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To cite this article: M. O'NEILL KAREN (2005) Can Watershed Management Unite Town and Country?, *Society & Natural Resources*, 18:3, 241-253, DOI: [10.1080/08941920590908097](https://doi.org/10.1080/08941920590908097)

To link to this article: <http://dx.doi.org/10.1080/08941920590908097>



Published online: 24 Feb 2007.



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Can Watershed Management Unite Town and Country?

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Resource agencies in the United States have taken up collaborative watershed management planning as a general policy tool. In doing so, they have adapted methods originally developed by voluntary partnerships in small rural watersheds and applied them across larger drainage areas with more diverse patterns of land use. Using Henri Lefebvre's concepts of social space, this article reviews research to identify the varied political, social, and physical characteristics that watershed organizers confront in urbanized and rural areas. Planners working in watersheds with diverse settlement patterns may find it difficult to meet the guiding principles suggested by the U.S. Environmental Protection Agency (U.S. EPA) and National Research Council: organizing watershed partnerships to involve those most affected by management decisions, making decisions within a specific geographic area, and using science and data to guide decisions over time.

Keywords collaboration, land use planning, spatial scale, watersheds

After 100 years of creating separate national policies for cities, suburbs, forests, and farms, federal agencies in the United States are encouraging state and local officials to create integrated regional management strategies to improve environmental conditions. The U.S. Environmental Protection Agency (U.S. EPA) runs the largest national initiative to encourage management at the physical watershed level. The watershed approach as developed in the United States marshals data to assess a specific drainage area, involves a broad range of interested parties, and sets goals through deliberative processes (National Research Council 1999). In the United States, this style of watershed collaboration originated in voluntary efforts organized by motivated participants in small rural watersheds. The U.S. EPA now encourages decision makers and local residents across a range of settlement types to undertake watershed collaborations.

It is open to question whether the watershed approach can become a general political tool. Chess and Gibson (2001) argue that the physical, social, or political

Received 23 July 2003; accepted 3 September 2004.

Thanks to Caron Chess, Joanne Fariello, Lena Raberg, Thomas Rudel, and three very helpful anonymous reviewers. This project was supported by the New Jersey Agricultural Experiment Station. An earlier version of this article was presented at the 2000 Joint Environmental Policy Symposium of the Rural Sociological Society (Natural Resources Research Group) and the American Sociological Association (Environment and Technology Section).

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characteristics of some watersheds may make them unsuited for collaborative work or for decision making at the watershed level. I consider the suitability of the watershed approach as a general tool by asking whether a decision-making model developed in small, relatively homogeneous settings can be transferred to larger, more diverse settings. This article reviews research findings to highlight characteristics of rural and urbanized areas that may pose problems in watersheds with diverse patterns of settlement and land use.

Most research on watershed collaborations analyzes the processes of the collaborative work, rather than the context for the collaborations. These studies provide practical information to organizers to help them recruit a range of participants and to facilitate the planning and implementation processes. The tasks of watershed management are, however, constrained by the physical characteristics of the watersheds and by the institutions that guide residents' interactions with the environment and with government.

To analyze conditions that organizers of spatially diverse watersheds confront, I use Henri Lefebvre's (1991 [1974]) conceptions of the social uses of space. After describing the U.S. EPA guidelines for watershed management, I briefly outline the factors that researchers find associated with successful watershed collaborations. Then I present Lefebvre's conceptual scheme and use it to consider how those favorable factors are distributed across rural and urbanized areas, citing findings scattered across watershed evaluation studies. I conclude with recommendations for applying the watershed approach in diverse settlement areas. Given the recent federal government emphasis on collaborative environmental decision making, the pitfalls of watershed planning noted in this article are relevant to many environmental policies.

U.S. EPA Principles of Watershed Management

The U.S. EPA promotes collaborative watershed management to supplement its statutory programs for reducing point sources of pollution (e.g., waste pumped into waterways from identifiable sites, such as industrial plants). The U.S. EPA recommendations for watershed management focus on controlling less readily identified nonpoint sources, such as oil washed from city streets or pesticide runoff from farms. Agency publications stress that watershed management is an approach that the U.S. EPA is encouraging, not a program run by the U.S. EPA.

