

Public Participation and Recycling Performance: Explaining Program Success

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What determines the success of different local recycling programs? Following up on earlier research that focused on the design and management of solid-waste recycling efforts (see Folz's article in the May/June issue of PAR), David Folz and Joseph Hazlett attempt to discover how important local population, socioeconomic, and political characteristics are in determining the relative success of different programs. They find that such success depends more on the policies chosen, how they are selected, and how they are implemented rather than on local community characteristics. In short, although local conditions may determine which programs are selected, the ultimate performance of local recycling programs remains in the hands of their designers and managers.

Knowledge of what works and why in terms of getting citizens to participate in recycling is useful information for local officials who desire to initiate or to refine a recycling program (Pollock, 1987; DeYoung, 1986; Sundeen, 1988). This article examines the extent to which community and demographic characteristics, recycling policies, public involvement in policy design and implementation, and other features of the local operating environment distinguish the cities that have higher rates of recycling. A central question is whether the recycling policies that work well in some cities are equally effective in other communities located in different regions, whose populations vary in size, socioeconomic composition, political culture, and form of government.

If specific community features and demographic factors are *important* in accounting for higher rates of participation and diversion, then local officials may need to scale back recycling expectations, or launch major education and incentive campaigns targeted to those groups in the community that are less inclined to recycle. Mandating participation in recycling is another option under such circumstances.

If population characteristics and other community variables are *unimportant*, compared to specific recycling policies and public involvement in policy formulation in explaining recycling success, then *what* policies a community adopts, and *how* it adopts them, assume particular importance for our understanding of how and why some communities attain higher rates of recycling. In essence, the promise of recycling can be more easily realized if local officials can control the factors that are important determinants of excellent recycling performance.

Previous research on solid-waste recycling suggested that cities with higher rates of participation and waste stream diversion place more importance on citizen involvement in the policy initiation *and* program design decisions (Folz 1991a, 1991b). These findings offered modest empirical support for the proposition that citizens are more likely "to participate effectively in collective efforts" when they have been party to the policy decision (Paehlke 1990, p. 363; Thomas 1990).

In addition, several policies were found to promote higher rates of recycling, most notably mandating participation, collecting recyclables at the curbside, and offering a community composting program (Allan, Platt, and Morris, 1989; Folz 1991b). Cities that provided free bins to households, set a specific recycling goal, and employed public education and marketing strategies that were part of a community-based outreach effort experienced more recycling success (Folz 1991b). Vining and Ebreo's community recycling studies (1989, 1990) confirmed the importance of well-designed educational and publicity programs in motivating citizens to recycle.

Were these policies effective partly because certain socioeconomic characteristics of the population or other community features predisposed a higher level of citizen interest or participation in recycling, or can local officials expect success regardless of the variety of features that differentiate cities? The research on collectively coproduced services, such as recycling, is inconclusive with respect to the salience of various demographic characteristics in determining participation (Percy, 1984). Vining and Ebreo (1990) found that recyclers tend to be somewhat older and wealthier. Sundeen (1988) found that only higher education and residential context (persons residing in medium-sized cities) related positively to coproduction participation; income, homeownership, ethnicity, age, and gender were not good predictors of the propensity to volunteer. Mohai and Twilight (1987), in contrast, observed that age and income were associated with environ-

mental activism: the young expressed the greatest level of environmental concern, and middle-aged persons were the most likely to engage in volunteer activities. Ferris (1988) reported that no demographic variables related to a person's propensity to volunteer. Brudney (1990, p. 16) concluded that "the coproduction literature has not adequately addressed issues of motivation or recruitment" in explaining who is likely to participate in collectively coproduced programs.

Recycling Performance Indicators and Demographic Features

Results of a national survey conducted in 1990 (see grey box) indicate that mandatory recycling programs attained participation and diversion rates almost twice as high as their voluntary counterparts (74.3 percent and 21.6 percent versus 39.7 percent and 12.2 percent, respectively). The increased convenience of participation that curbside collection afforded residents in voluntary recycling programs was apparent; mean participation in cities with curbside pick-up was 48.6 percent compared to 24.6 percent for programs with only drop-off collection systems. The diversion rates were 12.3 percent and 10.8 percent, respectively. The means for the population and community variables in each of the program types are listed in Table 1. Overall, only a few characteristics distinguished the cities in each type of program.

