

Suitability of a Program of Compensation for Environmental Services for the rural Rocky Mountains

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Abstract:

The paper will examine whether local communities in a major river basin in southwestern Wyoming could make use of compensation for environmental services (CES) in order to protect threatened water values in the basin.

Water is currently managed in the basin via a locally-rooted institution with nested action arenas that offers considerable flexibility and some promising history of past responsiveness to new policy needs at the local level. The basin, at the headwaters of the heavily-used Colorado River, is under pressure from energy development, second-home development, and downstream urban water demand which threaten traditional water uses valued by the community.

The paper will discuss possible ways using local funding (from existing taxes on mineral production already dedicated to water issues) to aid the community in designing a CES plan that could fit the current institutional design and help protect threatened traditional water uses.

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The Upper Green River Basin¹ in southwestern Wyoming currently faces a variety of forces which threaten the physical and social environment that are valued by the community. The basin, at the headwaters of the heavily-used Colorado River, is under pressure from energy development, second-home development, and downstream urban water demand.

¹ For purposes of this paper the Upper Green River Basin consists of the main stem, the New Fork tributary, and smaller tributaries of the Green River in Wyoming, primarily in Sublette County, Wyoming.

Residents of the basin seek ways to strengthen their ability to determine what becomes of their home, and to give continued vitality to features of their home place that they prize.

Those features include pristine high mountain wilderness and forest areas, open space vistas, abundant "blue ribbon" wildlife and fisheries, and communities with strong social ties and an ability of residents to pull together to provide each other with both amenities and assistance when needed.

The economy of the area in the past has been dominated by cattle ranching, with some tourism, recreation, and oil and gas production. It now appears that picture will be rearranged so that cattle ranching will become the least important of the four components of the local economy. Tourism and recreation, featuring the purchase of large ranch properties for second homes, is increasing. Local socio-economics are also being dramatically affected by a burst of natural gas production following new field discoveries, and the accompanying need for worker housing.

The area is high altitude and arid, a cold desert. The management of what water resources do exist has a significant impact in shaping the landscape and supporting natural resources, particularly fish and wildlife, on which the three industries of tourism, recreation and ranching depend.

Ranchers hold the rights to and consume the vast majority of water used in the basin. Typical use is old-fashioned flood irrigation for the production of hay for winter cattle feed. (Wyoming Water Development Commission (WWDC), Green River Basin Plan, 2001, Ch. 2).

Accordingly, how ranchers or their successors may use their water rights in the future is a key piece of the puzzle facing local residents who seek to influence what happens to their area.

Meanwhile, four years of drought since 2000 have increased the pressure on and anxiety about local water resources. Among other things, the impact of drought all along the length of the Colorado River has exacerbated traditional fears that the large urban centers downstream in California and Nevada will manage to impose a strait-jacket of limits on water use in sparsely-populated Wyoming, in order to ensure more water flows downstream for fountains, lawns and golf courses in Los Angeles and Las Vegas. Though Wyoming uses only about two-thirds of the water in the Green that is allowed to the state under interstate agreements, in a drought the compacts might require cuts in water use, and the longstanding fear is that downstream states that routinely use more than they are allowed will demand cuts in Wyoming use despite the compacts. (WWDC 2001, Basin Issues Summary)

Residents of the Upper Green River Basin therefore face a pressing need to understand the role of water in their physical and socio-economic environment, and to sustain or expand the water

management practices critical to maintaining that role, if they seek to defend the basin as a place where they will want to live.

Such a situation could be suitable for a “Compensation for Environmental Services” (CES) scheme. Such schemes attempt to compensate agricultural producers for values they create that are used, but not paid for, in existing markets. (Typical schemes encourage upstream farmers to undertake management of livestock, crops and farmyards so as to improve downstream water quality, for instance.) Such programs if properly designed can support producers and enable them to stay in their traditional home places and prosper. (See literature review.)

A CES program in Wyoming might focus on *water* use and the uncompensated benefits it can create, in contrast to most CES programs which focus on *land* use and the uncompensated benefits it can create.

Arguably, the use and management of water in the Upper Green River Basin is the linchpin in creating the conditions on which the growing tourism and recreation industries in the basin depend. Those conditions include all the open space, fish and wildlife habitat, and friendly communities found along the Green River and its tributaries below the high wilderness and forest lands. Such physical and social conditions have a high value, demonstrated by growing recreation and tourism, but they are currently not paid for.

Ranchers own the water rights, manage the water and create the values. They are, however, faced with the economics of marginal cattle operations versus high prices offered for their ranches as second-home sites. That calculus can force them to sell out in order to realize the value of the property they hold. The sale may or may not result in changed water management. It can nonetheless make for major change in the community, eliminating or sidelining the ranch families who have previously played a major role in social and civic life.

In the Upper Green River Basin (and possibly elsewhere in Wyoming), a CES program that ensures compensation for the non-crop values that ranchers can create through their water management could change the picture facing individual ranchers, and with it part of the picture facing the community.

Such a CES program would have two goals: supporting ranchers, to help them towards a more prosperous future; and supporting the provision of environmental services that deliver fish and wildlife habitat, recreation and open space and green space.

The program might support traditional water management (largely flood irrigation), or it might support other water management approaches, depending on how they affect local and downstream water amenities.²

The existence of such a program would, however, allow ranchers a broader range of choices in the handling of their land and water rights, and give them a greater opportunity to help determine what happens to their basin.

Such a proposal is, of course, based on the hypothesis that water management in the hands of a healthy ranching community is key to providing amenities such as fish and wildlife habitat, recreation and open space. This is a hypothesis that will require some testing.