Echoing a key report of the National Research Council (1999), the U.S. EPA suggests that state and tribal policymakers follow three guiding principles in watershed planning (U.S. Environmental Protection Agency—Office of Water 2003):

- *Geographic focus*: Agencies should define watershed management areas based on physical assessments of drainage patterns.
- *Partnerships*: Watershed management is distinctive because it is collaborative. Watershed partnerships should recruit and involve the people most affected by management decisions and ensure that these people shape key decisions about planning and implementation, whether or not they are already organized as interest groups (National Research Council 1999).
- *Sound management techniques based on strong science and data*: Watershed partnerships should gather and analyze data about the water quality and ecological functions of regional waterways and the surrounding landscape. Data gathering

and analysis should be iterative, as problems are identified, plans developed, and results evaluated.

In promoting watershed management planning as a flexible and general tool for reducing nonpoint sources of pollution, the U.S. EPA is suggesting that the watershed approach is readily adapted to watersheds of varying size and settlement patterns.

Policy analysts have long been cautious in applying model programs under novel conditions or across cultures or spatial scales (Cohen 1997). Watershed management in the United States is now being used to manage areas ranging from small tributaries to major drainage areas or estuaries, such as the Chesapeake Bay. For instance, the watershed partnerships evaluated in one study managed landscapes along Northwest salmon streams ranging from 188 to 5265 square miles (Huntington and Sommarstrom 2000). The U.S. EPA doesn't specify how a partnership should physically define its watershed. The U.S. EPA web page identifies watersheds at the level of the U.S. Geological Survey Hydrological Unit Code 8, which can cover hundreds of square miles, but many partnerships focus at code levels 10 or smaller (Raritan Basin Watershed Management Project 2004; U.S. Environmental Protection Agency 2004). Watershed management is also being tested across regions with different levels of physical and social heterogeneity and varied social institutions.

Factors of Watershed Management Success

Some factors that contribute to successful watershed management depend heavily on local social and political conditions. Evaluation research has highlighted factors such as effective leadership, participation of those most affected by water conditions, clear definition of the scope of issues to be discussed, the availability of technical and financial resources, and fair processes for decision making (Chess and Purcell 1999; Duram and Brown 1999; Leach and Pelkey 2001). As discussed next, the organizational resources, perceptions, and experiences that would put these factors into action are distributed unevenly across urbanized and rural areas. Lefebvre's conceptions of space can help in analyzing the challenges that the U.S. EPA initiative presents to organizers in spatially diverse watersheds.

Perceived, Conceived, and Lived Space

Lefebvre (1991 [1974]) and other theorists have argued that social action and conflict are organized and experienced spatially (Giddens 1984; Goffman 1959; Tuan 1977). Some scholars have used Lefebvre's conceptions to analyze how capitalist land development and government controls over land in cities in the United States affect workers and residents and how workers and residents knowingly or unknowingly resist these plans (e.g., Harvey 1996; Reiff 2000). These inquiries show that people's everyday activities, and the varied experiences and ideas that people associate with the places where they live and work, limit the ability of public and private organizations to impose new plans and new uses.

Henri Lefebvre (1991 [1974], 38–39) conceptualizes space in countries with advanced capitalist economies as having three interdependent social dimensions:

- *Conceived space* is the space that planners, architects, and policy makers envision in their blueprints and plans. It is what Lefebvre calls the *structure* imposed on space or *representations of space* (369). These conceptions may be manifested in

- part as physical projects or they may be enacted as administrative changes, such as a change in zoning regulations, which have real but less tangible results.
- *Perceived space* is the sense that people have of a space, usually as they view it. Lefebvre calls this the *form* of space or *spatial practice* (369). A particular society at a particular time develops activities that “mark the earth,” leaving traces that signify to members of that society distinct uses for that space, such as “the ‘corner’ of the street, a ‘marketplace’, a shopping or cultural center” (16–17). Lefebvre argues that designers build environments intended to visually signal a limited set of uses. Capitalism, urbanization, and other processes of modernity have all modified spatial practices. Social order, he argues, is both organized and represented in space (280, 289).
 - *Lived space* indicates how inhabitants and users experience and use a space as they are guided by images they hold of that space. These images center on emotional meanings. They include individual or group local knowledge of an area or beliefs about a place being sacred or profane (39, 41). It is the *function* of space or *representational space* (369). Lived space is linked to the underground of social life and to imagination (33, 39). In our contemporary life, for example, people form strong mythologies about the threat of nearby contaminated industrial sites.