Data and Methods

A national mail survey of 450 municipal recycling coordinators was conducted during March and April of 1990. Through contacts with state agencies, environmental organizations, and recycling businesses in all 50 states, municipal recycling coordinators were identified in 25 states and the District of Columbia. All coordinators in 24 states and the District, plus a 10 percent representative sample of New Jersey programs, were mailed questionnaires. Responses were obtained from 264 coordinators for a return rate of 58.7 percent. The regional and population distributions of the responses are not statistically different from all of the cities identified as operating recycling programs in early 1990. The representative nature of the data permits generalization to the nation.

The two dependent variables in the study were citizen participation rate and the solid waste diversion rate.¹ The city was the unit of analysis. The data for the recycling programs were obtained from the responses to the mail questionnaire. The demographic and community variables were collected from U.S. census sources.²

The cited coproduction literature suggested several propositions about the characteristics of persons who may be more inclined to recycle. Based on these findings, most demographic factors should be positively related, if at all, to participation and diversion. One exception is city size; we expect smaller, more homogeneous cities to have higher recycling rates. Fosler and Berger (1982) found that a strong, elected mayor may be able to gain more popular support for new programs. This suggests that cities with unreformed governments may have more successful recycling programs. Citizens in moralistic cultures may be more inclined to engage in recycling because it is an activity that benefits the community as a whole (Elazar 1984). Further, the population and community variables should figure more prominently in explaining participation and diversion in voluntary, rather than mandatory programs, because the latter have the force of law.

Correlation and multiple regression analyses identified the factors important for explaining variation in citizen participation and waste stream diversion for the 89 mandatory programs and the 175 voluntary programs, including the 66 that had only "drop-off" systems.³ In effect, this strategy controlled for program type since these models represent the major contemporary approaches to recycling in the United States.

Table 1
Means for the Population and Community Variables

Variable	Mandatory	All Voluntary	Voluntary Curbside	Voluntary Drop-off
Population	85,576	79,286	107,578	30,017
Percent female	51.94	51.43	51.60	50.92
Percent white	93.58	91.25	89.40	94.36
Household size	2.72	2.65	2.63	2.69
Percent owner	52.25	57.50	57.53	57.29
Mean household income	21,924	21,375	22,132	19,843
Per capita income	8,219	7,913	8,259	7,228
Percent white collar	26.44	26.58	26.88	24.51
Median education	12.63	13.04	13.12	12.60
Median age	32.50	30.78	30.68	30.95
Percent reformed government	28.00	53.50	60.50	32.00
Political Culture (percent distribution)				
Moralistic	23.00	40.00	38.50	46.30
Individual	76.00	48.60	52.30	48.10
Traditional	1.00	11.40	9.20	5.60

Cities with *mandatory* recycling had lower levels of owner-occupied housing and median educational attainment and a higher median population age. They were also much more likely to have an individualistic political culture. Cities with *voluntary* programs were about twice as likely to have a council-manager form of government and a moralistic political culture. Demographic contrasts were most apparent between cities with voluntary curbside and voluntary drop-off systems; the latter group were significantly smaller, more racially homogeneous, less wealthy, and had lower levels of formal educational attainment. They were almost twice as likely to have an unreformed type of government.

Mandatory Recycling Policies and Community Features

The bivariate correlations indicated that only a few socioeconomic characteristics and community features were related to recycling participation and diversion in mandatory programs (Table 2). *Smaller* cities and those with individualistic political cultures had *higher* levels of recycling participation. Cities with a higher percent white, a lower per capita income, and a lower median age also *appeared* to divert more waste through recycling.

Regression analysis ascertained the actual import of community attributes compared to recycling policies for explaining variation in mandatory participation. Table 3 reports the standardized partial regression coefficients, or betas, that indicate the relative importance of each factor in the participation model for cities with mandatory recycling. Only *one* community attribute, political culture, attained significance in the model. Cities with individualistic political cultures had higher rates of participation, but other factors were more important in explaining why cities varied in recycling participation. Chief among these was the ability to impose sanctions or

warnings for noncompliance. Mean participation among cities with this policy was 77.24 percent, significantly higher than the 63.5 percent for cities without this enforcement policy. Confirmation of the importance of participation by key community actors in the formulation of recycling strategies was indicated by the higher participation in cities that involved local education personnel in the preparation of community awareness or publicity campaigns for the recycling program. Including a recycling component in the local school curriculum and encouraging children to share this information with others at home may have accounted for this higher participation. Conversely, cities that relied more on impersonal paid radio ads to publicize the program had *lower* rates of participation.