Local people, armed with technical assistance, are in the best position to test the hypothesis of a ranch-amenity connection in the Upper Green River Basin. A combination of current events in the basin could spur local people to seek such a test. One such event is a final report of a study of water values in the basin, due to be discussed in public meetings in summer 2006. Another is the fast pace of natural gas development, which has given basin residents an urgent sense of the need to get ahead of the physical and social changes coming to their basin.

If in the public discussions spurred by these events, the possibility of a CES program is suggested and its design attempted, the result could be a major community discussion examining local resources, their interconnection, and community goals. If the community then seeks technical assistance, it could test and examine the hypothesis of a ranch-water amenity connection. If data shows there is a valid connection between ranch water management and the provision of fish and wildlife habitat, recreation, and open space, the community could work to design a CES program. An initial literature review, and analysis of existing institutions in Wyoming, below, suggests such an effort could be worth undertaking.

Literature review on CES

An initial literature review suggests that there are successful examples CES programs designed to strengthen rural communities as well as protect natural environmental processes, as would

² Water quality, particularly salinity, is an issue along the entire length of the Colorado River, including into Mexico, and it is accordingly governed by international treaty, federal law, and interstate agreement. A long-standing U.S. federal-state program designed to reduce Colorado River salinity has offered incentives to switch from flood irrigation to sprinklers in one intensively irrigated portion of the Green River Basin in Wyoming. In other portions of the basin, however, if irrigation is to continue, the combination of climate and economics have made only flood irrigation feasible. Design of a CES program for the Upper Green River Basin would have to take into account its impact on Colorado River salinity goals. An initial inquiry with the Wyoming representative to the Colorado River Salinity Forum, however, suggests that an effort to maintain flood irrigation in the upper basin, in order to improve amenity values, should not run afoul of the salinity control effort. Personal communication, John Shields, 4-11-06.

be the goal of a CES program for the Upper Green River Basin. Useful analysis of the key elements of such programs is also available.

The basic concept of CES programs is that they correct a market failure. The programs provide payment for a positive externality, a benefit that local natural resources and the rural communities that manage them have been providing to others for no return. (Hartmann, Potter)

In other words, the rural communities have been subsidizing others with their services and expertise in managing local natural resources. A CES program can end that subsidy, and instead ensure that the rural community receives compensation for its services. (Hartmann) A properly designed program can overcome the high transaction costs that in the past have been a barrier to payment for rural resource management services (Burstein).

The appeal of such a program for public policy is the potential to change the financial rationale behind local resource management decisions. CES programs can ensure that local resource management decisions need not be based only on private costs and benefits. Instead, the decisions can include consideration of the significant and widespread public benefits provided by careful local resource management. (Hartmann)

In developed countries like Europe and the U.S., such programs are described as schemes aimed at supporting the "multi-functional" role of agriculture. Agriculture's non-commodity outputs - everything from open space to clean water - are increasingly appreciated by the urban citizens of rich countries. CES programs, funded by the government, attempt to recognize and pay for those non-commodity outputs. (Blandford, Potter.)

There is considerable debate over such programs in the context of free trade concerns. One side argues such programs are legitimate subsidies supporting the non-commodity products, while another argues such programs are simply old-fashioned agricultural subsidies in disguise, which distort markets and should be eliminated under free trade agreements. (Blandford) Behind these arguments lie the question of how real the connection is between current agricultural regimes and the environmental amenities found in their area - and the further question of whether change, reduction or elimination of agriculture in rural areas would necessarily produce less valuable environments. (Potter)

In the U.S., national CES-type schemes have targeted relatively narrow outcomes - protection of soils and water quality, for instance. Such programs, embodied in the federal Department of Agriculture's Soil Conservation Service (SCS - now the Natural Resource Conservation Service, NRCS), date from the Dust Bowl of the 1930s. (Blandford) The programs tend to favor land retirement, and may reflect a view that nature is better off without people (and so rural landscapes are better off without farmers and ranchers.) (Baylis)

State and local governments in the U. S., however, have in the past 30 years taken a broader view of the positive externalities produced by agriculture - by rural landscapes where people play a major role. State and local governments have adopted incentive programs aimed at protecting an enhancing a variety of amenities provided by agriculture including vital farm communities and open spaces. (Blandford)

Federal law in the U.S. does not act to limit state and local initiatives in this area. State and local programs have been successfully put in action both to complement federal programs and to act independently of them, serving different goals. State and local programs may supplement the federal funding of SCS/NRCS programs, for instance, or set up new property tax subsidies and easement purchase programs, aimed at keeping land in agricultural use. (Blandford, Isakson).³

A major problem facing CES programs is how to link the rewards of the proposed program directly to the production of the non-commodity, amenity benefits that local agriculture creates. The difficulty of measuring such benefits and their link to farm and ranch activity makes the linking issue a tough one in CES program design. (Hartmann)

Some of the major U.S. programs offer one potential solution to this problem. In the U.S., applicants typically design a resource management plan and submit it to scientific and technical program staff, who determine whether the plan is likely to produce desired non-commodity benefits - if so, the plan is funded. (Blandford) One advantage of such an approach is that it does not dictate management methods but makes use of local ideas by encouraging participants to propose new ways to meet program goals. Measurement of success in achieving desired outcomes, however, may still be uncertain.

A major CES program in New York State demonstrates how CES programs can work in the U.S.

The CES program is funded by New York City to support environmentally-friendly farm practices and a continued agricultural economy in the "Catskills" area of New York State, which occupies a major watershed supplying surface water for the city's water supply. A major study of the New York/Catskills plan as a CES program was undertaken with Ford Foundation funding by the Salvadoran Research Program on Development and Environment (PRISMA).