These types of social space exist simultaneously and interact in ways not entirely under the control of planners (26, 86). There is a considerable body of theoretical and empirical literature inspired by Lefebvre and others concerning the perceptions and images that residents and nonresidents have about specific sites (e.g., Elands and Wiersum 2001; Greider and Garkovich 1994; Hull, Robertson, and Kendra 2001). This article presents findings about differences across urbanized and rural areas.

Social Space and the Watershed Approach

The U.S. EPA watershed initiative takes the geographic concept of a physical watershed and imposes it as a political concept, a new form of *conceived space* imposed atop existing political jurisdictions. The existing conceived space of political boundaries rarely corresponds with physical watershed boundaries in the United States (Goldfarb 1994). Adaptive management techniques favored in the watershed approach attempt to incorporate existing federal, state, and local plans and regulations into a coordinated framework for managing the watershed (Born and Genskow 1999). The regional and county-level organizations that would undertake this coordination, however, have historically been the weakest political entities in the federal system and often lack facilities for producing and analyzing local environmental data.

Low public awareness of watersheds and the local water cycle increases administrative difficulties. Watersheds are defined by physical topography, but except in the smallest or most obvious drainage areas, people cannot visually identify the boundaries of their local watershed (*perceived space*). For example, it has been difficult to build watershed identities in Florida, where the topography is flat (Born and Genskow 1999). In addition, few people think of themselves as residing in a watershed (*lived space*). Encouraging participants to analyze local environmental problems in the context of the watershed is especially difficult when the designated watershed is large (Korfmacher 1998). Research also suggests that urbanized and

rural areas each have characteristic deficits and strengths that affect management success.

Watershed Management in Town and Country

Since the mid-20th century, it has become increasingly difficult to mark the borders between town and country in the United States. Nonetheless, physical features, local regulations, and social practices remain sufficiently different in rural and urbanized areas to warrant comparison. In a survey of federally sponsored watershed collaborations in the United States, Duram and Brown (1999) found that the population and level of urbanization in a watershed had no statistically significant relationship to organizers' perceptions of their partnership's effectiveness. The following analysis is therefore not intended to argue that any one type of settlement and land use pattern is most likely to succeed in watershed management. Rather, it examines the advantages and disadvantages that rural and urbanized areas present to watershed management organizers, especially to those organizing watersheds with diverse forms of settlement and land use. Two of the studies report observations in other countries that nonetheless appear to be relevant to settlement patterns in the United States (Hooper 1995; S en ecal 2002). The following sections use Lefebvre's categories of social space to analyze research about the preparedness of different types of settlement areas for watershed management based on U.S. EPA and National Research Council principles, namely, planning at the drainage basin level, collaboration, involvement of interested parties, and management based on science.

Watershed Management and Conceived Space

Rural Areas

Rural watershed partnerships in the United States often cover lands that federal and state agencies either closely advise (e.g., agriculture agencies) or manage directly (e.g., the U.S. Forest Service). Some federal land management agencies have sponsored watershed plans as new forms of conceived space that attempt to manage ecosystem functions beyond the federal lands that these agencies manage or advise (Goldfarb 1994; Mullen and Allison 1999; National Research Council 1999; Vandergeest and DuPuis 1996). In practice, it has been especially complicated to set coordinated goals and plans for watersheds that include both federal and private lands, because public and private lands are subject to very different sets of regulations and plans (conceived space) and because people who own land adjacent to rural federal lands are often suspicious of the federal agencies (Born and Genskow 1999; McCarthy 1997; Woolley and McGinnis 1999).

Because some rural residents perceive these new collaborative conservation efforts as potential threats to property rights imposed by outside agencies and environmentalists, recruiting participants is often a problem (Raedeke, Rikoon, and Nilon 2001; Thomas 1999). Well-organized farmers and others who depend on federal resource programs are often overrepresented, but watershed partnerships typically fail to recruit across the full diversity of local agriculture (Born and Genskow 1999; Mullen and Allison 1999). In addition, many rural areas lack the scientific and technical skill base that is essential for watershed management. National or statewide environmental groups and builders' organizations are typically

the most skilled participants at the table, which gives them an advantage in negotiations (Huntington and Sommarstrom 2000; Scherer 2000).