Higher participation also occurred in cities that relied more extensively on general waste collection fees to help finance the annual operating costs of the recycling program. These higher fees apparently motivated more residents to recycle.

The factor most important in contributing to higher waste stream *diversion* was the type of vehicles and equipment used to collect recyclables. The use of trucks with compartmented trailers for collecting recyclable materials was the equipment configuration used by cities that diverted more waste (Table 4).

Only two socioeconomic factors attained significance in explaining mandatory *diversion*: lower median age and higher percent white. It is noteworthy that neither factor determined actual participation; these characteristics appeared to be important only for the *types* and *volume* of waste generated. Of more consequence for explaining higher diversion were two characteristics of the operating environment: the fiscal incentive inspired by higher landfill tipping fees and employment of recycling coordinators with more years of experience in the field of solid-waste management. Cities with both features had higher levels of diversion.⁴

Table 2
Correlations of Population and Community Variables with Citizen Participation and Waste Stream Diversion for Mandatory Recycling Programs

Independent Variable	Citizen Participation	Diversion
Population	-.21*	-.22*
Percent female	.21	-.12
Percent white	.10	.28*
Household size	.18	.17
Percent owner occupied	.41	.39
Mean household income	.11	.02
Per capita income	.06	-.22*
Percent white collar	-.07	-.09
Median education	-.10	.02
Median age	.05	-.21*
Government type (0 = Unreform) (1 = Reform)	-.11	-.01
Political culture	-.26*	.20

* p < .05.

Table 3
Regression Results for Citizen Participation in Mandatory Recycling Programs (N = 89)

Independent Variable	b	SE b	beta
Sanctions/warnings for improper separation	13.63	3.95	.303***
Importance of citizen participation as a problem	-3.58	1.08	-.292***
Use of paid radio ads to publicize program	-11.87	5.00	-.267*
Political culture	-5.95	2.07	-.254**
Education officials involved in preparing education program and publicity about recycling	11.16	4.78	.212*
General waste collection fees as proportion of the recycling budget	.227	.11	.175*

R² = .394.
 Adj. R² = .348.

* p < .05.
 ** p < .01.
 *** p < .001.

In sum, socioeconomic characteristics were comparatively *unimportant* in explaining significant variations in mandatory participation and diversion. Most important for attaining higher participation were the ability to issue sanctions or warnings for noncompliance, the involvement of local education personnel in designing a recycling promotional campaign, and the financial incentive related to the collection fees used to help pay for the recycling program.

Voluntary Recycling Policies and Community Features

For voluntary programs, some of the socioeconomic factors were related, and in the direction expected, to participa-

Table 5
Correlations of Population and Community Variables with Citizen Participation and Waste Stream Diversion in Voluntary Recycling Programs

Variable	All Voluntary		Voluntary Curbside		Voluntary Drop-off	
	Participation	Diversion	Participation	Diversion	Participation	Diversion
Population	.04	.05	-.01	.01	-.14	-.17
Percent female	.13	.03	-.10	-.18	.28*	.31*
Percent white	-.02	.16*	.00	.10	.18	.23*
Household size	-.04	-.02	.00	-.02	-.03	-.04
Percent owner	-.10	.07	-.11	.03	-.62	.43
Mean household income	.16*	.02	.12	.05	.00	-.02
Per capita income	.26*	.05	.19*	.05	.14	.08
Percent white collar	.15	.04	.06	.03	.19	.05
Median education	.23*	.16	.07	.12	.34*	.18
Median age	.04	.21*	.04	.09	.28*	.40*
Government type (0 = Unreformed) (1 = Reform)	.15*	-.02	.09	-.01	-.22	.11
Political culture	-.09	.00	-.01	.00	-.01	.00

* p < .05.

Table 4
Regression Results for Waste Stream Diversion in Mandatory Recycling Programs (N = 89)

Independent Variable	b	SE b	beta
Use of trucks with compartmented trailers	4.33	1.12	.355***
Citizen participation rate	.209	.058	.327***
Median 1980 population age	-.775	.264	-.310**
Amount of the landfill tipping fee	.056	.020	.280**
Percent population white in 1980	.242	.093	.234*
Years of solid-waste management experience of recycling coordinator	.236	.169	.125*

R² = .376.
 Adj. R² = .329.

