole Farm Planners tell me that since I'm doing vegetables instead of dairy crops on my land, that they didn't see how they could help me out in any way."[25]

A statistical analysis supports the proposition that, among eligible farmers (*i.e.* those with more than $10,000 in gross annual revenues), those who manage larger operations are more likely to accrue economic benefits from participating in WAP than those who manage smaller operations. As shown in Table 14, there is a positive correlation between the size of a farming operation and the percentage of farmers who maintain that their participation in WAP has benefited them economically. Among farmers with an annual gross income greater than $100,000, 66.7% of the respondents maintain that their participation in the program has improved their economic well-being. Yet only 26.7% of farmers with an annual income of less than $20,000 said that the program had helped them out economically. In the intermediate categories, 36% of farmers with sales ranging between $20,000 and $69,999 had improved their economic well-being while 50% of farmers with sales in the $70,000-$100,000 range had accrued economic benefits.

Using a Cochran-Mantel-Haenszel test for association and a significance level of 5%, one would fail to reject the null hypothesis that the annual gross income of a farm is associated with the impact of WAP on the farm's economic well-being. In other words, *the impact of WAP on a farmer's well-being appears to be correlated with the size of the farming operation*. The larger the farming operation, the more likely that participation in WAP will generate economic benefits.

It is important to note here that small farming operations are not necessarily owned by poor farmers. As discussed in chapter one, most farmers in the Catskills have other sources of income; less than 40% of the agricultural community claim farming as their principal occupation. It is commonly assumed that the smaller the farming operation, the more likely the farmer is to pursue additional economic endeavors. Although large farmers may earn greater economic returns from their participation in WAP, the program may still be helping the poorest members of the agricultural community.

[25] It should be noted that farmers who change their production pattern to dairy or other livestock operations would be required to obtain a new Whole Farm Plan that would be likely to include additional benefits. As discussed earlier, WAP prides itself in its flexibility, adapting to the dynamics of an ever-changing agricultural sector. Farmers are not locked-in to a particular Whole Farm Plan.

Table 14: Association of Net Farm Income with Impact of WAP on Farmers' Economic Well-Being

Net Farm Income in Thousands	Positive Impact on Economic Well-Being	No Impact on Economic Well-Being	Negative Impact on Economic Well-being
More than $100			
Frequency Row Percent	16 66.7%	6 25.0%	2 8.3%
$70 - $100			
Frequency Row Percent	5 50.0%	4 40.0%	1 10.0%
$20 - $70			
Frequency Row Percent	4 36.4%	2 54.5%	1 9.1%
$10 - $20			
Frequency Row Percent	4 26.7%	11 73.3%	0 0.0%

COCHRAN-MANTEL-HAENSZEL TEST FOR GENERAL ASSOCIATION:

Alternative Hypothesis (H_A):	Net farm income is associated with the impact of WAP on Farmer's Economic Well-Being
Degrees of Freedom:	12
Value:	22.66
Probability that H_A is False:	3.08%

While their participation in WAP is less likely to improve their economic well-being, it does not appear as though small farmers are unsatisfied with the program. As shown in Table 15, more than 85% of farmers in the smallest income category are satisfied with the program. This is just one indication that farmers' satisfaction with WAP is related to variables other than its impact on their economic well-being.

Table 15: Association of Net Farm Income with Farmers' Level of Satisfaction with WAP

Net Farm Income in Thousands	Satisfied with WAP	No Opinion about WAP	Unsatisfied with WAP
More than $100			
Frequency Row Percent	21 87.5%	0 0.0%	3 12.5%
$70 - $100			
Frequency Row Percent	8 80.0%	1 10.0%	1 10.0%
$20 - $70			
Frequency Row Percent	8 72.7%	1 9.1%	2 18.2%
$10 - $20			
Frequency Row Percent	13 86.7%	0 0.0%	2 13.3%

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3. Whole Farm Easements Program

According to economic theory, conservation easements do not necessarily generate economic benefits. Instead, they are understood as a means of transferring assets from one form to another. In the case of agricultural easements in the Catskills, farmers forgo the development rights to their land and promise to adhere to a Whole Farm Plan in exchange for a one-time cash payment. Similarly, for forestry easements farmers forgo all development rights to their forested land and are compensated with the estimated value of the forgone earnings. This section reviews farmers' motivations to sell easements on their land as well as their hesitations. In general, the watershed's agricultural community is uncertain about selling the development rights on their property. Farmers with larger operations appear to be more enthusiastic about the program.

Farmers expressed three motivations for wanting to participate in the Whole Farm Easement Program. First, some farmers simply desire the money. They would use the additional income for a variety of purposes including reducing their debts and mortgages, making improvements to their property, and for retirement funds. As one farmers expressed, "It looks like a real good way for me to achieve some retirement funding… It will make my last 10-20 years of farming a lot easier."

Second, watershed farmers want to preserve their farms; they do not want their land to be developed in other ways. Many are proud of the improvements that they've made to their land: "I've done a lot to this farm; I want to see it stay in farming." Others, committed to the future of farming in the Catskills, regarded it as their moral duty to ensure that agriculture continues to be a defining characteristic of the region.

The final reason that farmers want to sell easements on their land is that the agreements could facilitate the transfer of their farms. Oftentimes young people who desire to purchase a farm cannot afford to do so. The cost of the land and capital is too expensive. Meanwhile, many established farmers are indebted: even if they wanted to sell their farms, they are unable to sell it at a price that would be affordable to upstart farmers. Agricultural easements would allow the established farmers to pay off their debts while reducing the value of the land, enabling poorer farmers to purchase the operation. As one farmer claimed, "This land belongs in farming. And since I have no one to pass the land to, the WAC easement will make this operation affordable to a young farm family" (WAC 2001a: 6).

The Whole Farm Easement Program can be envisioned as a type of payment for environmental services. The program will provide a monetary reward to farmers for maintaining practices that protect and improve the quality of New City's water supply. In a sense, the program will enforce the notion of "territory." It will allow local actors to undertake desired interactions with one another and the natural environment of the *space* that they inhabit; it will allow them to define the watershed as their own culturally specific *place*. In other words, the easements program will allow watershed residents to undertake economic practices that define the watershed as a place where sustainable agriculture is practiced, thereby reinforcing their identity as both environmentalists and farmers.

On the other hand, given that the easements are held in perpetuity and that they require that the landowners always adhere to a Whole Farm Plan, the program does limit the degree of local control. As their cultural identity evolves, future inhabitants of easement lands will be limited in their ability to alter the local landscape in ways that reflect their evolving community identity. They will be unable to articulate different identities and new definitions of place. This was a fear expressed by many farmers in the watershed. They recognized that they could receive an immediate economic benefit, yet they did not want to restrict the land use options of future generations. Justifying his reluctance to sell a conservation easement, one watershed farmer explained, "My children are too young to decide if they want to be farmers. I don't want to limit their freedom to choose." Uncertain about the future, many in the agricultural community indicated that they would forgo the immediate benefit of an easement payment in order to maintain long-term flexibility in determining future land use practices.

Another concern with the easement program was that it would impose exorbitant transactions costs upon the participating farmers. As one critic maintained, "The money received from an easement does not justify the bureaucratic hassle associated with it. The City's restrictions are insane." Indeed, there are many steps involved in specifying an easement contract. Once a farmer expresses a desire to sell an easement, land surveys and mapping must be conducted, planning is done, appraisals are made, and documents must be approved by the New York City

Mayor's office. If nothing else, the process is very time-consuming, requiring one to two years of preparations.

Given the persuasive arguments both for and against obtaining a conservation easement, it is not surprising that most watershed farmers are uncertain about their desire to participate in the Whole Farm Easement Program. As illustrated in Table 16, 39.1% of the farmers surveyed said they were uncertain about their desire to sell agricultural easements on their land. Among the remaining farmers, roughly half (29% of the total) were interested in selling an agricultural easement; the remaining half (31.9% of the total) were opposed. Overall, the agricultural community was uncertain about its desire to participate in the agricultural easements program.

Farmers were similarly uncertain about their desire to sell forest easements on their land. Due to the steep mountainsides and the narrow valley floors of the watershed, most farmers in the Catskills have some forested land on their property. As illustrated in Table 17, 41.3% of the

Table 16: Desire to Participate in the Agricultural Easement Program

Desire to Participate (Score)	Frequency·	Percent
Yes (3)	20	29.0%
Uncertain (2)	27	39.1%
No (1)	22	31.9%
Total	69	100.0%

Mean Desire to Participate = 1.97

Table 17: Desire to Participate in the Forestry Easement Program

Desire to Participate (Score)	Frequency·	Percent
Yes (3)	19	30.1%
Uncertain (2)	26	41.3%
No (1)	18	28.6%
Total	63	100.0%

Mean Desire to Participate = 2.01

· No Response = 3

· No Response = 3; 6 farmers indicated that they did not have forested land on their property and, thus, were ineligible to participate.

surveyed farmers were uncertain if they wanted their land to remain forested in perpetuity. 19 of the 63 farmers (or 30.1%) indicated that they would like to sell a conservation easement for their forested land while 18 (or 28.6%) indicated that they did not desire to participate in the forest easement program.