³ Free trade concerns currently do not block the national program in the U.s., and appear unlikely ever to block the local and state programs there. The national programs offer a reasonable attempt to aim the subsidy at environmental outcomes, thus qualifying for "green box" treatment as allowable programs, under the World Trade Organization standards. Further, state and local CES programs, unlike national programs, while sharing "green box" qualifications, would also typically be considered "collective action" left untouched by WTO restrictions, according to two U.S. agricultural economists who have reviewed the issue. (Blandford)

The Salvadoran study, completed in early 2002, describes the process by which New York City and the upstream agricultural Catskills area came to an agreement to deal with the deteriorating quality of surface water on which a major part of the city's water supply depends. Under the agreement of 1997, the city funded a \$1.5 billion program (over 10 years) to pay relatively impoverished farmers in the Catskills to improve agricultural practices and thereby upgrade water quality in the watershed serving the city. By undertaking the program, the city avoided building a \$6 billion water treatment plant (which would have cost another \$200-\$300 million a year in operation and maintenance.) (Isakson).

Key principles of the NYC/Catskills program are:

- *local leadership* (by a representative Watershed Agricultural Council (WAC)(WAC homepage, 2005) The council was originally appointed by a state official from those who had volunteered time to design the program, and new council members are now elected by the council. (Huneke, 2005)
- *voluntary, grass-roots participation* (farmers can apply to the program for design and funding of a plan for upgrading their operations, but are not required to do so; information about the program is disseminated neighbor-to-neighbor, rather than at agency-hosted meetings)
- *full funding* by the city (including staffing and technical assistance to the watershed council).

(Isakson)

Farmers who decide to join the program can receive:

- *technical assistance in design of a "whole farm plan"* to improve farming practices in a way that typically both reduces water pollutants and increases farm efficiency.
- *program payments for all capital expenses of implementing the plan* (typically, that includes construction of a cement farmyard to control animal waste, at a cost of some \$60,000-\$80,000 per farm, plus purchase of additional operating equipment)
- *cash supplements to existing federal conservation programs* which pay costs of installing buffer zones or otherwise protecting streams and wetlands
- *professional staffing for farmer cooperatives* formed to find niche markets for traditional and new farm products
- *cash payments for permanent easements on their farms* (such easements restrict future farm operations to the best management practices adopted under the "whole farm plan.")

(Isakson)

More than 85% of the farmers in the watershed have joined the program to take advantage of the design and funding of “whole farm plans” for better farm operations. Many farmers also use the proffered supplement to federal riparian and wetlands protection program; two cooperatives have been formed, are struggling, but have made progress finding niche markets for certain products; farmer interest in the easement program has been only mild. (Isakson)

How such a program came about is of crucial interest for any attempt to build a similar program elsewhere. The catalyst for creation of the Catskills program was a regulatory order from the federal Environmental Protection Agency to New York City. Though city officials had noted water quality problems earlier, no remedy was seriously considered until the “outsider” - the federal agency - found the quality of the city’s water supply deteriorating. In 1990 the EPA ordered the city to build a new treatment plant (estimated at \$6 billion) or improve protection of key watersheds. The city’s initial response was to propose far-reaching restrictions on Catskills farmers (using land-use control power over the area that had been legislated to the city during acquisition of its water supply in 1905). The farmers’ response, in turn, was to rally to challenge the equity of the city’s proposed severe restrictions on how they could use their land. Negotiations (mediated by New York State officials, interested in the fortunes of both sides) led to a sketch of a city-farmer agreement and initial city funding in 1992, followed up by a detailed agreement in 1997 for the entire program with full city funding, an agreement which received the EPA approval necessary for the city to avoid building the new treatment plant. (Isakson)

Thus, fear of regulation (both EPA regulation of the city and city regulation of the farmers) prompted the creation of the program. Nonetheless, in actually deciding to join the program, farmers were motivated less by concern over regulation than by broader monetary and non-monetary rewards, PRISMA researchers found.

A PRISMA survey showed that the prime motives farmers expressed for joining the program were a desire to take advantage of a fully-funded program to improve their farms, enhance their economic viability, and become recognized as stewards of the land and of water quality. (Isakson)

In addition, farmers indicated satisfaction with the program whether or not their own farm economics actually improved under the whole-farm plans. Their satisfaction, the survey showed, was due to non-commodity rewards to them. Those rewards did include freedom from regulatory threat but also included both personal pride and a sense of recognition by the broader community of their role as conservators of natural resources. (Isakson)

The primary researcher found, in interviews of farmers, that a key part of the program's value for local people is the voice and the influence it has given them. The program has in farmers' minds allowed them, through negotiations with others in their communities and with the big downstream city, to articulate and attract investment in a vision for the Catskills area. They believe the investment in their vision will make the Catskills a more satisfying place for them to live for years to come. (Isakson). The WAC board chairman commented in late 2005,

A lot of the projects we do are things farmers have always wanted to do. I believe farmers are conservationists to start with, but they don't have the finances to do it... It's been very rewarding for WAC members...I never dreamed in all my years milking cows that I would be doing this. It's like a college education... I really enjoy it. (Huneke 2005)

Though the NYC/Catskills experience may be the most relevant for a CES proposal in the U.S., literature examining CES programs in developing countries also offers useful lessons. Some recent studies warn of the damage that can be done to rural communities by CES programs that encourage "conservation" of resources via exclusion of local people from resource use. The good news, however, is that that model can be avoided. (Rosa; Burstein; Hartmann.⁴)