* p < .05.
 ** p < .01.
 *** p < .001.

tion and diversion, but there was no consistent pattern of significance across program types. The strongest relationships occurred among the communities that had drop-off systems (Table 5). Among these cities, higher participation and diversion appeared to occur when the city had larger proportions of females, older residents, and citizens with higher educational attainment.

The multivariate analysis for *all* 175 voluntary programs, (see Table 6), indicated that almost 40 percent of the variance in participation was explained by eight factors, *none* of which were population or community variables. What contributed most to higher levels of voluntary recycling was curbside collection of recyclables. For the communities that could afford this service, the added convenience clearly facilitated citizen participation. In addition, contracts with private haulers to collect recyclables were important in promoting higher levels of voluntary participation. Almost 40 percent of the cities had

Table 6
Regression Results for Citizen Participation in All Voluntary Recycling Programs (N = 175)

Independent Variable	b	SE b	beta
Curbside collection provided	11.57	3.44	.221***
Technical assistance from state agencies in program design	-4.00	1.02	-.220***
Recycling goal established	9.20	2.67	.212***
Importance of local staff in designing the recycling program	4.05	1.19	.209***
Private contractor collects recyclables	8.76	3.35	.168**
Average price per ton for recycled aluminum	.02	.008	.137*
Composting program	8.77	4.01	.136*
Neighborhood or community information meetings used to publicize the recycling program	5.48	3.31	.110*

R² = .414.
 Adj. R² = .386.

* p < .05.
 ** p < .01.
 *** p < .001.

such contracts. To maximize profit, private haulers may have provided residents with free bins, or promoted recycling more extensively if contract provisions permitted them to retain all or part of the proceeds from the sale of recyclable products.

Technical assistance from state agencies or personnel was not important in the design of voluntary recycling programs. Conversely, local government staff played a very important role in the program design process. The staff were probably instrumental in helping the community to establish a recycling goal. Establishing a firm target and reporting progress towards its attainment apparently motivated citizens to sustain the practice of recycling.

Higher prices for aluminum, one of the most valuable recyclable materials, had a similar effect. The communities that paid consumers the market price for recyclables brought to drop-off centers no doubt encouraged more households to make the trip. Composting biodegradable yard wastes was another important strategy that promoted higher participation by households.

Finally, the cities that relied more extensively on meetings with neighborhood or community groups to get the word out about how, when, and where to recycle solid wastes experienced higher levels of actual program participation. This strategy, more than any other type of marketing or publicity effort, had the most potential to boost voluntary recycling levels.

The multivariate analysis of waste *diversion* for all voluntary programs (Table 7), once again demonstrated that socioeconomic variables were *not* important in explaining recycling success. Establishing a *higher* recycling goal figured most prominently in explaining why some communities

diverted more of their waste stream from disposal. In effect, citizens rose to the challenge represented by a goal higher than the modal 25 percent level.

Cities with higher diversion rates also were more likely to transport their solid waste to a sanitary landfill located *outside* the county. No doubt the higher disposal charges incurred by these cities were an incentive to maximize the recycling effort.

Three strategies used with success to encourage citizens to recycle were paid newspaper ads, campaigns by local scout troops, and technical assistance from local environmental groups in the preparation of publicity programs. These specific types of community outreach efforts illuminate our understanding of how some cities managed to divert more of their waste. Involvement by the community's young men and women in recycling drives and tapping the experience and network of various environmental groups constituted a more decentralized publicity and educational effort.

As in mandatory programs, the more experienced coordinators of voluntary programs played an important role in helping to engineer a higher community diversion rate. We suspect that their professional expertise, knowledge of recycling markets, and their familiarity with community leaders yielded dividends in getting more citizens to recycle regularly.

Recycling Policies and Community Features in Drop-off Programs

If population or community characteristics are important at all in explaining variation in recycling success, these effects

Table 7
Regression Results For Waste Stream Diversion in All Voluntary Recycling Programs (N = 175)

Independent Variable	b	SE b	beta
Recycling goal level	.305	.052	.357***
Solid-waste disposed in landfill located in same county as community	-5.39	1.23	-.270***
Citizen participation rate	.084	.022	.232***
Paid newspaper ads used to publicize recycling program	3.31	1.16	.174**
Local scouts conduct campaigns to encourage citizens to recycle	3.76	1.43	.162**
Technical assistance received from environmental groups in preparing community education programs about recycling	4.34	1.91	.143*
Recycling coordinator's years of solid-waste management experience	.148	.075	.120*

R² = .409.
 Adj. R² = .385.