Among those farmers who expressed a desire to participate in the agricultural easements program, the overwhelming majority operate large-scale operations. As shown in Table 18, 66.7% of the farmers who indicated that they would like to sell an agricultural easement had operations with a gross farm income greater than $100,000. This represented 46% of all farmers in that income category. In contrast, only 25% of farmers in the smallest farm category and 5.56% in each of the intermediate categories said that they would like to participate in the agricultural easements program. Given that smaller farmers are often engaged in other income-generating activities, this result is not surprising. One would expect that part-time farmers would be less committed to preserving agriculture in the watershed.

Fortunately for the large-scale farmers who desire to sell conservation easements, the Whole Farm Easement Program appears to be biased in their favor. In order to select the farmers from whom it will purchase conservation easements, the Watershed Agricultural Council uses farm-size as one of its principal selection criteria. Though other criteria are used—such as the proximity of the farm to reservoirs, the type of soil on the farm, and the road and stream frontage of the farm—the selection process does favor larger operations. This bias is reflected by the exclusion of farmers in the Small Farms Program from participating in the easement program.

4. The Natural Resources Viability Program and the Catskill Family Farms Cooperative

Though it was implemented as a cornerstone of WAP's incentives program, the Natural Resources Viability Program has seen only modest success. The failure of the initiative to generate significant rewards for watershed farmers has been attributed to two factors. First, the program has not received consistent and adequate funding, and, second, it has been plagued by a history of poor management.

Lack of funding for the Natural Resources Viability Program may stem, in part, from jealousies among the various stakeholder groups in the Catskill/Delaware watershed. Funding for the agricultural incentives program—as proposed by the *ad hoc* Task Force in 1991—was not approved until the signing of the MOA in 1997. As a part of the mammoth agreement, New York City committed $59.7 million to a development fund known as the Catskill Fund for the Future. Not all of the funds were committed to watershed agriculture *per se*, but rather to the broader economic interests of the watershed community as a whole. Administration of the fund was assigned to the Catskill Watershed Corporation (CWC), a successor of the Coalition of Watershed Towns that negotiated the MOA on behalf of the watershed's non-agricultural interests.

To date, the CWC has been somewhat reluctant to support agricultural initiatives in the watershed. Most of its efforts have focused on developing small businesses and tourism in the area. In 1999, the Corporation allocated $93,000 to agricultural development in the watershed; but that amount fell 37% the following year to $58,000 (WAC, 2001a: 9). While the amounts

Table 18: Association of Net Farm Income with Desire to Sell an Agricultural Easement

Net Farm Income in Thousands	Would Like to Sell an Agricultural Easement	Unsure of Desire to Sell an Agricultural Easement	Would Not Like to Sell an Agricultural Easement
More than $100			
Frequency Row Percent Column Percent	12 46.2% 66.7%	9 34.6% 34.6%	5 19.2% 26.3%
$70 - $100			
Frequency Row Percent Column Percent	1 10.0% 5.6%	5 50.0% 19.2%	4 40.0% 21.0%
$20 - $70			
Frequency Row Percent Column Percent	1 9.1% 5.6%	7 63.6% 27.0%	3 27.3% 16.7%
$10 - $20			
Frequency Row Percent Column Percent	4 25.0% 22.1%	5 31.2% 19.2%	7 43.7% 36.9%

are by no means insignificant, many actors complain that the funding is insufficient and that the CWC is holding back. As an official from the NYC DEP explained, "We believe that WAC should be able to access some of that money [from the Catskill Fund for the Future] for its program." "But," he acknowledged, "that never really happened." He concluded, "We agree that WAC should have that function of encouraging agricultural development and marketing. It's just a question of from which pot of City money it should receive its funding."

The reluctance of the CWC to fund agricultural development may reflect a certain degree of jealousy that non-agricultural actors in the watershed hold towards the region's farmers. Relative to other interests in the watershed, the farmers' negotiations with New York City were quick and easy. While farmers and the City had come to an agreement in 1991, the concerns of other watershed residents were not resolved until the MOA was completed five years later.

When the *ad hoc* Task Force first proposed the Watershed Agricultural Program, some in the watershed community were convinced that the City was employing a strategy of "divide and conquer," and they accused the agricultural sector of "selling-out" (Stave, 1998). The possibility of envy was captured in the comments of one actor who helped to negotiate the MOA on behalf of the Coalition of Watershed Towns: "The farmers had an easier time… There's this myth that the family farmer is better than everybody else. Because of that, they get better treatment and have more political support." This apparent jealousy may explain why the CWC has provided only limited financial support for the Natural Resources Viability Program.

While the lack of funds may help to explain the minimal success of NRVP, another possible reason is poor management. In 1998, the Watershed Agricultural Council obtained a loan from the CWC to expand the production of specialty or 'niche' market produce for fine restaurants and other consumers in New York City. The initiative, known as the Catskill Family Farms Cooperative, was to be administered as a part of WAC's Natural Resources Viability Program. The Cooperative endured a number of struggles during its first two years of operation.

When it was first initiated, the only qualifications for farmers to become a member of Catskill Family Farms was that they cultivate a non-dairy specialty crop and that they participate in the Watershed Agricultural Program. The open qualifications attracted about 20 local farmers who produced a variety of goods, including fingerling potatoes, rabbits, strawberries, Christmas trees, wild leeks, goose liver pâté, fiddleheads, and garlands. While the cooperative prided itself on the wide array of its products, the diversity eventually overwhelmed the fledgling organization. Trying to market so many different types of goods created a great deal of confusion. The Cooperative's sales staff was unable to move its product; a lot of the produce simply rotted in CFFC's cooler before it ever reached the market. One former member claims that his first year of participation in the cooperative cost him $8,000. In the words of another member, "We were losing. Period. We were too diverse; we had to become more focused."

Faced with this dilemma, the cooperative chose to limit the diversity of the products that it marketed and specialize in the production of fingerling potatoes. The cooperative's manager had been particularly successful in selling the specialty potatoes to restaurants in New York City, and he encouraged the group to follow his example. Unfortunately, few of the farmers had ever cultivated fingerling potatoes before and many of them simply employed the same approach that one would use to grow conventional potatoes. Thus, rather than producing the narrow, finger-shaped potatoes that were desired by New York City's high-end restaurants, they grew large, round potatoes that they were unable to sell.

Many farmers attribute the hardships experienced by the Cooperative in its early years to poor management by the NRVP.[26] Under the particular funding arrangement of the CFFC—namely that funds were obtained from a grant to WAC—the organization's management was not responsible to member farmers *per se*, but rather to its employer, the Watershed Agricultural Council. This led some Cooperative members to conclude that their manager was not so much concerned about their particular needs as he was about keeping his job. In part, this was because

[26] It should be noted that this claim is based on limited research. All of the information related to the supposedly poor management of CFFC was offered by farmers during interviews. The recurrence of the complaint merits its inclusion in this report.

he may have been overwhelmed with responsibility. The manager did not simply administer the Catskill Family Farms Cooperative, he also oversaw a number of other development programs in the watershed, including the forestry development program. This forced him to make a number of promises that he was never able to fulfill. Farmers complained of missed deliveries, lost orders, forgotten appointments, and general incompetence. One farmer complained, "They told us what to grow, we grew the stuff, and they never took any of it." Another griped, "He would tell you that he was going to deliver… He'd made that promise but he never showed-up. He never picked-up the merchandise." Many disgruntled farmers dropped-out of the cooperative and have yet to return.

While some members of Catskill Family Farms attributed the shortfalls of their manager to having "too much on his plate," others maintained that as an employee of WAC, he felt no responsibility to the cooperative. "We didn't have anybody who was watching out for us," said one farmer. When funding for the initiative was interrupted in December 1999, the Cooperative severed its ties with the Watershed Agricultural Council. While WAC had been counseled to nurture the program for five years, it no longer had the discretion to halt what one Cooperative farmer described as a "revolt."

The new CFFC manager still receives his paycheck through WAC but he is directly responsible to the cooperative members. Members appear to be happy with the new arrangement and are optimistic about the future. The farmers are not bitter towards WAC, they simply maintain that "the Council did not cut us loose soon enough." Indeed, they commend the role that WAC played as an incubator of the cooperative, noting that it "allowed us farmers to organize to the point where we can band together and have an economically viable force, that we can do things together that we never could have done separately."

5. Non-Pecuniary Benefits Generated by the PES Package

Contrary to the premise of neoclassical economic theory, human beings derive well-being from a variety of sources, not just the utility provided by consuming a particular good or service (Gudeman and Rivera, 1998; Sen, 1987). In the case of farmers in the Catskills, the high level of satisfaction with WAP and its related initiatives reflects more than the generally positive impact the programs have had on farmers' economic well-being. It appears that it is also a product of a variety of non-economic benefits that have been engendered by the PES package. Providing farmers with a territorial voice, improving their psychic well-being, reinforcing their identity as good stewards of the land, and strengthening their social capital are four of the non-pecuniary entailments that have been generated by farmers' participation in WAP.