Mistrust has yielded a variety of responses. In areas where conflict with federal resource agencies has been high, active federal involvement can be the “kiss of death” for a watershed collaboration (Born and Genskow 1999). In the Yakima River and upper Sacramento River areas, landowners initiated their own watershed projects with few or no government officials in order to gain control over environmental decisions (Woolley and McGinnis 1999). Rural residents in California, however, were more willing to work on collaborations with the decentralized Bureau of Land Management than with more centralized federal agencies (Thomas 1999).

Some environmentalists oppose collaborative methods as a new form of conceived space because they expect the flexibility of the method will produce weak environmental action, especially in rural regions with little institutional commitment to environmental regulations. Landowner-dominated projects, such as those in the Yakima and Sacramento areas, only confirm these environmentalists' fears (Huntington and Sommarstrom 2000; McCloskey 1996). Furthermore, farmers, miners, and foresters have already worked at the national policy level to weaken rules for total maximum daily load (TMDL) measures of nonpoint pollution that the U.S. EPA had proposed as part of its watershed initiative (Copeland 2001). In the face of such tendencies, researchers have attempted to promote techniques for substantive negotiations, rather than simply allowing the watershed process to drift toward “lowest common denominator” goals (Born and Genskow 1999, 50).

Suburban and Urban Areas

Suburban and urban areas are defined by many types of conceived space, such as stormwater drainage systems, road salting policies, or zoning requirements that defy modification for conservation goals and that are physically defined without regard to watershed boundaries (Hooper 1995; Huntington and Sommarstrom 2000). Although most suburban and urban areas have resources, expertise, and a culture of political volunteerism that can be applied to watershed management, it may be difficult to identify which local agency officials should be responsible for watershed management and how they should accommodate local land management practices (Huntington and Sommarstrom 2000; Krupka, Chess, and Gibson 2000; Nelson and Weschler 1998; Sénécal 2002).

Developers and financial interests in urban areas seldom participate in watershed collaborations and may simply resort to courts to challenge unfavorable plan results (Born and Genskow 1999; 2001). On the other hand, water utility managers often join watershed partnerships with an interest in improving the quality of water that their plants receive for treatment (Copeland 2001). Suburban areas do feature laws and regulations for controlling stormwater runoff and soil erosion that may be linked to watershed management plans (Born and Genskow 1999; 2001).

Coordination Problems in Diverse Watersheds

In diverse settlement areas, planners at the watershed level confront a great variety of conceived spaces, including some that pit potential collaborators against each other. For instance, residents of rural areas near many cities resent the institutional and legal controls that cities have set over rural source water areas. New York City

made many concessions to upstate rural communities in order to win limits on land development near its rural water sources (Dizard 1999; Platt, Barten, and Pfeffer 2000; Walton 1992). In urbanized and rural fringe areas, municipalities are accustomed to competing against each other for development projects by designing pro-growth plans and rules (Gottdiener 1994; Logan and Molotch 1987; Warner and Molotch 2000). In these areas, officials and local boosters are not inclined to cooperate with neighboring municipalities to limit development unless they face immediate water quality problems.

Underlying such conflicts among localities are the problems of recruiting participants and ensuring fair representation at the watershed level. Scholars of environmental democracy argue that people who are politically inexperienced or hold minority viewpoints may be missing from negotiations, unable to marshal expertise, or unable to sustain their interests effectively against strong players (Hayward 1966; Pelletier et al. 1999). In large or diverse watersheds, the voices of particular disadvantaged groups may be especially faint.

Advocates propose the watershed approach specifically to target the sorts of institutional barriers created by the different forms of conceived space noted here. Differences in the forms of perceived and lived space in various settlement areas are less often noted in the watershed literature, but such differences contribute to problems of coordinating conceived space.

Watershed Management and Perceived Space

Rural Areas

Watersheds are defined by topography, but since few watershed borders are visibly evident, even in rural areas, the watershed remains a scientific concept that asserts connections that few nonscientists perceive. Differing perceptions of the rural landscape (perceived space) have motivated rural conservation plans. Residents have formed some rural watershed partnerships specifically to affirm their own goals, acting against the possibility that outsiders may impose restrictive controls (Woolley and McGinnis 1999). This impulse arises in response to conservation measures in the United States and Europe that have been shaped by the urbanite's idea of nature as a place that must be protected from human activities, an idea tied to a particular way of viewing the rural landscape (Mormont 1987; Runte 1987). Scenic value is a key cue for urbanites and tree-lined streams are a sign of ecosystem health.