* p < .05.
 ** p < .01.
 *** p < .001.

Table 8
Regression Results for Citizen Participation in
Voluntary, Drop-Off Recycling Programs (N = 66)

Independent Variable	b	SE b	beta
Recycling coordinator's years of solid waste management experience	1.20	.242	.455***
Solid-waste disposed in landfill located in same county as community	-12.67	4.09	-.289**
Mixed white paper included in recycling program	14.03	4.77	.267**
Median age of population in 1980	1.16	.559	.191*

R² = .509.
 Adj. R² = .478.

* p < .05.
 ** p < .01.
 *** p < .001.

should be most apparent in the programs that are the least convenient and most demanding for citizens. With no curbside collection service or free bins provided, residents must remember to separate recyclables, store them until sufficient volume justifies a trip to a "convenience" center, and then have, or be able to obtain a means to transport the materials to the collection point. One would expect citizens with higher incomes and education, for example, to have the resources to participate with greater regularity in this type of program.

The regression analysis for *participation* in drop-off programs however indicated that only *one* population characteristic, higher median age, had any import for explaining higher participation. Moreover, this factor is the *least* important of the four variables in Table 8 that together accounted for almost *half* of the variance in participation.

Of premier importance in drop-off programs was the solid-waste management experience of the recycling coordinator. Experience in making decisions about the best strategic locations for drop-off centers, or a more extensive network of contacts with key neighborhood leaders or groups may have served coordinators well in their efforts to maximize participation.

The drop-off programs that *diverted* more of their waste contracted with a private advertising firm for promotion of recycling. They also had higher rates of citizen participation. Outreach efforts by local officials to inform citizens about recycling was important in diverting more waste voluntarily (Table 9). Holding regular neighborhood meetings to encourage citizens to recycle may be effective because these can be tailored to suit the information needs of residents from diverse socioeconomic backgrounds. The five variables in Table 9 explain over 60 percent of the variance in diversion; the only demographic characteristic that has any import in helping to explain higher diversion is the older median age of the population. The policy of paramount importance is a well-designed, grassroots publicity campaign consisting of face-to-face meetings with local officials. These efforts suc-

ceeded in promoting drop-off recycling regardless of the per capita income, median education, or any other population characteristic.

Conclusion

Recycling success, as measured by participation and diversion, is clearly not dependent upon city socioeconomic characteristics or other political features of the community. What explained large proportions of the variance in recycling performance among cities with different programs were the specific recycling policies adopted, the process by which communities made these policy decisions, and other features related to the program's operation.

The bivariate analysis suggested that some population and community features were associated with successful programs, but the multiple regression analyses demonstrated that these factors did not account for the recycling success enjoyed by the cities in our study. While community variables may be important for predicting citizen preferences for, or a community's ability to afford a particular *type* of recycling program, they were not important determinants of a city's recycling performance. In this instance, the findings of null impact are auspicious for they suggest that local officials can manage the factors most important for achieving high rates of recycling.

Outreach efforts by local officials to residents of city neighborhoods, coupled with educational and publicity campaigns prepared with the assistance of local education personnel, environmental organizations, or other citizen groups, were typical features of the program design and implementation processes of the cities with the most successful recycling efforts. This approach connotes a more decentralized, consultative process as it relates to the formulation and implementation of strategies to enhance participation in recycling. For a

Table 9
Regression Results for Waste Stream Diversion in
Voluntary, Drop-Off Recycling Programs (N = 66)

Independent Variable	b	SE b	beta
Contract with advertising firm for promotion of recycling	17.16	3.27	.414***
Citizen participation rate	.189	.037	.413***
Neighborhood or community information meetings used to publicize the recycling program	5.16	1.65	.247**
Solid-waste disposed in landfill located in a different county	5.19	1.83	.224**
Median age of population in 1980	.479	.227	.172*

R² = .639.
 Adj. R² = .609.

* p < .05.
 ** p < .01.
 *** p < .001.

coproduced program that relies upon citizen willingness to sustain a change in waste disposal behavior without any direct, immediate, or tangible benefits to the household, the emphasis on citizen involvement in policy formulation may deepen the sense of personal responsibility and commitment to solving a problem to which everyone contributes.