Territorial Voice

The widespread satisfaction with the Watershed Agricultural Program is partly a product of the historical context from which it arose. Many farmers in the watershed view the program as a substantial improvement over the regulations that New York City had tried to impose upon them in 1990. They have resigned themselves to the fact that they are residents in the City's watershed and that their interactions with the land must not have a negative impact on water quality. As stipulated under the McClellan Act of 1905, these are the 'rules of the game.' WAP,

however, has provided farmers with a voice in determining how the watershed is managed, or in how the 'rules' are interpreted. Rather than externally imposed regulations, the program allows for internal definitions. Local actors played an important role in designing WAP, they continue to play an active role in its administration via the Watershed Agricultural Council, and their individual participation in the program is voluntary. In part, their satisfaction is measured relative to the alternative of compulsory regulations.

As explained in Stave (1998), people from New York City construct the watershed differently than local residents. For the residents of New York City, the watershed is little more than a resource, the source of their drinking water. It is only one component of their daily lives. For farmers in the Catskill/Delaware system, in contrast, the watershed governs many aspects of their lives. Its topography has defined where they live, how they farm, and the network of roads that connect them. The watershed is an important component of their daily livelihoods, their social networks, and their community structure. When New York City proposed to impose regulations upon the watershed, it threatened to usurp the local people's social identity.

Many watershed residents describe the success of WAP as a type of 'David-over-Goliath' triumph. With greater legal and financial resources, New York City had a history of imposing its will upon the upstate community and had assumed that it would be able to do so again. By uniting together, however, watershed farmers were able to reverse the previous trend and secure the right to define how the local landscape would be managed. As one resident explained, "We told the City, 'you can't walk in and tell us farmers to get lost. We belong here.'" Indeed, identification of agriculture as the 'preferred land use' in the watershed carried with it the implicit recognition of the farmers' right to interact in meaningful ways with their land. It reaffirmed the watershed as a *place* where agriculture is practiced and local residents are largely responsible for its sustainability.

Psychic Well-being

In addition to reaffirming their right to farm in the watershed, many in the region's agricultural community noted that their participation in the Watershed Agricultural Program had improved their psychological well-being. They explained how the program's provision that they would be held harmless from future regulations meant that they could feel relatively confident that they would be able to continue farming in the watershed. This was a common praise.

One farmer went beyond this version of psychological well-being. She explained how capital improvements to her farm had done little to improve her economic well-being yet they made her feel much better about her farming operation. Her story is worth repeating:

> [My adoption of a Whole Farm Plan] had nothing to do with my economic well-being. But what it did do… It did a couple of things for my overall well-being. *Overall* well-being as opposed to *economic* well-being. The biggest one, is that I had all of the gates on my farm copied from gates from the different counties in England. I had twelve gates made, each one copied from a different county in England. My farm looks *really* beautiful. From the road you can see the principal gate. It looks like I know what I'm doing. It gives an impression to

> customers, to people driving by, that I know what I'm doing and that this is a classy place to buy your land. It did a lot for my well-being. I feel *great* when I look at those gates. They didn't even cost that much. They cost $100. And economics, it doesn't matter. It really impacted my life and my farm. It wasn't supposed to affect my economic well-being.

This account illustrates the pride that many farmers take in their operations. Their farms are a reflection of who they are, an expression of their identity: They are farmers who take pride in their operations. Structural improvements to the farms participating in WAP may or may not make the operations more profitable. They do, however, improve the farm, thereby boosting the farmers' self image.

Good Stewards of the Land

When New York City first proposed regulations they tried to appeal to watershed residents on environmental grounds. In the cover letter for the draft regulations, the NYC DEP framed its watershed protection efforts as a responsibility mandated by the State of New York to serve the collective good:

> These proposed regulations are not anti-development. They are anti-environmentally irresponsible development. The City's obligation to issue them presents a challenge to the City, upstate towns, and counties and the State to forge a partnership that is committed to protecting the water supply of half of the State's residents (1990a: 2).

Watershed residents rejected the City's appeal to establish a common environmental ethic and resented the implication that they were poor stewards of the land (Stave, 1998). They felt that they did not receive adequate recognition for sustaining water quality and they maintained that the residents of New York City were, in fact, the real environmental polluters. They spoke of the trash in New York City streets and City residents' excessive use of water: "They leave the tap running all day." Referring to the Croton Watershed east of the Hudson River, one watershed official observed, "New York City had a clean water supply and they polluted it with sprawl."

Meanwhile, members of the watershed's agricultural community have portrayed themselves as environmentalists. As one community member noted, "Farmers, as a rule, if it were economically viable, would be their own stewards of the land without any help." Given the economically precarious livelihoods of most farmers, however, many were not able to afford practices that protect water quality. WAP has provided them with the necessary resources, thereby reinforcing their identity as environmentalists. As discussed earlier, one of the most common motivations for participating in the program was to become a better steward of the land and to improve the quality of New York City's drinking water. Farmers speak of their environmental practices as if it were their ethical duty and their participation in WAP has made it possible to fulfill that important responsibility:

> We really truly feel that the Whole Farm Plan is a moral obligation. We're trying to do the best we can with the land. We're getting free advice and free help to

> maintain the land, to not have it wash away, and to not be polluting the water. If it's contributing to sustainable agriculture, then yeah, we're in favor of it.

The Watershed Agricultural Program has thus contributed to the overall well-being of watershed farmers by allowing them to become better stewards of the land. As one farmer explained, "We want agriculture to be the good guy." By empowering farmers to implement environmental practices on their land, WAP has created and/or reinforced watershed farmers' connection with their local environment and made its protection an explicit part of their social identity.

Social Capital

When they first organized to oppose the land use regulations that had been drafted by New York City, farmers in the watershed's agricultural community drew upon their social capital. Farmers had already established valued relationships as friends, neighbors, fellow members of the Grange, and other community arrangements. Those preexisting social networks were critical in that they allowed farmers to quickly mobilize and protest the proposed agricultural restrictions. Thus, in addition to existing as inherently valuable social relationships, social capital also empowered farmers to achieve a desired end: the Watershed Agricultural Program as an alternative to land use regulations.

The establishment of WAP's membership body, the Watershed Agricultural Council, has helped to increase the value of social capital in the watershed. It is important to note here that social capital is not a static concept. Like other forms of capital, it has the ability to depreciate (if not maintained) or grow. In the case of WAC, one might say that creation of the Council allowed for the appreciation of social capital in the agricultural community. Via their membership in—and the representation by—the Watershed Agricultural Council, each farmer participating WAP is granted a voice in determining the development of agriculture in the watershed. Through their monthly meetings, committee assignments, and the development of their individual Whole Farm Plans, watershed farmers are able to collectively determine the future of agriculture in the Catskills. WAC has served as important vehicle for facilitating social cooperation, contributing to the overall well-being of the community.

Though no farmers referred to it as social capital *per se*, many recognized the importance of their social bonds and how the creation of WAC has facilitated social relationships. This sentiment is captured by a number of quotations from farmers in the watershed:

> You want to give tremendous amount of credit to the Watershed [Agricultural Council] for one thing: it's that they've brought the farmers together.

> I believe in the Program. It's a lot better alternative. It's farmer-controlled to a high degree. We're working primarily with local people and the Soil and Water Conservation Districts are in charge of implementing this. People you're comfortable with, people you have a history of working with, people you trust, neighbors… We're working to make this a better place for everyone. It's hands-on involvement right from the bottom-up.

> [WAP's greatest strength is] the people conducting the program. Everyone on the Council is committed. I've never seen an organization or a group of farmers that have come together with such purpose. As long as we can maintain this program, we can see a future for agriculture in this valley.
>
> It's a special bond between us members [of the Catskill Family Farms Cooperative], we've spent so much time together.

The formation of the WAC has helped to strengthen the agricultural community in the Catskills. As a vehicle that allows farmers to collectively manage agricultural production in the watershed, the Council has helped to forge a common identity among watershed farmers. They are both farmers and environmentalists working together towards the preservation of agriculture in the watershed and the protection of New York City's water supply.

Divisions within the Community: While collective management of the Watershed Agricultural Council has augmented social capital and strengthened the agricultural community, this is not to suggest that all social relations among watershed farmers are harmonious. Like most communities, the watershed's agricultural community is best characterized as a 'divided we' (Watts, 2000). Whereas community members are united in their objectives to sustain farming in the watershed, they are divided by struggles for power, recognition, and resources. One female farmer, for example, complained that the other members of WAC did not take her seriously because of her gender. She felt that her opinions and ideas were often invalidated and scoffed at because the predominantly male Council did not consider her to be a 'real farmer.'

Other farmers complained of a 'good old boys' network. They maintained that there is a certain group of farmers who, due to their social connections, are able to receive preferential treatment in WAC-administered programs. One farmer, for instance, said that he had hoped to participate in the pilot phase of the conservation easements program but that WAC's administration never responded to his inquiry. He resigned himself to the fact that it was "everybody's friends" who were going to be chosen to participate in the program. Indeed, there may be some truth to this complaint. One farmer who had been selected to participate in the pilot phase of many WAC initiatives—including the Watershed Agricultural Program, the Whole Farm Easement Program, and the Nutrient Management Program—spoke of how he and one high-ranking WAC official "go way back." This sentiment that there is a network of privileged farmers was echoed in a number of similar complaints[27]:

> There are board members that sit on the full council that have had *tons* more money spent on their places than some of these other people. I mean it's just wrong.
>
> There's a lot of politics involved in the whole thing. If you know the right buttons to push and the right people to talk to, you're going to make-out better.