Analyses of CES programs that have strengthened local communities suggest key principles include:

- *involvement of local users in program design* from the very beginning, emphasizing local decision on program goals
- *equal emphasis for social goals as for environmental goals* in program design, if any social goals are undertaken. Consistent attention to social goals from the outset can: help guide program design; make clear the need for a long-term program and therefore highlight the need to identify long-term sources of compensation; and reduce later disputes and jealousies among parties affected by the program
- attention to *meeting basic subsistence, production, and new-market needs* of the local users. Studies note that programs will not serve local users unless they address those needs as well as the provision of environmental services.
- *identification of reliable funding sources, and attention to the time frames* for which various sources will be tapped
- attention to protection or reinforcement of *property rights*
- *expansion of local users' rights*, rather than restriction of them
- detailed *definition of the "environmental services"* involved that are to be rewarded

⁴ These studies examine CES programs that provide lessons for strengthening local communities in Mexico, El Salvador, Costa Rica, Honduras, Ecuador, Colombia, Peru, Brazil, and the United States (in the New York City/Catskill study).

- ability to draw on *existing social capital in local communities*, in the form of capacity to organize and work together for problem-solving

(Rosa, Burstein)

CES programs can use a range of benefits to reward users who participate - including direct cash payments, tax or other incentives, and technical and marketing assistance, all directed to individuals or to community organizations or a combination of the two. (Rosa)

The institutional framework in Wyoming: Water law and management

Water is currently managed in the Upper Green River Basin, as it is (with variations) across Wyoming, via an institution with nested action arenas and operating at different scales. This institution offers considerable flexibility and some promising history of past responsiveness to new policy needs at the local level. (The terms of analysis used are from the Institutional Analysis and Design approach, Ostrom, 2005) The system developed in isolation, in a sparsely-populated rural and (until the last 30 years) relatively poor state. The management system has been relatively successful as a system for managing irrigation water. The system has delivered a supply that is usually adequate, with reasonably maintained facilities and conformance to rules. (Tang, 1994)

The Wyoming system operates at several scales:

- 1) individual irrigators on the creek-side or ditch-bank level, who operate under a variety of local rule arrangements on who gets how much water when.
- 2) local organizations, covering a larger area, in some locations, include canal companies, reservoir companies, irrigation districts, each with their own water-distribution rules.
- 3) regional and Wyoming-wide water administrators, who administer water distribution rules that only kick in during water-short seasons, actual drought, or major conflict between local users in which one combatant calls upon this level for aid. A non-regulatory sister agency offers grants and low-interest loans, using mineral tax money, for new investment and rehabilitation of irrigation and other water supply facilities.
- 4) the state Legislature, which makes some statutory changes to water management rules, largely at the behest of the local and regional levels, and officially approves (with few changes) the loan and grant agency proposals for water facility investment.

These levels are interconnected and quite responsive to each other. Each level has its own arenas for daily action and for internal rule-making, and each can invoke intervention or rule change from the level at the next larger scale but does so more and more rarely as the scale increases, as would be expected. The written Constitution of the state forms the fundamental

backdrop to the system: its water language was formulated through considerable debate among Wyoming people in 1889 and has not been altered since.

The Wyoming water management institution features good social networks, and much face-to-face communication within action arenas at each scale and between levels of different scale. The system has key elements of a common property system for managing water which both foster and draw upon these social networks. (Dietz, 2003; Ostrom, 1990; Agrawal, 2002) There are effective and low cost rules in place for allocating the water in a way that recognizes local conditions, for excluding people from use of the resource, for monitoring and sanctioning rule violations, and for resolving disputes. There is also a tradition of recognizing and respecting local rule-making ability.

Property rights in water under this system are distributed among the levels of different scales. (Ostrom, 2003, 2005)) Individuals and irrigator organizations have rights of access, withdrawal and some aspects of management. The regional and Wyoming-wide level administrators (five people) have most rights of management, the power to approve or deny attempts at alienation, and authority over exclusion and the position of each individual irrigator in rights to withdraw water.⁵

One feature that is lacking is a collective-choice mechanism for rule change. Change takes place at the local level, and also at regional and statewide levels, largely through interaction among irrigators and between them and the regional-statewide administrators. This can lead to the slow accretion of rule change via state-wide agency rulings on how to accommodate individual new needs brought before them by the petition of an individual water user. The Legislature rarely initiates management changes, though it does initiate water facility investment policy. There is therefore little means for individual water users to take active part in proposing and adopting new water management rules.

For most of its 110 years, this system has largely proved itself resilient - adapting to changing needs of the irrigators and of the larger society. In the last 30 years of rapid economic change in Wyoming, however, the water management system has faced challenges to which it has not adapted well (demands, for instance, for recognition of previously ignored water uses

⁵ This follows from the emphasis on dates at which water rights originated, which within the "prior appropriation" system of water law in Wyoming means that those with the oldest rights have the first right to take water in times of scarcity. The four superintendents of the four major hydrologic water divisions in the state, and the power of the superintendents and the "State Engineer" in charge of water management at the state level, have the power to confirm water rights and their place in the priority system.

important to Native Americans, or important to national environmental goals embodied in federal legislation).⁶

Another such challenge is the increasing marginalization of the traditional goals of the water management system. The Wyoming water management system has focused on water as a producer of commodities (most typically, hay, due to Wyoming's cold, high desert climate). Yet, the value of water in both Wyoming and the larger U.S. society is increasingly found in its non-commodity functions - in its provision of environmental services like clean water and fish and wildlife habitat, or its provision of aesthetic, spiritual, or recreational amenities. (National Research Council, 2002) The relevance of the water management system to the needs of the society is slowly eroding, and change appears necessary.