The cities with the most successful voluntary efforts established clear, challenging goals for recycling a specific proportion of their waste stream. They also provided curbside pick-up and free bins, contracted with a private company for collection services, and instituted a composting program. The ability to issue sanctions or warnings for improper separation, and financial circumstances involving collection and tipping fees were important for mandatory programs. Regardless of program type, cities with higher participation and diversion rates employed more experienced recycling coordinators.

The purchase-consume-dispose behavioral cycle is a long-standing one in American society. There are many source

reduction and resource recovery strategies that waste producers can employ to purchase more wisely, consume less, and recover more. We do not suggest that there is a single, best set of recycling policies for every community; our findings, however, confirm the importance of an open, democratic process in deciding how and what to recycle.



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Notes

1. The city's citizen participation rate was measured by the response to the question: "Currently, about what percentage of these eligible households actually do participate in the recycling program?" The city's waste stream diversion rate was measured by the response to the question: "In your estimation, what percentage of the total annual solid waste volume generated locally has been diverted from disposal by recycling?"
2. Demographic and community characteristics were derived primarily from the 1980 *Census of General Population Characteristics* and the 1980

General Social and Economic Characteristics. The type of government (reformed or unreformed) was obtained from ICMA Municipal Yearbooks, and the political culture designation was obtained from Elazar (1984). The coding for political culture was moralistic = 3, traditionalistic = 2, and individualistic = 1.

3. Multicollinearity was not detected in any of the regression models.
4. The mean experience level for the recycling coordinators was 6.2 years.

References

- Allan, Theresa, Brenda Platt, and David Morris, 1989. *Beyond 25 Percent: Materials Recovery Comes of Age*. Washington, DC: Institute for Local Self Reliance.
- Budney, Jeffery L., 1990. *Fostering Volunteer Programs in the Public Sector: Planning, Initiating, and Managing Voluntary Activities*. San Francisco, CA: Jossey-Bass Publishers.
- DeYoung, Raymond, 1986. "Some Psychological Aspects of Recycling: The Structure of Conservation Satisfaction." *Environment and Behavior*, vol. 18 (July), pp. 435-486.
- Elazar, Daniel, 1984. *American Federalism: A View From the States*. New York: Harper and Row, Publishers.
- Ferris, James M., 1988. "The Use of Volunteers in Public Service Production: Some Demand and Supply Considerations." *Social Science Quarterly*, vol. 69 (March), pp. 3-23.
- Folz, David H., 1991a. "Recycling Program Design, Management and Participation: A National Survey of Municipal Experience." *Public Administration Review*, vol. 51 (May/June) pp. 222-231.
- _____, 1991b. "Recycling Solid Waste: Citizen Participation in the Design of a Coproduced Program." *State and Local Government Review*, (forthcoming).
- Fosler, R. Scott and Renee A. Berger, 1982. *Public-Private Partnership in American Cities: Seven Case Studies*. Lexington, MA.: Lexington Books.
- Mohai, Paul and Ben Twight, 1987. "Age and Environmental Concern: An Elaboration of the Buttel Model Using National Survey Evidence." *Social Science Quarterly*, vol. 68, pp. 798-815.
- Paehlke, Robert C., 1990. "Environmental Values and Democracy: The Challenge of the Next Century." In Norman J. Vig and Michael E. Kraft, eds., *Environmental Policy in the 1990s*, Washington, DC: Congressional Quarterly, Inc., pp. 349-367.
- Percy, Stephen L., 1984. "Citizen Participation in the Coproduction of Urban Services." *Urban Affairs Quarterly*, vol. 19 (June), pp. 431-446.
- Pollock, Cynthia, 1987. *Mining Urban Wastes: The Potential For Recycling*. Washington, DC: Worldwatch Institute.
- Sundeen, Richard, 1988. "Explaining Participation in Coproduction: A Study of Volunteers." *Social Science Quarterly*, vol. 69, pp. 547-568.
- Thomas, John Clayton, 1990. "Public Involvement in Public Management: Adapting and Testing a Borrowed Theory." *Public Administration Review*, vol. 50 (July/August), pp. 435-445.
- Vining, Joanne and Angela Ebreo, 1989. "An Evaluation of the Public Response to a Community Recycling Education Program." *Society and Natural Resources*, vol. 2, pp. 23-36.
- _____, 1990. "What Makes a Recycler? A Comparison of Recyclers and Nonrecyclers." *Environment and Behavior*, vol. 22 (January), pp. 55-73.

