

WATER MANAGEMENT ORGANIZATIONS: SCALE EFFECTS AND MANAGEMENT TOOLS

Ding Jing and Edna Loehman

Dept. of Ag. Economics, Purdue University

John Wesley Powell in the late 19th century proposed that communities needed to control their own water and land resources, following the practices of Hispanic irrigation communities (Kenney, 1997). More recently, the concept of common property resource management (CPRM) as it applies to water management has been brought to our attention through the work of Elinor Ostrom and her colleagues Edella Schlager and William Blomquist (1998). The message of CPRM is that local community organization can be successful in averting the tragedy of the commons and in fostering sustainable development. Ostrom (1998) has developed the Institutional Analysis and Development Approach (IAD) as a framework for studying CPR institutions. Concomitantly, the New Institutional Economics emphasizes the importance of management rules in economic organizations.

Our work draws on the CPRM/ IAD paradigm in comparing water management organizations across the U.S. with respect to management methods. Basically, a water management organization (WMO) can have one or more purposes of: promoting water resource conservation, management, development; establishing water supplies for domestic, agricultural, commercial, and industrial uses; and participating in water resource planning and management with other local, state, and federal agencies. Our work demonstrates that there is a large variety of types of WMOs across the U.S. and this study delineates distinguishing characteristics.

We used a survey design to compare eight WMOs. They are Central Platte Natural Resources District, Nebraska; Whitewater Joint Power Board, Minnesota; St. Joseph River Watershed Initiative, Indiana; Tippecanoe Soil and Water Conservation District; Huron River Watershed Council, Michigan; Stony Brook-Millstone Watershed Association, New Jersey; and Sabine River Authority, Texas.

A questionnaire was designed and sent to these eight WMOs. The basis for the survey method is Grounded Theory (Glaser, 1967), a method developed by sociologists for theory development grounded in observation. Here, we seek to explain resource allocation in a WMO. Resource allocation includes the determination of the total budget, how it is financed, and how it is allocated across the water supply and/or water quality, conservation education, construction, monitoring and regulatory activities, etc.

The questionnaire consists of three main sections: the watershed's characteristics, WMO management characteristics, and WMO resource allocation and management activities. Table 1 shows physical features of the WMOs. Some include the entire watershed. The variation in number of counties included is notable, as is the mixture of urban and rural types. Table 2 shows the management focus of the WMOs; some focus on surface water quality while others focus on the combination of surface and groundwater quality; some include flood control and others do not; most include erosion control; many have fish and wildlife management in addition to water quality management.

Table 3 details regulatory instruments. Most combine state and local management tools; zoning and septic regulation are common activities. Notable are the use of conservation easements and marketable permits. Table 4 shows the annual budgets in 1997; per capita expenditures for water quality ranged from a low of \$0.34 annually to a high of \$24.95 \$10.51 annually, with a mid-range around \$4-6 annually. Table 5 delineates funding sources. Three districts had more than 50% funding from grants, three had more than 50% from taxes or user charges, and the rest had major funding from federal sources or voluntary contributions.

The resulting typology for WMOs is based on origin and enforcement authority (state, local, or combined), funding source (user charge, tax, grant, state or federal appropriation), and management purpose (surface water quality, surface and ground water quality, etc.). The eight WMOs studied represent eight distinct types on this basis.

Since the sample size was small, we examined relationships between resource allocation and WMO characteristics qualitatively. Several observations emerged with regard to budget allocation. First, there is a distinct negative relationship between per capita water quality budget and total population. Either there are economies of scale in water quality management, or larger population areas may simply not be spending enough. Second, WMOs with local funding authority tend to have larger per capita water quality budgets than those without. Finally, state-initiated WMOs have larger budget shares and larger per capita expenditures for planning and modeling.

Table 1. Geographic Features of WMOs

WMO name	TSWCD (IN)	CRWD (MN)	WJPB (MN)	SBMWA (NJ)	HRWC (MI)	SJRWI (IN)	CPNRD (NE)	SRA (TX)
Location	Central IN	Central MN	South-eastern MN	Central NJ	South-eastern MI	North-eastern IN	South central NE	SE, E, and NE TX
Watershed managed	partial	100%	100%	40%	100%	100%	25%	75%
Urban Pop.	98%	30%	62%	100%	63%	75%	70%	51%
# counties included	1	3	3	5	6	6	9	21

Table 2. WMOs' Management Focus

WMO name	TSWCD (IN)	CRWD (MN)	WJPB (MN)	SBMWA (NJ)	HRWC (MI)	SJRWI (IN)	CPNRD (NE)	SRA (TX)
Surface water quality	X ¹	X	X	X	X	X	X	X
Groundwater quality	X	X	X		X		X	
Water quantity	X ²	X	X		X		X	X
Flood control		X	X		X	X	X	
Wetland & wildlife habitat	X	X	X		X	X		X
Fisheries		X	X		X	X		X
Erosion control	X	X	X	X	X	X		
Other				X ³		X ⁴		X ⁵

Table 3. WMOs' Available Regulatory Instruments

WMO name	TSWCD (IN)	CRWD (MN)	WJPB (MN)	SBMWA (NJ)	HRWC (MI)	SJRWI (IN)	CPNRD (NE)	SRA (TX)
Prohibition contaminating activities in critical area		W			S ¹			S
Special permitting		W	L		S	S		S
Zoning	L	L	L		L	L		L
Marketable permits		L				F		S
Septic system & regulation	S	L	L		L	L		L, W
Conservation easements		L		L		S		F
Hazardous waste collection	L	L	L			L		S, L, W
Preparation for emergency cleanup		L		S	S, L			S
Other instruments			S, L ²				W ³	
Enforcement authority ⁵	No	Yes	No	No	No	No	Yes	No
Main execution agency	L	L	L	S&L	S&L	L	W	S

Note: ¹ "L" = local agencies/groups, "S" = state agencies, "F" = federal agencies, and "W" = the WMO

Table 4. WMOs' Annual Budget

WMO name	TSWCD (IN)	CRWD (MN)	WJPB (MN)	SBMWA (NJ)	HRWC (MI)	SJRWI (IN)	CPNRD (NE)	SRA (TX)
Annual total budget (million dollars)	0.900	0.200	0.275	0.600	0.400	0.090	4.000	20.500
% for WQ	60% ¹	100%	100%	100%	95%	100%	30% ²	10% ³
Annual per capita WQ budget (dollars)	6.28	13.33	24.95	0.91	0.80	0.34	10.51	4.64

Note: ¹ Other 40 percent are spent on soil conservation.

² Other 70 percent are spent on improving recreation condition, protecting river flow, etc.

³ Other 90 percent are spent on water supply (operating 3 major reservoirs and a channel system).

Table 5. WMOs' Funding Sources

WMO name	TSWCD (IN)	CRWD (MN)	WJPB (MN)	SBMWA (NJ)	HRWC (MI)	SJRWI (IN)	CPNRD (NE)	SRA (TX)
Grants	15%		62%	27%	85%	75%	20%	
Direct federal appropriation	45%							
Direct state appropriation	25%						20%	
Direct county appropriation	10%		5%					
Tax for WQ protection		100%					60%	
User charges								100% ¹
Voluntary contribution	5%			73%	15%	25%		
Other sources			33% ²					
Funding authority ³	No	Yes	No	No	No	No	Yes	Yes

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