[27] It should be noted that these are merely quotes from farmers and that these claims have not been thoroughly investigated by the author. According to WAC, they are "overstated."

> I think that the Watershed [Agricultural Council] treats some farmers unfairly. It's *who* you are not *what* you are.

Still other farmers are envious of the resources targeted towards dairy farms. Since they do not produce priority pollutants, these farmers complain, they are ineligible to receive many of the economic benefits associated with the adoption of a Whole Farm Plan. While they pose the least threat to water quality, they receive fewer benefits. Indeed, as discussed earlier, farmers with more animal units receive greater levels of funding and only farmers with dairy cows are eligible to participate in programs such as the watershed cheese initiative. As one farmer grumbled:

> They [the Watershed Agricultural Council] said that they could only help me out if I was growing dairy crops. Now that is wrong. For them to say that they can't help me out if I'm not doing dairy farming, that was a major slap in the face.

Divisions within the agricultural community can work against the environmental objectives of the Watershed Agricultural Program. One sheep farmer, for instance, found it humorous that a bridge that was installed on his property as part of his Whole Farm Plan had actually encouraged his sheep to defecate in the water. In part, this was a manifestation of his frustration for being treated as an outsider who did not practice dairy farming. Another farmer who grew vegetables expressed an equal frustration for being excluded from the economic benefits associated with participation in WAP. When asked what he was doing with his wastewater, he responded, "The Whole Farm Plan isn't doing shit for me and I don't give a shit about it. I'm just dumping it out there." Stories such as these demonstrate the limits of allocating funds solely on the principle of marginal analysis. Though allocating funds where they will control the greatest amount of pollution per dollar spent is, according to mainstream economic theory, logically impeccable, the reality is that it may alienate community members who might otherwise be valuable allies. These farmers were not necessarily opposed to environmental protection. Rather their actions reflected their frustrations and animosity towards being excluded from aspects of the agricultural community and the associated benefits. It was their means of protesting the unequal distribution of power and benefits in the Watershed Agricultural Program.

6. Concerns of Watershed Farmers

Overall, most of the actors involved are satisfied with the Watershed Agricultural Program. New York City government officials are happy with the program because it is a low cost alternative to a water filtration plant, requires less administration than land use regulations, and, ultimately, protects and improves the quality of the City's drinking water. The U.S. Environmental Protection Agency is also content with the program and has approved it as a satisfactory watershed management plan. Finally, and perhaps most importantly, the watershed's agricultural community is happy with the program. The general feeling among farmers is that their participation in WAP has improved their economic well-being, that the program is founded upon the principles of home rule and voluntary participation, that it has strengthened their social capital, and that it has reinforced their identity as good stewards of the land. Nonetheless, not all farmers are happy with WAP; some of them expressed some very legitimate complaints. Some of those complaints—such as the bias of the program towards dairy farmers and existence of a 'good old boys' network—have already been addressed. It is worthwhile, however, to address

three additional concerns that were repeatedly encountered during the course of this study: (1) too much money is spent on administration of the program, (2) the program relies too heavily on scientific experts rather than listening to local ideas, and (3) there is a suspicion of New York City's long-run intentions.

Though the Watershed Agricultural Program is financed by New York City, the City's DEP conducts very little of the program's management. Most of the administration responsibilities are delegated to the Watershed Agricultural Council. Of the $35.2 million committed to the current phase of WAP, $2.7 million was allocated towards program management, administration, and outreach (WAC, 1997: 7). Relative to the overall expense of the program, administration costs have been rather small. In 2000, for instance, WAC incurred more than $6 million in expenses, yet only 9% of that money was spent on program administration. Despite its small proportion of the total budget, many members of the agricultural community complain that the Council spends too much money on administration and that that money should be going to the farmers. Consider the following complaints:

> The watershed program would be good if more money was spent on the farmers and less on the salaries of the people running it!
>
> They could cut administration costs—they have too many people and vehicles—and spend the money where it belongs: on the farmers.
>
> A lot of the money is going into the administration, as it does with everything else. These guys, they're all making a lot of money, (laughing) but they're not spending much where it ought to be.
>
> What they're doing is providing middle class jobs for people. And that's all they're doing. They're supporting one another in keeping these jobs going. But helping us, that's another story. They're not.
>
> Most of the money is spent on WAC management, lawyers, and inexperienced engineers who will go away once they learn something useful.

The prevalence of such comments suggests that watershed farmers may harbor some suspicions of WAC's administration. There is a concern that WAC employees are more concerned with maintaining their jobs than with actually helping the farmers. Should this suspicion continue, it could erode the legitimacy of WAC. Once the sense of euphoria of having avoided regulations from New York City wears off, farmers may begin to question the objectives of their representative organization.

Another common complaint among watershed farmers is that WAP relies too heavily upon scientific experts and, at the same time, fails to respect local knowledge and ideas. Indeed, incorporating science into the management plan was critical to establishing an agreement between New York City officials and watershed farmers (Ray and Heidlebaugh, 1996: 16); WAC has allocated 10% of its budget towards research and scientific support by Cornell

University and the New York State Department of Environmental Conservation (WAC, 1997: vi).

Nonetheless, some farmers feel that the program relies too heavily on scientific experts: "Science and technology are great, but it seems that plain common sense is overlooked sometimes." On a related note, many (though not all) farmers felt as though WAC's engineers were inexperienced and that they did not know what they were doing. For example, one sheep farmer complained, "My Whole Farm Planners came to me thinking that they were simply going to tell me what to do on my property with no knowledge of sheep at all." The same farmer went on to explain how some of the practices recommended in the Whole Farm Plan actually had a negative impact on water quality. Another farmer complained that his planning team disregarded his knowledge of the local environment. Referring to an eroding stream bank on his property, he claimed:

> I told them what needed to be with the river, but they wouldn't listen to me! But he (a nationally known hydrologist) comes along and told them almost the exact same thing that I told them… 95% of what I had told them; and as soon as he said that they all agreed to it.

While scientific insights may be an important component of resource management plans, stories such as these illustrate the equally important role that should be played by local knowledge.

A final complaint that has been leveled against the Watershed Agricultural Program is that New York City really has no interest in the well-being of watershed communities. Many farmers and local officials maintain that since City officials are only interested in providing their constituency with clean water; they are not fully committed to the incentives program. These critics claim that while the City has been quick to initiate the aspects of WAP that have a direct impact on water quality, they have been slow to implement any aspects of the economic rewards program. As one watershed official complained, "The part of the program that was supposed to provide economic benefits has never been developed because the City has been holding back." The lack of a functioning incentives program has encouraged many farmers to question the long-term objectives of New York City: "It is a 'win/win' situation in this early stage that we are in, but I remain cautiously optimistic as to the long range plan of New York City!" Or, as another farmer grumbled, "They still put water quality way above the economic well-being of the farmer."

Other farmers complained about the immediate impact of WAP on their farms. They claimed that WAP was negatively impacting the value of their farms and maintained that New York City should build the $6 billion water filtration plant rather than impeding upon the lives of the watershed's agricultural community. One watershed official, for example, claimed, "New York City funding is just a political payoff for having ripped the farmers off here for the past 60 years. It's just a political buyoff, that's all it is." This general feeling of distrust may undermine the effectiveness of WAP. Many farmers, feeling that the City has no interest in their economic well-being, may be reluctant to implement BMPs intended to improve the quality of the City's water supply. They may share the same *quid-pro-quo* mentality of the farmer who intentionally dumped in his wastewater in the field because he felt that his Whole Farm Plan did nothing to benefit him but everything to benefit the City. The failure of New York City to reward him for maintaining water quality encouraged him to intentionally pollute the water. By more

enthusiastically supporting the development of an economic rewards program, New York City officials would be more likely to elicit their desired response from all watershed farmers.

7. Environmental Critiques of WAP

Although the Watershed Agricultural Program has been in place since 1992, there has been surprisingly little written about the environmental impacts of the pollution prevention program. In recent years, several critiques on the New York City's complete watershed management strategy have been produced, yet they have focused almost exclusively on the non-agricultural issues of the plan. One of the most vocal critics of the City's protection efforts is the Natural Resources Defense Council (NRDC), an environmental non-governmental organization.

According the NRDC, the greatest threats to New York City's water supply occur in the East-of-Hudson system (Marx and Goldstein, 2001). The organization's primary concern is that the rampant development that characterizes the Croton Watershed threatens to degrade water stored in the system's flagship reservoirs in the Kensico and West Branch basins.[28] Rather than *preventing* pollution, the NRDC maintains, that the City is relying on a strategy of pollution *control*; it suggests that the City more aggressively acquire lands and purchase more conservation easements in the region. The NRDC makes no mention of the WOH system or the Watershed Agricultural Program in its critique.

The most thorough review of the environmental dimensions of the Watershed Agricultural Program occurs in a study conducted by the National Research Council (NRC) in 2000. The NRC does not explicitly site any shortfalls in WAP. It does, however, offer a list of recommendations to improve the program (NAS, 2000: 405-6). Most of the suggestions call for a more quantitative and scientific approach to watershed management. For example, the Council recommends that WAP adopt a scientifically based phosphorous load reduction goal that is customized to the unique environmental characteristics of each watershed basin. One might infer from this that the Council is concerned that WAP's unspecified goal of simply controlling animal wastes (particularly barnyard runoff) may be insufficient and that a more concrete measurement should be established.