By contrast, rural residents are more likely to perceive markers of habitation and economic use as defining features of their home regions. Farmers participating in the Embarras River watershed project in east-central Illinois view straight and deep drainage ditches as a sign of tidy efficiency and meandering streams as a sign of farmer neglect. Farmers wrote a watershed management plan emphasizing their accustomed goal of land drainage, rather than alternatives discussed by participating scientists (Rhoads et al. 1999). Rhoads and his associates conclude that in building a standard or ethic for human interaction with the local environment, nonscientists rely more heavily than scientists do on their ordinary daily perceptions (perceived space). In areas like the Embarras watershed, the lack of a local base of scientific expertise may lead residents to resist expert judgment.

Suburban and Urban Areas

Visible distinctions in suburban and urban areas, such as differences between business and residential districts, are almost entirely irrelevant to watershed management. This may make it difficult to recruit watershed management participants from visibly built-up areas. Even though visible water pollution is now largely controlled, urban waterways are still perceived as ecological sacrifice zones (Rogers 1993). Waterfront improvement projects in major cities, such as those in Chicago and San Antonio, have almost exclusively aimed to boost commercial use. Experience with visibly degraded city environments, flooding problems, or development encroaching on residual farms and woodlots in suburban areas may incline some residents to support environmental protections (Rome 2001; Tremblay and Dunlap 1978). Even when organizers use such issues to initiate watershed management, however, officials and residents are likely to continue to treat them as isolated policy problems (Woolley and McGinnis 1999). The ecosystem services of suburban and urban wetlands and waterways are well studied by scientists but have made little impression on residents' perceptions.

Coordination Problems in Diverse Watersheds

In physically diverse watersheds, nonresidents' perceptions of urbanized and rural lands may lead to divergent diagnoses about the nature and solution of water problems. The visibility of the water cycle in rural areas, coupled with the preservationist view, encourages planning participants from downstream urban areas to emphasize preserving land in rural headwaters areas or creating stream buffers on agricultural or timber lands (Korfmacher 1998). Conversely, the visibility of environmental degradation in cities may lead rural residents to consider city problems to be unrelated to rural practices. Nelson and Weschler suggested this as the reason why few local officials from rural areas participated in the Maumee River watershed council (in portions of Indiana, Michigan, and Ohio), even though 85% of the watershed is farmed (Nelson and Weschler 1998). In watersheds with diverse settlement and land use patterns, it may be especially difficult to envision the physical watershed.

Watershed Management and Lived Space

Rural Areas

Differences in the perceived space of rural areas for residents versus nonresidents are related to differences in their lived experiences as landowners and workers versus recreationists and motorists (Vandergeest and DuPuis 1996). Farmers and ranchers often characterize themselves as stewards of the land and relate the history of local land formations to past human actions. Watershed organizers who neglect rural residents' stories can not expect them to readily adopt the attitudes of scientists (Rhoads et al. 1999). Upstream rural residents who are unaffected by the actions of others in a watershed are especially unlikely to be motivated by watershed models.

Suburban and Urban Areas

In suburban and urban areas, drinking water is provided by facilities that are out of mind—unless local flooding leads to alerts to boil the tapwater—and few residents

directly experience local waterways or consider them to be natural systems. A participatory urban environmental program in Montréal exemplified this attitude. Although organizers aimed to foster local ecological improvements, residents set street cleanliness as their top goal (Sénécal 2002). Some scholars and practitioners in the United States now advocate projects to visually naturalize waterways in human-dominated rural or urbanized areas to increase awareness of local waterways (Rhoads et al. 1999). Similarly, conservationists and officials are increasingly demanding state and federal funding for open space preservation in the midst of urbanized areas to serve day-to-day human needs as well as ecological functions (Yaffe 2000).

The assumption that cities are not part of nature may have disproportionate effects on some groups. For instance, studies in urban areas show that many poor and working-class whites, members of ethnic minority groups, and recent immigrants are devoted to fishing for recreation and for subsistence, often in contaminated waters near home (Beehler, McGuinness, and Vena 2001). Because members of minority groups have been under-represented in watershed partnerships, these types of urban problems may receive little attention (Born and Genskow 1999). Without adequate representation, outreach is also hampered.