The changing value of water is at work in the daunting economics now facing irrigators and prompting them to sell off their home lands (sometimes with satisfaction, but sometimes in despair) in Wyoming locations like the Upper Green River Basin. A CES program will only be suitable for such locations in Wyoming if it can fit into the existing water management system. It might, however, also offer that system a new avenue to prove itself resilient, and relevant to its users, once again.

CES and Wyoming: Applying lessons from the literature

One close observer of the Upper Green River Basin describes the situation facing area ranchers this way:

What I witnessed in my years in the Upper Green Basin was that many of the descendents of the original settlers of that country had no one to pass the place on to. There remain today a few of these in the Big Piney area. The owners are now in their later stages of life and their children are grown and have long left the country with no intention to return to that hard life. Ranching is not as profitable as it once was and today's youth are not looking at working that hard for that little. I guess it just isn't as glamorous as it once was. The hope is that when the time comes to sell out and retire that they can find someone who will maintain the ranch as it was...Water is always at the root of these endeavors because without it, the land quickly reverts to the arid desert landscape with such a reduced value that most folks can not afford to reduce their worth that substantially." (Smith, 2005)

For some the answer is to leave the ranch and sell it (with the water rights) to wealthy individuals, corporations, or developers, this observer noted. Those new owners may quickly

⁶ For a more detailed discussion of the Wyoming water management system, examined through the Institutional Analysis and Design framework described in Ostrom 2005, see MacKinnon, draft paper, presented at the fall 2005 Colloquium of the Workshop in Political Theory and Policy Analysis, Indiana University: http://www.indiana.edu/~workshop/colloquia/papers/mackinnon_paper.pdf
A final version of this paper is scheduled for publication in June 2006 in the Wyoming Law Review.

learn the value of their water rights and they have the money to make sure those rights are fully used - often in a traditional flood-irrigation manner. Other ranchers manage to find absentee buyers who re-hire the rancher to manage the ranch with a profit-sharing agreement that keeps the rancher on the land for life with motivation to manage it well - but leaving nothing that his children could take over. (Smith) Still others may find a new buyer who does not appreciate the value of continuing past irrigation practices.

Some ranchers are frustrated in their desire to keep the land in their families or at least in ranching. In one example demonstrating the value some see in keeping land in ranching, an elderly woman selling her home ranch in the area sold part of it to a neighboring rancher and part to a developer. The developer had wanted to acquire the entire ranch; the owner, however, sold part to the rancher at half the price per acre she charged the developer for the other part. (Personal communication, Niemi, 2005)

A CES plan could offer a way to change the options facing ranchers in the area, so that the valuable externalities created by the traditional ranch, now going uncompensated, become part of the economic equation. A different-enough equation might allow those who desire to keep the land in ranching, and remain part of their community, to have an income that will give them more choices.

Based on the lessons from CES literature and the institutional setting in Wyoming, the kind of CES program suitable for consideration in the Upper Green River Basin might be outlined as follows:

A program designed and led by local people, implemented by a representative watershed council whose programs, staff and general operations are *fully funded* by appropriate sources.

The funding sources could be, for the short term, state revenues from oil, gas and other mineral production. (Such revenues have already been dedicated by the Legislature to water investments through the state's grant-and-loan agency in water facilities. The stated policy has been to take revenues from non-renewable resources and invest in renewable resources.)

For the long term, however the funding sources for the program should come from local or state funds fed by revenues from the valuable resources created by the ranchers' water management. Such funding could require new or existing taxes targeting hunters, fishermen, ranch sales or tourists (see below).

In the design of the program, the twin goals would be: 1) to make it possible for *ranchers to remain the owners and managers* of their home places with a prospect of a prosperous future; and 2) to maintain and improve water management in the basin to *support a high value of water for amenities dependent upon water* such as fish and wildlife habitat, recreation, open space and green space.

Voluntary participation by ranchers and other water rights holders, or groups of water rights holders (like irrigation districts) would be the basis of the program.

Participants could receive: *technical assistance and full capital investment funding for ranch plans* that include maintenance and improvement of water management practices that produce amenity values; *investigation, capital funding, and marketing aid for new products and markets* the ranch could serve; *assistance in amending water rights to recognize the full range of uses* (including amenities) to which the water is being put (in addition to irrigation and stock watering); *funding for community enhancement projects or new local government services* (from libraries to markets to land-and-water-use education for newcomers...whatever the local watershed council created to administer the program proposes. Such funding might be tied to the percent of voluntary participation occurring in each local area); and cash or technical *supplements to existing federal and state programs* designed to encourage stream, wetlands, fish and wildlife protection.

The initial program design would be the work primarily of local people, with a few technical, legal, scientific and economic advisors and a few representatives of the initial funding agency. Together such a group should identify and articulate the goals of the program (with the expectation that the articulation may be rough and will improve through experience with the program). Local designers should include representatives of not only the agricultural sector but the towns and their business interests, as well as environmental groups, and all other interests in the area likely to be affected, including a representative of the oil and gas industry.

While the initial group to propose the program can and should be informal, one of the issues it must address is how to form an entity that can receive and administer public funds. The group should come up with a proposal for legislative authorization of a watershed council that can meet constitutional requirements in this area.

The New York City/Catskills experience demonstrated that full funding of all acceptable applications from local farmers is the best way to achieve the widespread participation on which achievement of the social and environmental goals depends (Isakson).