Similarly, the report maintains that New York City should develop a greater understanding of the factors controlling the transport of the pathogens *cryptosporidium* and *giardia*. Currently, the relative influence of agriculture and other land uses as source of these pathogens is not well understood. Regarding the CREP program, NRC suggests that lands should be prioritized based on environmental criteria such as the frequency of inundation and vegetation type.

The NRC also suggests that more monitoring be implemented to evaluate the environmental impact of Whole Farm Plans. Currently there are only two monitoring sites in the WOH system; the Council feels that these may be insufficient to determine the ability of Whole Farm Plans to reduce non-point source pollution. The report suggests that more pollution control models should be developed and that they should be evaluated as a part of the monitoring process. One

[28] As illustrated in Figure 3, most of the water originating in the WOH system is stored in the Kensico Reservoir before it flows to New York City. The West Branch Reservoir serves as a crucial back-up to the Kensico Reservoir and as the City's 'insurance policy' should a problem occur at Kensico.

of the NRC's principal concerns, it appears, is that the WAP's participation-based evaluation criteria may be insufficient. Instead of evaluating the success of the program based on how many Whole Farm Plans or BMPs have been implemented, the NRC suggests that specific metrics that relate to actual water quality improvement be established.

Supporting its technical approach to watershed management, the National Research Council recommends that WAC and NYC DEP continue to support science for the Whole Farm Planning process. It specifically sites the need for continued and consistent funding, noting that in the past lack of sufficient financial resources resulted in the discontinuation of several relevant lines of work (though specific programs are not mentioned) that had the potential to significantly improve WAP. The Council maintains that "the success of the WAP and other related programs is directly related to the level and constancy of financial support" (NAS, 2000: 405).

Finally, NRC cautions that greater efforts should be made to ensure the long-term maintenance of best management practices. The Council notes that in other areas where BMPs have been implemented, compliance has decreased over time and, as a result, become an ineffective means of controlling pollutants. It concludes that the success of WAP will likely be greater if WAC or NYC DEP assumes responsibility for the continued maintenance of BMPs. Perhaps inspired by this suggestion, the NYC DEP is recommending that new funds be allocated to support BMP maintenance in Phase III of the Watershed Agricultural Program.

CHAPTER 4: ANALYSIS OF RESULTS

New York City's watershed management plan is the product of a unique juncture in social history. New York City's water supply is the largest unfiltered system in the world and, matching the size of its water supply, few municipalities have the financial resources to implement such a grand water protection strategy. Nonetheless, the plan's Watershed Agricultural Program and related agricultural initiatives offer valuable lessons and insights that could improve the performance of PES mechanisms in other parts of the Americas. This chapter links the specifics of this particular case study to the more general design of PES mechanisms. Some of the issues explored include the role of the state; funding levels; marketing support for niche markets; technical support requirements; landscape vision and territorial voice; process, appropriation, and collective action; drawing on social capital; and the distribution of benefits.

Role of the State

The state can play a key role in the design and implementation of PES mechanisms. This is an obvious lesson gathered from the New York experience. Another lesson, one that is certainly equal in importance yet subtler in its manifestation, is that the state can play multiple roles and that those roles are largely determined by the level at which the state governs. In this particular case, the local, state (*i.e.* New York State), and national governments all played a distinct yet important role in the design of New York City's watershed management plan. At the national level, the EPA served as the catalyst, igniting the process to improve the quality of the City's water supply. Local governments, both those from watershed communities and New York City, then stepped in to defend the interests of their respective constituencies. Finally, New York State played one of the most crucial roles: mediating the competing interests of the various stakeholders and, ultimately, producing a mutually beneficial arrangement. Rather than repeating the history of watershed agreement and the particular actions undertaken by each governing body, this section will take a more generalized approach, drawing upon the specifics of the New York experience to illustrate three lessons regarding the role of the state in the design of PES mechanisms.

First, action may have to be initiated from governing bodies that are far removed from the particular resource in question. The short-term political realities faced by regional governments may discourage those bodies from addressing the issues of local resource management. The deteriorating quality of New York City's water supply, for example, had been evident for decades (Stave, 1998), yet neither the New York City nor the New York State governments undertook corrective actions. Legally, the NYC DEP had the authority to acquire new lands or implement land use regulations in watershed areas. To do so, however, would have required significant expenditures of both political and economic capital, so the City resigned itself to inaction. Similarly, the NYS DOH was entrusted to ensure the quality of the state's water supply yet it also failed to take any action, possibly out of fear of upsetting New York's upstate constituency. Thus, though they considered themselves the political underdog, the power of upstate watershed interests may have encouraged inaction on the part of both New York City and

New York State governments. Only a body that was less accountable to the voting power of watershed residents—and largely immune to the budgetary concerns of New York City—could risk the political capital of requiring the City to improve its management practices. In New York, the EPA played this role.

When the EPA issued the Surface Water Treatment Rule in 1989 it required all municipalities in the US to filter their surface water supplies. Cities could avoid this requirement, however, if they designed a satisfactory watershed management plan and consistently met federally established criteria for water quality. This highlights yet another important lesson regarding the role of the state in resource protection efforts: standards are one way to ensure the protection of natural resources; allowing for flexibility in how those standards are achieved, however, is more likely to encourage the design of protection efforts that also benefit the local resource managers. To date, less than 2% of the municipalities in the US who obtain their water from surface system have proven to the EPA that they can avoid filtration by instituting aggressive watershed protection programs (WRI, 2000: 210). Nonetheless, cities such as New York are demonstrating that there are alternatives to regulatory approaches to resource management. Allowing for customized approaches that protect resource quality, environmental initiatives are more likely to alleviate the economic concerns of local residents. The 'threat' of having to implement a more uniform technology (*e.g.* water filtration) is another important component to environmental initiatives: it encourages communities to balance their short-term economic needs with the long-term realities of natural resource conservation, ultimately improving the likelihood that the established environmental criteria will be met.

In addition to initiating requirements to protect environmental quality and allowing for flexible approaches to resource management, the state can also play an important role in the design of PES mechanisms by mediating the competing interests of various stakeholder groups. In the case of New York City's watershed management plan, the State of New York played an extremely important role, arbitrating an agreement between upstate and downstate interests on two separate occasions. First, the New York State Department of Agriculture and Markets was able to reconcile the differences between New York City's desire to protect water quality and Catskills farmers' efforts to maintain the economic viability of the local agricultural economy. The result was the Watershed Agricultural Program. Five years later, the State governor's office mediated an even more challenging agreement between the City, the watershed's non-agricultural interests, the EPA, and environmental NGOs, producing the much-celebrated New York City Watershed Memorandum of Agreement in 1997.

The New York State government was, perhaps, ideally suited to mediate a solution between upstate and downstate interests. Though regionally distinct, both parties were situated within the state's jurisdiction. In other words, it was in the state governor's best interest to reach a compromise between protecting the quality of the City's water supply yet guaranteeing the economic livelihood of watershed residents. Choosing one side or another would have been certain to alienate a large number of voters, while inaction would have encouraged increasing tensions and, ultimately, a less than desirable outcome. Indeed, provincial governments can play an important role by bringing the various stakeholder groups to the negotiating table, establishing the rules for their interactions, and, hopefully producing an arbitrated solution that addresses the concerns of all relevant stakeholders.

Level of Funding

The funds committed to New York City's watershed management plan represent a significant savings when compared to the $6 billion that it would have cost to construct a filtration system for water originating in the WOH watersheds. Nonetheless, the $39.2 million that New York City has invested in WAP over the past nine years—not to mention the cost of the supporting agricultural initiatives and other programs included in the $1.5 billion MOA—represent a significant financial commitment to water quality. In real terms, the cost of the City's management plan is substantial. It is doubtful that governments in less affluent parts of the world would have the luxury of making such a large financial commitment to a PES program. This points to a fundamental question regarding PES mechanisms: Are they a viable option for governments with extremely limited funds? This is a legitimate question. Unfortunately, this case study of NYC's watershed management plan does not offer a definitive answer.

On one hand, rewarding farmers for the provision of important environmental services does not necessarily require a substantial commitment of funds. Like most people, farmers generally have many values existing outside of their own economic interests. As a comparison of Tables 11 and 13 demonstrate, a noticeably higher percentage of farmers are satisfied with WAP than those who claim that the program has improved their economic well-being. This suggests that farmers' satisfaction with WAP is dependent upon variables other than its impact on their economic well-being. In addition to the economic rewards associated with WAP, farmers also obtain satisfaction from the many non-pecuniary benefits generated by their participation in the program. Thus, creating institutional arrangements that engender non-economic benefits such as enhanced social capital, territorial voice, or the prestige of being an environmental steward may present a low-cost alternative for governments seeking to reward farmers for the production of natural resources.