Coordination Problems in Diverse Watersheds

Taken together, the literature indicates that residents of rural and urban areas have different types of knowledge and beliefs about their environments that will affect their participation in watershed partnerships. As a result of their lived experiences, urban dwellers may prioritize public health concerns about drinking water, while rural residents target sedimentation in local tributaries (Ehlers, Pfeffer, and O'Melia 2000). Proponents contend that the watershed approach can identify local needs and that its processes for decision making can be adjusted to suit local participants. Instructive texts are less clear about adjusting the process when potential participants across a diverse settlement area do not agree why they should even undertake watershed level planning.

Conclusion and Recommendations

Differences in the conceived, perceived, and lived space of rural and urbanized areas affect the ability of partnerships in physically diverse watersheds to designate a drainage basin, attract participants, design effective methods of collaboration, and gather and analyze local data. Recognizing these differences could lead organizers to (1) design collaborative methods that accommodate differences across settlement types, and (2) devise specific strategies for recruitment and data collection for each physically and culturally distinct portion of the watershed. Although this article focuses on the specific challenges of watershed management, many of these recommendations could be applied to other forms of collaborative environmental decision making.

Regarding the design of collaborations, because the watershed approach is intended to couple the social processes of decision making with geographically—rather than politically—defined districts, it offers a special opportunity for addressing environmental inequalities across space. Planning maps could be used to

investigate how flooding and pollution hazards are redistributed within a watershed and to discover who benefits and loses by this redistribution. This approach would acknowledge the persistent segregation of residents in the United States by class, race, and ethnicity. Pursuing such ends may promote recruitment of members of minority groups and other disadvantaged groups and provide them a sense of common purpose that cuts across settlement types, goals consistent with the environmental justice movement. It might also help those who are spatially well placed to recognize processes leading to segregation and to undertake figurative or literal upstream mitigation measures.

Research suggests that designing collaborations with Lefebvre's three types of social space in mind would help in achieving these and other watershed partnership goals. Some watershed partnerships effectively coordinate existing forms of conceived space across settlement areas. They less often consider differences in perceived and lived space across settlement areas. Rhoads and his associates (1999) and other researchers find that residents in rural areas or poor urban areas have little scientific experience to supplement their day-to-day experiences and perceptions when forming opinions about the environment. Collaborative ventures designed from the start by such residents, together with scientists, would be more likely to produce plans that appeal to a wide portion of the population. Lefebvre (1991 [1974], 365) himself is dubious about gaining adequate representation for non-experts in planning ventures.

Some watershed organizers have attempted to design collaborations that acknowledge the lived experience of residents who depend on resource extraction, although this usually occurs in watersheds dominated by a particular extraction activity. Similar consideration extended to a fuller range of lived experiences, such as urban and rural subsistence fishing, would seem important for achieving social justice as well as for achieving the partnership's specific goals. These observations suggest that watershed planners must recruit a variety of participants who can create compelling images and narratives about practices throughout a watershed that contribute to watershed health or decline.

Partnerships will more likely succeed in designing these general collaborative processes if they also set specific strategies for recruiting participants and generating scientific data for each settlement area. Acknowledging differences in the political and scientific experience of groups across settlement areas throughout a partnership's life span would help dispel the false assumption that all interested parties can join deliberations with roughly equal competence.

Watershed planning occurs against a history of conservation colored by conflict between rural residents and the planners whom residents perceive as outsiders, as well as by assumptions that urban waterways provide few ecological services. In response to rural mistrust or urban indifference, some watershed organizers may consider limiting their field of action to smaller areas, in order to avoid having to coordinate decisions about rural and urbanizing areas. As Woolley and McGinnis (1999) note, refocusing a project to include only a portion of a watershed may reduce conflict, but it is no longer watershed-based management. It may be that increased residential mobility and movements supporting local agriculture are improving awareness of the interconnectedness of town and country.¹ Project planners who consider spatial diversity from the start may be able to take advantage of this awareness to overcome some of the burden presented by the legacy of conflict.

Note

1. I am indebted to an anonymous reviewer for this idea.

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