Full funding of a CES program in Wyoming is a real possibility. Due to energy development, and the current boom in both production and prices, Wyoming is now wealthy, boasting a budget surplus that is the envy of other states.⁷ The energy development is one of the forces putting

⁷ The majority of the state's budget is fueled by taxes and royalties on minerals production (primarily the energy minerals - oil, gas and coal.) As a result, there is no state income tax. That means a rollercoaster in state finances, depending on the fortunes of the energy market. Currently, and probably for several years more, state government finances are on the upswing. For the current 2005-2006 biennial budget, the state of Wyoming in October 2005 announced it expected to see some \$180 million more in its General Fund, used for ordinary expenditures, than was forecast only 10 months earlier in January 2005. (Wyoming CREG October 2005)

pressure on the Upper Green River Basin, so it is appropriate that energy revenues be used for initial funding of a CES program.

The water facilities investment program (Wyoming Water Development Commission (WWDC) program) already recommends funding, subject to approval by the Legislature, of approximately \$30 million each year on studies and construction of water projects and issues. A CES program could be proposed locally, recommended by the WWDC, and approved by the Legislature.

WWDC could fund the local CES program watershed council initially, or even permanently. An option might be WWDC funding for individual proposals approved by the council (such as ranch improvement plans) for perhaps 5 years apiece.

A feature of the CES program could be that the watershed council should work to identify more permanent funding. The goal would be to place the costs of the program ultimately directly on those who benefit from the amenity values in water that it supports. Thus the program would have succeeded in reducing the transaction costs that currently prevent market payment for those benefits. Such permanent funding might come from a special hunting and fishing license fee for the Upper Green River Basin, for instance, or a local addition to the lodging tax assessed on tourists who come to enjoy the agricultural scenery. Alternatively, it might come from such sources as a new real-estate transfer tax, targeting the value of irrigated ranches and healthy creeks in a new real estate market.⁸

Such a CES program appears to have a good chance of support from decision-makers at each level of Wyoming water management.

Individual rancher-irrigators deciding whether to participate in the program would be eyeing an outcome of both material and non-material rewards. (Ostrom, 2005) The material rewards would include capital investment in their ranching operations, and funding for community improvements. The non-material rewards would include knowledge that their lands could stay in ranching, the prospect of a future for ranching in their community via creation of a new forms of management and ranch income that might appeal to a new generation, a voice in deciding the fate of their community, and pride in stewardship of land and water.⁹

⁸ For the real estate transfer tax, see Real Estate Transfer Taxes (1998) and (net refs) For a broad discussion of potential funding sources for "conservation" which might be relevant to a CES program, see Hopper and Cook (2004).

⁹ One optional program feature suggested above - aid in amending ranchers' water rights to recognize additional water uses - would be an interesting material reward for ranchers to assess. It would suggest innovation regarding water law, which is often regarded with suspicion in Wyoming. It might however also offer the potential of increased security against perceived threats from downstream states, by identifying Wyoming water rights with water uses recognized nationwide to be more valuable than hay production. Since the possible innovation in water law would under this program come only through voluntary proposals by individual ranchers and traditional case-by-case review by the regional/statewide

For ranchers assessing a CES program overall, the linkage between program and outcome would be uncertain and the information incomplete (Ostrom 2005), but ranchers would have total control as to whether to join the program. The typical area rancher is male, aged 50-70, with an education of high school or beyond, and experience in both water management and politics on a local and regional level. Coming from experience with a system of managing water as a common property, and a relatively homogenous community with a recognized culture and relative social equity, they would have the ability to participate in design of the program and assess its usefulness. Creation of such a program might offer local people more opportunities for participation in a collective-choice mechanism affecting local water management than they have had in the past. Regulatory programs have been steadfastly resisted in these communities, but a voluntary program offering these potential rewards, and locally designed, could be appealing.

At other levels in Wyoming water management, some of the same considerations are likely to come into play. Irrigation districts might be tempted to apply for assistance as a whole in order to avoid administrative hassles that could be associated with applications by only individual members of the district, but otherwise districts are likely to desire the material and non-material rewards of the program.

At the regional/state water administrator level, requests for changes in ditch locations, etc, in order to improve management could increase. New requests to add additional beneficial uses to existing water rights (under the option to amend existing water rights) would arise. Though these would add to the caseload of the administrators when they sit together as a board of decision-makers four times a year, their caseload already typically rises and falls based on initiatives that water rights holders or they themselves undertake. They have also shown themselves capable of developing new standard processes to speed the review of new initiatives. Added administration for regional staff might be required by some of the potential changes, but in many cases there would be no need for more administration. The potential benefits of the program, in keeping water rights holders and their water rights in operation, and in enshrining in water rights the broad array of uses which could help defend Wyoming against any restrictions down-streamers might impose on Wyoming water use, all address concerns that have guided the regional-state administrators through the system's century-long life. Those benefits are therefore likely to appeal strongly to the administrators and sway them in favor of the program.

administrators (rather than a wholesale innovation adopted at the Legislative level), the option to amend water rights could on balance be a positive for acceptance of the program.

In the case of the sister agency to the water administrators, the water facilities funding agency (WWDC) would have different considerations but is also likely make a favorable decision. The program would create a new drain on agency funds and place new demand on staff to participate in initial negotiations, and to oversee the work of the local council created to run the program. On the other hand, legislative authorization of the local council (rather than leaving the program to WWDC to administer) would save the agency a major administrative burden.¹⁰ Overall, of course, the CES program would also expand agency turf. The CES program in the Upper Green River Basin could be regarded as a pilot for similar programs that other basins might seek for their areas. Further, the WWDC has a 20-year tradition of seeking to aid agriculture, and its policy is set by a citizen commission dominated by agricultural interests. In the end the potential to increase the options of ranchers and to address the fear of downstream state “raids,” plus the opportunity to expand agency turf, is likely to tip the balance at the WWDC in favor of the new program.