On the other hand, distinguishing the satisfaction generated by pecuniary and non-pecuniary benefits is difficult, particularly in this case study. Indeed, as Table 12 shows, farmers' satisfaction with WAP appears to be associated with the impact of the program on their individual economic well-being. All of the non-economic benefits explored in this example are secondary entailments to a generous package that is focused on maintaining the economic viability of farming in watershed communities. The prestige derived from serving as a good steward of the land, for example, is largely a result of New York City providing the funds to make infrastructure improvements that farmers would not have been able to afford by themselves: the City has provided them with the financial resources necessary to implement BMPs. Similarly, territorial voice is afforded to the agricultural community because the economic benefits generated by the PES package allow its members to continue farming despite the difficulty of competing with low-cost producers from other areas of the country.

In addition to non-economic benefits being contingent upon the economic benefits, there are other related problems to relying upon a PES mechanism that only generates non-pecuniary rewards. First, the objective of the PRISMA-Ford project is not so much to design environmental strategies that make farmers happier, as it is to alleviate their economic poverty. Indeed, most farmers would find little satisfaction from the prestige of being an environmental

steward when their families are faced with poverty and starvation. Non-pecuniary benefits are generally a luxury for those who have already met their economic needs.

Another concern is that economic resources are generally necessary to implement practices that improve environmental quality. This is certainly the case in New York City's watershed management plan where real financial investments are necessary to reduce the pollutants generated on dairy farms. In areas of the world where farmers are already providing important environmental services (*e.g*. peasant farmers cultivating genetic diversity in food crops), many of them are poor. Providing these environmental stewards with economic rewards would allow them to continue practicing sustainable agriculture and reduce their need to pursue more lucrative—and less environmentally beneficial—alternatives.

Despite the necessity of financial commitments to PES mechanisms, not all strategies necessarily require as much as funding as New York City's watershed management plan. Three initiatives explored in this case study offer possible examples. The Natural Resources Viability Program and the Catskill Family Farms Cooperative, for instance, are relatively low cost alternatives designed to increase the demand for the products of watershed farmers. Indeed, providing farmers with marketing assistance is one low-cost way to improve their economic well-being. The third party funds necessary for such initiatives are relatively small since the consumers who purchase the products provide the actual economic reward. Unfortunately, neither the NRVP nor the CFFC has been particularly successful at improving the economic well-being of watershed farmers. Both programs, however, show promise.

The Small Farms Program is the third low-cost component of New York's PES package. As discussed in chapter two, SFP offers small-scale farmers with technical support—and occasionally low-cost structural improvements to their farms—so that they can reduce the pollutants produced by their operation. Some of these practices (*e.g.* manure spreading and scheduling) also have the potential to improve agricultural yield. Thus, once it is initiated, the program may generate economic rewards for small-scale watershed farmers. Indeed, educating farmers about how they can improve their particular operation may be one low-cost component to be incorporated into PES strategies.

From these results, the viability of PES mechanisms in the face of limited funds is questionable. New York City's strategy has been successful largely because it has had the financial ability to provide farmers with real economic rewards in return for protecting water quality. While non-pecuniary rewards may provide one alternative for rewarding farmers, non-economic benefits may not be possible nor meaningful unless accompanied with strategies that improve the economic well-being of environmental stewards. Economic rewards do not, however, have to take the form of direct cash payments or infrastructure improvements. In addition to such costly investments, PES strategies can also incorporate low-cost alternatives such as marketing support and technical assistance.

Support for Niche Markets

Tapping into niche markets is one way to increase the demand for farmers' products and thereby reward them for their contributions to environmental quality. Since niche markets take

advantage of the predominant form of economic exchange (*viz.* the market institution), the financial commitment (as discussed above) is relatively small and few supporting institutions are necessary. Nonetheless, as demonstrated by the experiences of the Catskill Family Farms Cooperative in New York, the design of the supporting institutions can be crucial to the creation of effective PES mechanisms that truly generate economic rewards for environmental stewards.

One particularly important lesson garnered from the New York experience is that institutions that encourage cooperation and regional—as opposed to individual—specialization, are more likely to generate economic rewards for farmers who provide environmental services. Recall that during its first year of operation, farmers participating in the Catskills Family Farms Cooperative cultivated a wide variety of products that ranged from wild leeks to strawberries and Christmas trees. As a result of this diversity, the Cooperative had a difficult time selling its members' products. The economic rewards were minimal and some farmers even lost money. Now, however, the Cooperative has become more unified in its approach, encouraging all of its members to grow fingerling potatoes. Since most of the participating farmers now cultivate the same product, the Cooperative has been able to focus its marketing efforts and command a significant amount of market power. Fingerling potatoes are now identified as a product cultivated in the Catskills much like oranges are identified as a product of Florida. Institutions that encourage individual farmers in a particular resource area to cultivate the same product can help to create a regional identity; it may be possible to enhance that identity by recognizing the environmental services provided by farmers in the area. Moreover, institutions that persuade farmers to coordinate their production and marketing efforts can enhance their collective ability to control market price: though the real number of farmers participating in cooperative efforts may be small, by cultivating specialty products their relative market power can be substantial.

In addition to highlighting the benefits of cooperative agricultural efforts, the history of the Catskill Family Farms Cooperative offers another important insight regarding niche markets: the cultivation of specialty crops oftentimes requires specialized knowledge. When CFFC first decided to grow fingerling potatoes, few farmers were aware of the particular techniques required to grow the specialty crop. They simply employed conventional potato growing methods and, as a result produced relatively round, nearly conventional potatoes. Due to their of lack of knowledge, the farmers produced a crop that failed to fill a niche market and was therefore difficult to sell. By definition, specialty crops are different from conventional crops; their cultivation requires specialized knowledge. Efforts that encourage farmers to tap into niche markets may need to be paired with initiatives that educate participants about the unique cultivation techniques of the specialty product.

Technical Support Requirements

As discussed in chapter two, one of the founding principles of the Watershed Agricultural Council was that the program be based on strong scientific grounding. To date, the program has received a great deal of customized technical support, most of it provided by the Cornell Cooperative Extension, the local Soil and Water Conservation Districts, and the USDA Natural Resources Conservation Service. According to the National Research Council, however, additional scientific testing will be necessary if WAP is to meet its environmental objectives (NAS, 2000).

Like New York City's watershed management plans, PES mechanisms in general may demand significant amounts of technical support. Controlling sources of non-point source pollution, for instance, requires monitoring and expertise that is typically not available to the layman farmer. Similarly, the contribution of individual farmers who conserve genetic diversity or contribute to carbon sequestration is likely to go unnoticed unless measured by scientists with technical expertise. In short, technical support lends legitimacy to PES strategies. It is a means to ensure that environmental objectives are met and thereby justifies the economic rewards appropriated to environmental stewards.

Despite the legitimacy that technical support offers to PES mechanisms, many critics question its authority and whether or not it is truly necessary. As a growing body of literature suggests, local residents oftentimes have a more intricate knowledge of their local environment than imported technocrats (*e.g.* Nazarea, 1999; Norgaard, 1984; Scott, 1998). Oftentimes, these so-called 'experts' employ standardized environmental practices that do not necessarily correspond with the unique characteristics of local ecosystems.

In this particular case study, an attempt was made to customize resource management to the particularities of the Catskills' environment by garnering technical support from local institutions. Nonetheless, even within the customized framework of the Whole Farm Plans, the knowledge of scientific experts is limited. As they have drawn from a limited menu of BMPs, Whole Farm Planners have, in some circumstances, required practices that actually *encourage* environmental pollution (*e.g.* requiring sheep farmers to install bridges over waterways when, in fact, the water crossings actually encourage the sheep to defecate in the water). Others claim that too much legitimacy is granted to scientific expertise and that the planners should be more accepting of farmers' knowledge of the local environment (*e.g.* the vegetable farmer who knew what was necessary to control erosion on his property yet the planning committee would only accept the findings of a nationally known hydrologist).

Despite the polemics surrounding the issue, it appears as though both scientific and local knowledge offer valuable insights. Rather than privileging one set of knowledge over the other, both local understandings and scientific expertise should be incorporated into the design of PES mechanisms. The legitimacy afforded by scientific monitoring, the valuable insights garnered from technical expertise, and an understanding of local environmental characteristics and the particularities of less common farming operations are all important components that should be incorporated in environmental rewards strategies. Collaboration and mutual respect among local farmers and technocrats is recommended to achieve the environmental objectives of PES mechanisms.

Landscape Vision and Territorial Voice

The conflict that emerged between New York City and the Catskills' agricultural community can be understood as a competition among alternative visions of the watershed's landscape. Recall from the introductory chapter, that a landscape is the set of resources—or the ecosystem—that people create by looking at their natural surroundings through a particular lens of values and beliefs. Thus, given that various individuals and stakeholder groups are possessed of a particular

set of values, any given physical space can be constructed as many socially constructed landscapes.

When New York City issued the Discussion Draft in 1990, it proposed a set of land use regulations that reflected its own particular vision of the watershed landscape. The City constructed the Catskills as little more than its source of water; the region was understood as a 'watershed' in the strictest sense of the word. While the NYC DEP recognized that people lived within the watershed boundaries, it envisioned those people as environmental polluters whose lives and lifestyles only endangered its particular vision of the landscape and as such needed to have restrictions placed on their actions.

In contrast to New York City's limited vision of the Catskills, watershed farmers constructed their local landscape as a multi-functional space. It defined where they lived, how they interacted with the land, the community that they were a part of, and, indeed, the very source of their livelihoods. Water is only one aspect of the everyday life for City residents, yet the region where that water originates is the center of social and economic life for Catskill farmers. When New York proposed to limit farmers' interactions with the space that they inhabited, it not only threatened the viability of agriculture in the watershed, it threatened to rob farmers of their identity and, ultimately, deny them of the right to construct their own meaningful vision of the landscape.

Both the City and the watershed's agricultural community approached the negotiations that followed as a type of power struggle, each party trying to impose its respective vision of the Catskills' landscape upon the other. The agreement that was reached during the negotiations represented a compromise to the extent that watershed farmers and City officials agreed to respect one another's vision of the local landscape. This offers an important lesson that should be incorporated into the design of PES mechanisms: rather than assuming that all actors share a uniform vision of the landscape, resource managers should not only respect alternative constructions of the landscape, but they should build upon those constructions, making them into a reality that is beneficial to all of the relevant actors.

The Watershed Agricultural Program that emerged from the negotiations reflected the new, shared vision of the Catskills' landscape. More specifically it identified the area as a place where sustainable agriculture is practiced and, because the farmers are good stewards of the land, New York City is provided with a clean source of drinking water. What has made WAP so successful, however, is not so much that it represents a shared vision of the landscape, but rather that it imparts a notion of 'territory.' Through the Watershed Agricultural Council, farmers are given a voice in determining how they can interact with their natural surroundings. This, in turn, respects the watershed community's belief in the principle of home rule and has helped to sustain farmers' enthusiasm for the program. Indeed, PES strategies that incorporate the idea of territory, will not only improve the economic well-being of environmental stewards, but they will also increase their political power, thereby generating even higher levels of local support.

Process, Appropriation, and Collective Action: Drawing on Social Capital

The territorial voice afforded to Catskill farmers via the Watershed Agricultural Program was largely a product of the agricultural community's appropriation of watershed management. Via the Watershed Agricultural Council, local farmers play an active role in determining how one another's farms should be managed in accordance with a Whole Farm Plan and, via related programs such as the Natural Resources Viability Program and the Whole Farm Easement Program, in shaping the future of agriculture in the Catskills. Appropriating the responsibility of watershed management to farmers was a direct result of farmers drawing upon their social capital to undertake collective action. One result of that action, namely WAC, has helped to augment the agricultural community's social capital, and thereby empowered it to take further collective action.

As discussed in the preceding section, providing farmers with a voice in defining the management of local resources was crucial to garnering their support for New York City's watershed management plan and, ultimately, in ensuring a high rate of participation in WAP. At the same time, however, excluding important stakeholder groups from the negotiation process—and thereby the administration of WAP—may have limited the potential of the program to generate even more environmental and social benefits.

One group that was conspicuously absent from WAP negotiations was the environmental community (see Appendix A). While this exclusion was intentional and intended to facilitate the negotiation process (see Ray and Heidlebaugh, 1996), it may have created a program that stressed the interests of the watershed farmers at the expense of environmental quality. Indeed, the program does not have any concrete environmental objectives, rather its success is measured only in terms of farmer participation and the number of BMPs implemented. In its evaluation of WAP, one of the principal concerns raised by the National Research Council was the failure of the program to measure the impact of watershed farms—both those with and without a Whole Farm Plan—on water quality (NAS, 2000). While it may have muffled the territorial voice of the watershed's agricultural community, allowing environmental groups to participate in the negotiation process may have contributed to a management strategy that has a more noticeable impact on water quality.

Other watershed interests were also absent from the negotiation process. Only the agricultural community and water quality regulators were allowed to participate in the design of an agricultural management strategy. All of the watershed's non-agricultural interests were excluded. As discussed in the previous chapters, this may have created a certain degree of jealousy within the watershed community, with many accusing the agricultural sector of 'selling-out.' This, in turn, has had a mixed impact on the ability of watershed residents to undertake collective action. On the one hand, it may have served as an example for other watershed actors, encouraging them to form the Coalition of Watershed Towns and undertake a collective action against New York City. On the other hand, it may have decreased the support for WAP among other watershed actors, thereby diminishing the ability of watershed farmers to define their role within the watershed as a whole. This later point is most evident by the reluctance of the Catskill Watershed Corporation to provide funding for agricultural development initiatives.

This process of appropriation and collective action in the Catskills illustrates the ramifications of excluding certain stakeholder groups from the design of PES mechanisms. Though limiting the number of parties involved in the negotiation process is likely to produce an agreement much quicker, the absence of certain interests will affect the long-term success of the management strategy. By empowering certain stakeholder groups, the negotiation process may be perceived as an attempt to weaken others. As a result, excluded groups may be inclined to work against the environmental and/or economic objectives of the PES strategy. Similarly, the absence of certain voices (e.g. environmental groups) in the design process means that the concerns of those interests may become more and more pressing as the management plan is played out.

Distribution of Benefits

Among the most challenging issues associated with the design of PES mechanisms is how to distribute the related benefits. Whether or not a program achieves its desired results is dependent not only upon the size of the economic rewards, but also upon which actors are targeted to receive them. The dual objectives of a *progressive* environmental payments system, namely to improve the stock of natural assets while alleviating economic poverty, may be incompatible in situations where funds are limited and wealthier agents are in the position to make the largest contributions to environmental quality. Under such circumstances, programs that prioritize environmental quality will do little to alleviate economic poverty, while initiatives that focus on poverty alleviation will contribute little to the accumulation of natural assets.

In situations where environmental payments systems are supported with limited funds, mainstream economic theory—and, indeed, many would argue 'common sense'—maintains that each additional dollar spent on the rewards program should be allocated to where it will achieve the greatest improvement in environmental quality. As discussed in the previous chapter, this logic of getting 'the biggest bang for the buck' is known as marginal analysis; it is a prerequisite to achieving an 'efficient' result. When applied to PES strategies, the principal objective of marginal analysis is to improve environmental quality. Little—if any—consideration is given to the other objective of a progressive environmental payments system, poverty alleviation. In the Catskills, allocating funds on the principle of marginal analysis has generated greater benefits for large-scale dairy farmers. Though it is difficult to determine the relative wealth of large-scale farmers in this particular example, the distinction is more evident in the Third World, where the size of one's farming operation is roughly consistent with the economic status of the farmer. Thus, if a program similar to the Watershed Agricultural Program were implemented in rural Latin America, it would not level the economic playing field, but only make it steeper.

In addition to increasing economic inequalities, basing an environmental payments system solely upon the principle of marginal analysis may generate animosities within the resource community. It is not inconceivable that many wealthy farmers in the so-called 'developing world' achieved their status through policies that favored individuals from a particular ethnic and/or political background. A PES strategy that reinforces historical injustices is likely to be despised by farmers who have suffered discrimination in the past. Excluding poor farmers and others from the rewards system may encourage those individuals to rebel against the environmental objectives of the program. Indeed, this was the sentiment expressed by the

Catskills' vegetable farmer who intentionally dumped his wastewater in the field because WAP did little to help him economically.

Yet another concern related to the use of marginal analysis is that it fails to reward farmers for their past contributions to environmental quality. As alluded to in the preceding paragraph, it is an ahistorical concept. Rather than rewarding farmers for their current best practice, WAP employs the logic of 'additionality': farmers only receive benefits for improvements that they make to their farm from a given time forward. While this may make economic sense in situations where funds are limited, it is also likely to generate additional levels of animosity. Farmers who have made improvements to their farming operations in the past may feel as though they are excluded because they acted out of concern for environmental quality rather than in their own economic self-interest. Of course, this did not appear to be a major concern raised by Catskill farmers and the economic reality is that it would be impossible to reward all farmers for all of their past contributions. Nonetheless, PES designers would do well to recognize—perhaps with non-pecuniary awards—the previous contributions of environmental stewards.

Ironically, whereas the use of marginal analysis has created a program that focuses on environmental quality, the voluntary nature of WAP means that the initiative may fail to meet to meet that particular objective as well. In the current situation, some of the worst polluters in the Catskills may continue to operate their farms and, essentially, compromising the quality of New York City's water supply. This carries with it a larger lesson for PES strategies: if the economic rewards are not large enough and the morality of behaving as a good steward of the land is absent, farmers who contaminate the environment will have little incentive to participate in a voluntary environmental payments program. It might be possible to encourage the worst polluters to participate by coupling the PES strategy with regulations or economic sanctions for excessive pollution. Of course, such an approach would undermine the principle of voluntary participation that has garnered so much support from farmers in the Catskill/Delaware watershed. An alternative strategy would be to increase the size of the economic rewards such that the benefits of contributing to environmental quality are certain to exceed the costs of not participating. Yet this strategy is also problematic in that, once again, it would mean creating even larger rewards for the farmers with the poorest track record.