The Legislature would have to approve a CES program. It would have to authorize creation of a watershed council properly designed to constitute a governmental body that can receive state funds.¹¹

In the decision-making arena of the Legislature, a CES program is again likely to receive approval. The local origins of the proposal will be a persuasive factor for elected representatives typically suspicious of “top-down” programs. The Legislature has a decades-old tradition of a very generous “farm loan” program for Wyoming agriculture, and recent experience with a “small water project” program designed to help fund water facilities on ranch lands (which foundered for lack of something like a local watershed council to handle the public funds and be accountable for public benefit from those funds). There are constituents and lobbyists who would argue against a new subsidy that has solely agricultural purpose, yet they could (like the WTO) find this program acceptable because of its twin purpose in supporting environmental as well as agricultural goals. Meanwhile, the Legislature also has a 25-year tradition (largely impervious to the boom-and-bust cycle of the state’s dependence on

¹⁰ The creation of the local council also may serve another need - setting an example for re-vamping the “advisory groups” the WWDC has set up in each major Wyoming river basin but which have little representative basis and uncertain purpose.

¹¹ In an exception to an 1889 general ban on state funding or loan of credit to individuals or corporations, or any work of internal improvement not approved by a 2/3 vote of the people, a 1939 amendment to the Wyoming constitution provides that the legislature can provide funds for the “conservation or utilization of water” through legal subdivisions of the state, irrigation, drainage and other water-related districts, or “any public corporation legally organized for the purposes of the conservation, distribution or utilization of water or soil.” (Wyoming Constitution, Art. 16, sections 6 and 10) A review of the watershed improvement districts already provided for in Wyoming statutes (W.S. 41-8-101 et seq) suggests that such districts might not be the best vehicle for administering a Wyoming CES program, particularly because representation in the district is determined by land-ownership, not an appropriate collective choice mechanism for the CES purpose. Approval of a CES program should not require action at the constitutional level.

energy revenues) of earmarking major streams of energy tax revenue for investment in water, based on a policy of using revenues from “non-renewable” resources to invest in “renewable” resources.

The proposal to rely on those water funds for program administration in the first few years of any proposal, while ultimately shifting proposal costs onto users of the environmental benefits, will appeal to legislators. A number of Wyoming legislators are resentful of environmental interests getting what they consider a “free ride” under federal programs requiring environmental protection. Depending on perceptions of who might ultimately bear those costs, the proposed program may meet different receptions in the Legislature. Supporters of wildlife and fisheries programs would resist incursion into what they may see as a limited pool of potential license fee payments, on which most Wyoming wildlife and fisheries programs currently depend. On the other hand, they may find encouragement to believe in future legislative aid to wildlife and fisheries, and therefore room for compromise, in the example of 2005 legislative approval of a “wildlife trust fund” fueled by energy taxes. (Wildlife Act, 2005) Towns reliant on lodging tax funds for extra revenue could similarly resent plans for a new program to tap tourists’ pocketbooks. Real estate sales people are likely to oppose a real estate transfer tax, but may find their objections dwarfed by the size of the prices being paid for ranches. All these concerns however could be allayed by evidence that the CES program genuinely aids the wildlife, fish, recreation and open space amenity needs of all these groups. Any group concerned about the ultimate funding sources should therefore be prompted to participate fully in the design of the CES program to ensure that it does have those results.

Some outside observers might suggest that other incentives for putting water to new uses might be more effective than setting up a CES program. Encouraging a market in water rights in Wyoming, for instance, might appear likely to see more water put to riparian or instream uses, traditional economists would argue. Alternatively, they might suggest creation of a “salvage” program that encourages ranchers to use water more efficiently by ensuring they can sell off for other uses rights to water not needed after efficiency improvements.

These standard market approaches however ignore the deeply ingrained opposition of Wyoming irrigators to selling their water rights off the land (largely because of the widespread understanding that most of the value of ranch lands in the state is in the water rights, not the land itself - as suggested by the observations of Smith, above.)

Market approaches also ignore the potentially vital connection between water use practices and amenities like fish and wildlife habitat and green open space - the connection that must be proved true if a CES program is to be put in place. There is considerable local belief in such a connection. Old-timers in the basin argue that increased flows in the Green River and

decreased diversions for irrigation may lead only to seasonally higher flows through a desert landscape, and not to support of the present rich riparian areas and fish and wildlife habitat.

This analysis suggests that a CES plan could win participation and approvals at the various necessary levels in Wyoming, where market approaches are likely to fall short.

Yet what about an incentive for local people to invest their time and energy to *create* a CES proposal? The New York/Catskills CES program was a response to the threat of regulation, even if that was not in the end the primary reason cited for participation in or satisfaction with the program. An effort to change rules (particularly in an institution operating at a number of different scales) often requires a catalyst - indeed, a crisis.

In the Upper Green River Basin, two developments are now likely to supply both a catalyst and a sense of crisis.

First, a locally-backed, state-funded study on "the economic value of water" in the basin is currently underway, with a final report due in June 2006. The report, funded through the WWDC, is required to be presented by its authors to local communities and to a statewide meeting of people interested in water policy and investment, in meetings from June-November 2006.