As should be evident by now, there is no ideal way to distribute the economic benefits of a PES initiative. Adherents to the concept of marginal analysis maintain that limited funds should be allocated where they have the largest incremental benefit on environmental quality. Indeed, such an approach would appear to achieve the 'biggest bang for the buck' as it would reduce the transactions costs of dealing with numerous small-scale farmers. Nonetheless, the approach is problematic in two respects. First it may do little to alleviate economic poverty, a specific objective of a progressive PES strategy. Second, it may create divisions within the resource community, encouraging individuals who receive little to no benefit for their environmental services to work against the objectives of the PES initiative. This is not to suggest that the concept of marginal analysis should be abandoned altogether. Quite the contrary, the principle offers valuable insights and it is a feasible way to achieve meaningful improvements to environmental quality in situations where funding is limited. Nonetheless, the dual objectives of a progressive environmental payments system are more likely to be met if the concept of economic efficiency is tempered with a concern for economic justice.

CONCLUSION

For nearly two centuries the New York City government had envisioned the landscape of the Catskills as little more than a source of drinking water. In 1990, when the City proposed land use regulations that essentially imposed its particular vision of the landscape upon local farmers, the watershed's agricultural community revolted. For them, the biophysical place known as the Catskills was much more than a watershed, it was a place that defined their social and economic interactions, and served as a foundation of their cultural identity. The regulations would have denied them the opportunity to express who and what they were, namely farmers whose livelihood consisted of practicing agriculture in the Catskills. Through a process that evolved from conflict to negotiation, the two stakeholder groups found that their respective landscape visions were not necessarily incompatible. Together, they designed an innovative set of institutions that appears to satisfy both of their landscape objectives: protecting the quality of New York City's water supply while enhancing the economic viability of agriculture in the watershed.

Combined, the various institutional arrangements can be understood as a PES package. The cornerstone of the package, the Watershed Agricultural Program, is geared more towards the concerns of City residents, namely implementing agricultural practices that control nonpoint sources of water pollution. Nonetheless, the infrastructure improvements, purchases of new farming equipment, and managerial assistance associated with the best management practices appear to generate real economic rewards for watershed farmers. The supporting agricultural initiatives—the Conservation Reserve Enhancement Program, the Whole Farm Easement Program, the Natural Resources Viability Program, and the Catskill Family Farms Cooperative—further the objectives of both stakeholder groups by providing Catskill farmers with either cash payments or marketing support as a reward for managing their farms in ways that enhance New York City's water protection efforts.

Many components of the PES package have yet to generate any tangible economic rewards. The Whole Farm Easement Program, for example, has yet to go into effect while lack of funds and poor management appear to have hindered the efforts of the Natural Resources Viability Program to expand the demand for the products of watershed farmers. Nonetheless, most watershed farmers are happy with the program. In addition to exempting the agricultural community from future land use regulations, the program has improved the economic well-being of nearly half of the participating farmers. The economic benefits, however, have not been distributed equally; farmers with larger operations receive greater levels of economic support. This does not necessarily imply that the program is biased against poor farmers since the majority of farmers in the watershed area have other sources of income.

In addition to generating economic rewards for watershed farmers, the PES package also generates a number of non-pecuniary benefits. Those non-economic benefits include the provision of a territorial voice, improved psychic well-being, the empowerment and affirmation that watershed farmers are good stewards of the land, and enhanced social capital. Despite the value local farmers place in such non-pecuniary benefits, they cannot be disassociated from the

economic benefits of the PES package. Many of these benefits might be described as entailments to the various institutions designed to improve the economic viability of sustainable agriculture in the Catskills.

New York City's watershed management strategy is a unique and innovative approach to natural resource management. The agricultural program that it advances offers valuable lessons for resource managers throughout the world. Some of those lessons relate to the role of the state, others to the level of funding, and still others to the appropriate degree of technical support. Yet of utmost importance, the agricultural strategy demonstrates that the provision of natural resources is often contingent upon the economic status of actors residing in the resource area. Under the appropriate institutional arrangements, empowering local actors with economic resources can actually enhance their ability and produce additional incentives for them to provide environmental services. As discussed in this report, there are limitations to New York City's strategy: it might be necessary to implement additional mechanisms that ensure the protection of water quality and certain key actors may have limited access to the economic benefits. Nonetheless, the agricultural package has done much to improve the quality of New York City's water supply; at the same time, it has also improved the economic and social well-being of watershed farmers. Resource managers throughout the world, regardless of their position in the developed or developing world, have much to learn from New York City's example: rewarding farmers for the provision of environmental services can be an effective way to both augment natural capital and alleviate rural poverty.

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APPENDIX A

AD HOC TASK FORCE POLICY GROUP MEMBERS AND AFFILIATED ORGANIZATIONS

Albert F. Appleton, Chairman: Commissioner, NYC Department of Environmental Protection

Dennis A. Rapp, Facilitator: Deputy Commissioner, NYS Department of Agriculture & Markets

Robert Bendick, Jr.: Deputy Commissioner, NYS Department of Environmental Conservation

William S. Benson, Jr.: Master, New York State Grange

Joseph Conway: Deputy Commissioner, NYC Department of Environmental Protection

Raymond Denman: Farmer, Sullivan County Farm Bureau

Paul A. Dodd: State Conservationist, USDA Soil Conservation Service

Philip Griffen: Chairman, NYS Soil and Water Conservation Committee

Dr. Leo Hetling: Director, NYS Department of Health

William Murphy: Dairy Farmer, Farmers Preservation Alliance

Howard Nichols: Chairman, Delaware County Board of Supervisors

Keith Porter: Director, NYS Water Resources Institute at Cornelll

Howard Tuttle: Dairy Farmer, Greene County

Charles Wille: President, New York Farm Bureau

Source: NYC DEP (1990b).

APPENDIX B

BEST MANAGEMENT PRACTICES (BMPS): 2000 Accomplishments on Watershed Farms

BMP	Completed	BMP	Completed
Manure Storage Structure	3	Subsurface Drain	4
Brush Management	3	Riparian – Tree & Shrub Planting	16
Conservation Cropping Sequence	5	Trough or Tank	1
Cover & Green Manure Crop	1	Underground Outlet	4
Critical Area Planting	2	Waste Utilization	47
Diversion	6	Barnyard Water Management System	19
Fencing	34	Record Keeping	34
Riparian Forest Buffer	3	Calf Greenhouse	6
Filter Strip	8	Calf Hutches	1
Lined Waterway or Outlet	1	Barn Ventilation	1
Obstruction Removal	4	Farm Fueling Facility-Above Ground	3
Pasture & Hayland Planting	7	Farm Fueling Facility-Closure	2
Pipeline	2	Manure Spreader	6
Prescribed Grazing	2	Loader	3
Roof Runoff Management System	2	Manure Truck	1
Access Road Improvement	9	Manure Scraping System	2
Heavy Use Area Protection	11	Manure/Sump Pumps	2
Spring Development	24	Anaerobic Fixed Film Digester	1
Stock Trails & Walkways	13	Farm Dump Closure	1
Streambank Stabilization	3	Sewer Connection Yearly Fees	1
Stripcropping – Field	1	Watering System	1
Nutrient Management Plan	60	**Total BMPs**	**399**

Source WAC (2001a)

APPENDIX C

Dear Farmer,

I am studying the impact of the Watershed Agricultural Program on farmers in your community. The results of the study will assist in the design watershed management strategies in Latin American countries. Could you please take a moment to complete the survey below and return it to me in the enclosed postage-paid envelope. (Please note that your participation in this survey is voluntary; the information that you provide will remain confidential and will not be used for purposes other than this study). My deadline for completing the study is fast approaching; a prompt response is greatly appreciated. Thank you for your help!

Sincerely,

Ryan Isakson
Doctoral Student
Department of Economics
University of Massachusetts at Amherst

---

1. What is your level of satisfaction with the Watershed Agricultural Program?
   € Very Satisfied € Somewhat Satisfied € No Opinion
   € Somewhat Unsatisfied € Very Unsatisfied

   Comments:

   _____

   _____

   _____

2. How has the adoption of a Whole Farm Plan affected your economic well-being?
   € It has improved my economic well-being
   € It has worsened my economic well-being
   € It has had no impact on my economic well-being

3. Do you feel as though your economic concerns were adequately addressed when designing your Whole Farm Plan?
   € Yes € No € No Opinion

4. What is your primary motivation for participating in the Watershed Agricultural Program?

   _____

   _____

   _____

5. Do you have any suggestions for how Whole Farm Planning can be altered to help you improve your economic position?

_____
_____
_____

6. What is your gross annual income from farming?
   € Less than $20,000 € $20,000 - $30,000 € $30,000 - $40,000
   € $40,000 - $55,000 € $55,000 - $70,000 € $70,000 - $100,000
   € More than $100,000 € I prefer not to answer this question

7. The Watershed Agricultural Council is currently designing a program that would grant conservation easements for agricultural land. Would you be interested in obtaining such an easement?
   € Yes € No € I do not know

8. Would you be interested in obtaining a conservation easement for any of your forested land?
   € Yes € No € I do not own any forested land € I do not know

9. Would you be willing to participate in a telephone and/or in-person interview with me (your identity would remain anonymous)?
   € Yes € No

   If you answered "yes" to the above question, please provide the following contact information (note that this information will only be used for the purposes of this study):

   Name: _____ Telephone: (_____)_____

   Address: _____

   _____

10. Additional Comments:

_____
_____
_____
_____
_____
_____