The report is expected to describe and assess as far as practicable the value of water created by current water management practices in the basin, running the gamut from commodity values to non-use values. A summary of the report requirements notes: "The document should provide decision-makers at all levels in water matters, from the ditch bank to state offices, with a way to identify, articulate, and understand the interrelations of water use, water value, culture, and the economics tied to the water." (WWDC, 2005)

There is reason to believe the scheduled public discussions of the report could spur community debate on "where to go from here." Report investigators are an economics consulting firm specializing in natural resource and environmental issues in the western U.S., one Wyoming economics consulting firm, and two Wyoming engineering firms experienced in local water rights management issues. (WWDC 2005) Principals with the key economics and engineering firms involved are known for their ability to describe and discuss complex issues with general audiences.

A community debate on "where to go from here" would be likely to examine the role of the ranching community in the evolving economy of the basin. Policy makers involved in those local discussions could float the idea of a pilot Wyoming CES program in the Upper Green River Basin and it could become an item for further discussion if there is sufficient local interest.

A second current development also suggests there may be in the Green River Basin the sense of crisis needed for local people to invest their energy in design of a CES program. That is due to the energy development that is creating rapid change in the local economy.

Current planning by the federal agency responsible for granting permits to natural gas wells (tapping federally-owned gas in the basin) indicates that well-drilling in the area could *triple* in the next few years. Gas production is already putting a strain on local services and on infrastructure such as housing,. (Bureau of Land Management (BLM), 2005)

People in the Upper Green River Basin have formed a local volunteer advisory group to the federal agency for management of the gas production and its impact. The volunteer effort involves over 100 people donating a reported “thousands of hours” to the project. This group produced in September 2005 a set of recommendations for federal, state, local and corporate expenditures to mitigate the impact of development in a key gas area on local resources ranging from cultural values to transportation to air quality to wildlife. People involved in that advisory group, however, have expressed frustration with the willingness of federal officials to respect their local knowledge and act on their recommendations. (Gearino, 2005; Upper Green River Valley Coalition, 2005).

Those complaints have reached the ears of state legislators and the governor, resulting in assorted “impact aid” proposals for the Wyoming Legislature’s 2006 session and generating further discussion and studies preparatory to legislative action. (Press release, Nov. 2005; Interim Committee Activities, 2006)

Faced with major new industrial development, people in the Upper Green River Basin have to figure out how to accommodate competing interests in order to make the basin a place where they still want to live, ten or more years from now. They have to decide how to juggle the needs of the potentially competing economic sectors of recreation, tourism, ranching and gas production, along with their own needs for community and for spiritual and aesthetic support.¹²

To figure that out, they have to weigh the role and interconnections of each major factor in their economy. Recreation and tourism (and the resultant second-home economy), as well as much of the spiritual and aesthetic support of local people, very clearly depend on wildlife, clean air and water, open spaces, and high mountain wilderness areas and forest lands.

¹²To illustrate the common assumption in the basin that local communities are one of the assets to be protected as a new economy emerges there, consider the following. The chairwoman of the volunteer advisory group (consisting of environmental, industry, ranching, and other representatives) working with the federal agency on oil and gas development in the basin also heads a local environmental activist organization (the Upper Green River Valley Coalition) whose mission statement includes the following statement: “The Coalition believes that there is a place for natural gas development in the Upper Green as long as it safeguards the Valley’s abundant wildlife and air and water resources and protects local communities.” (Upper Green River Valley Coalition, 2005)

The volunteer local advisory group to federal permitting agencies is already engaged in figuring out what accommodations the energy industry should have to make to protect those resources and to protect local communities.

Another piece of the puzzle, however, should be figuring out what relation the ranching sector may have to all those factors.

It appears likely that while ranching may be important to the maintaining the resources important to recreation and tourism, it may also be important to sustenance of the community that people in the basin say that they enjoy and don't want to lose.

The work of local people on gas development issues in the Upper Green River Basin demonstrates they already have significant "social capital" - expertise in the needs and interrelation of local resources, and capacity to articulate complicated issues and to seek action through citizen organizations and/or local, state or federal agencies. Yet it is clear, from the frustration that members of the volunteer group on energy development express, that such social capital could be developed further or perhaps find new avenues for affecting events.

The test of whether this area of Wyoming is ready to consider a CES program will come in 2006, as the public meetings on the "economic value of water" report are held. Many of those involved in the volunteer group on energy development will be among the audience to whom the 2006 report on water values in the basin will be presented. They will be the ones to decide whether to address the questions of "where do we go from here" raised by the report. Their discussions that will help create both a sophisticated understanding of the local resource situation, and a way to build on the existing social strengths of the community. Given the sense of crisis they already have, they could decide to make a serious attempt to design a CES program.

As a first step, the local group can call on technical experts, and possibly state WWDC funding or private funding, to determine whether there is a scientific connection between traditional water management in the basin and the amenities of clean water, fish and wildlife habitat, and green open space. At the same time, the local group could seek assistance in designing a CES program appropriate to their situation. The progress of the scientific studies could provide guidance on how to ensure that program payments are linked to provision of the desired services.

This initial review of Wyoming communities and institutions suggests a CES program might be suitable and could be fit within the design of the institution for managing water in the Upper Green River Basin.

Local debate is needed to determine whether such a program is truly suitable to the area.¹³ Specifically, local investigation and debate is needed to examine the implied assumption behind such a CES program, that there is a strong rancher-amenity connection that needs protection in the area.

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¹³ Additional issues to be researched and debated might include: how much the gas industry should participate in the informal group designing a CES program; models for organizing the local council to run a CES program; the actual use rate in Wyoming of federal CES-type subsidy programs, and the reasons for the use rates; post-2002 successes and failures of the New York City/Catskills program; current and upcoming regulatory initiatives regarding ranch operations and water quality; and effect of Colorado River salinity concerns on a CES proposal for the Upper Green River Basin.

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