

Planners' experiences in managing growth using transferable development rights (TDR) in the United States

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Abstract

While many authors have addressed aspects of transferable development rights (TDR) policy and programming in the United States, empirical data of TDR programs are lacking. Such data are needed to evaluate TDR program implementation and success. This paper reports on the development and implementation of a nationwide self-administered mail survey of planning professionals charged with administering TDR programs. Furthermore, it reports the results and findings of the empirical evaluation of 52 TDR programs in the United States. The reported research tests hypotheses concerning the extent to which TDR program characteristics (e.g., PDR, TDR bank, state enabling legislation, initiators, number of goals, housing demand, presence of background studies) are associated with TDR program success. The results show that the joint existence of a PDR program, the use of background studies, the establishment of a TDR bank, together with which parties initiate TDR programming, the number of initiators, and the type of development demand are positively associated with TDR program success.

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Introduction

Studies note that numerous countries with urbanizing areas are contending with a host of land use challenges (e.g. agricultural land preservation, habitat fragmentation, historic preservation, affordable housing, and infrastructure planning) and seek market-based policy solutions (McConnel et al., 2003). One potential market-based solution is transferable development rights (TDR) programming which allows severing of the right to develop land in a free-market system of willing sellers and buyers. Beginning in the 1970s, TDR programs started being adopted on a small scale in more than 30 states in the United States (Pruetz, 1997). While some scholars have pointed to the potential of TDR to preserve natural

resources at low public costs (e.g., Danner, 1997; Levinson, 1997), others have questioned the equity and efficiency of early TDR programs (e.g., Barrese, 1983), while others have highlighted benefits of TDR program flexibility as a market-based tool (Miller, 1999). TDR programs appear to have had varying degrees of success with a range of outcomes (Pruetz, 2003). Machemer and Kaplowitz (2002, p. 781) developed a framework for evaluating TDR programs and their success. Their case studies, as well as others, suggest the importance of such factors as local knowledge of land use, strong leadership, and the presence of a TDR bank (i.e., local facilitator) for TDR program success. However, as Machemer and Kaplowitz observed, “uniform data and reporting on TDR programs do not yet exist” (2002, p. 781). Likewise, Bengston et al. (2004) found, among other things, an absence of empirical evaluations of public policies for managing urban growth and protecting open space. This paper is one step towards

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an empirical evaluation of TDR programs in the United States.

An extensive review of the history and evolution of TDR programs in the United States is beyond the scope of this paper. Many authors have addressed aspects of the development of TDR policy and programming in the United States (e.g., Macheimer and Kaplowitz, 2002; Miller, 1999; Stevenson, 1998; Johnston and Madison, 1997; Levinson, 1997; Barrese, 1983; Field and Conrad, 1975; Wengert and Graham, 1974). However previously published literature is unclear on how widely TDR programs have been embraced or adopted by communities. Nor has the literature empirically evaluated TDR program implementation or success. For example, a study of growth management in New Jersey's Pinelands reported infrequent use of TDR by property owners and developers in New Jersey's areas for TDR use (Beaton, 1991). A 1994 study of planners in the northeast United States reported that planners noted TDR as an available farmland preservation measure (Pfeffer and Lapping, 1994). TDR has been identified as a successful tool for minimizing agricultural land fragmentation in eastern United States (Lynch and Lovell, 2003; Brabec and Smith, 2002). Thorsnes and Simons (1999) suggested that market-based approaches for allocating development rights would be effective even in small jurisdictions and that local governments increasingly act as facilitators of the transfer of development rights. However, Arendt (2004) asserts that TDR programs are typically not easy to administer. At the same time, the benefits of TDR programs are beginning to be suggested in international applications; a website devoted exclusively to TDR includes profiles of TDR programs in Canada, Australia, Mexico and India (Pruetz 2003). TDR programs have also been suggested as a means for minimizing the opportunity costs of protecting critical habitat (Chomitz, 2004). Nonetheless, empirical data of TDR programs from across the United States is lacking.

Therefore, the authors of this paper developed and implemented a nationwide survey of planning professionals charged with administering TDR programs in an attempt to begin to fill the gap in empirical data about TDR programs in the United States. This paper reports on survey development and implementation, and the results and findings of that nationwide survey of TDR professionals.

Brief background of TDR

TDR programs (like purchase of development rights [PDR] programs) are based on the notion that "development rights" are one of many sets of rights associated with fee simple land ownership. These land-based development rights may be used, unused, transferred or sold by the owner of a parcel (Wiebe and Meinzen-Dick, 1998; Barlowe, 1978; Rose, 1975). In PDR programs, funding generally comes from grants or tax revenues and the

development rights are not transferred but simply retired. Conversely, in TDR programs, the development rights severed from a sending site are generally transferred to a receiving site and used to allow more development at the receiving site than could otherwise occur. Consequently, the acquisition of the development rights in a TDR program is funded not by grants or taxes but by the developers of the receiving sites who acquire greater development potential, and therefore potential profit, by voluntarily using the TDR option.

The "sending sites" are the areas that a community has identified as worthy of permanent preservation and the "receiving sites" are areas where the community has determined are capable of accommodating additional development and with both areas for preservation and areas for development, TDR offers a planning policy that essentially redirects development rather than simply preventing development and thus recognizes that there are areas where development must be allowed and even encouraged (Millward, 2006). TDR programs are guided by local ordinances although the prices paid for the development rights are often privately negotiated between the sending area landowners and the receiving area developers. In many TDR programs, in addition to being transferred to a receiving site development, development rights severed from a sending site can also be sold to an intermediary, held by the original property owner or, in some cases, remain unused, as in a PDR program (Wright, 1993; Hagman and Juergensmeyer, 1986; Rose, 1975). For example, New York City has allowed the purchase, sale and use of vertical development rights, so-called "air rights," among and between neighboring landowners for more than 30 years (Pruetz, 1997; Roddewig and Inghram, 1987). Once a parcel's development right has been severed, regardless of whether it is subsequently used or retired, a conservation easement is usually placed on the property parting with its development rights limiting the parcel's future use.

In the United States, the TDR concept was first introduced by Gerald Lloyd (1961). After the initial TDR programs were under way, scholars attempted to examine the efficacy of those "first generation" TDR programs. Some of these first TDR programs were in such places as New York City, Collier County, Florida and Calvert County, Maryland. The literature concerning these early programs focused on practical aspects of TDR programming and suggestions for "second-generation" TDR programs (e.g., Roddewig and Inghram, 1987; Pizor, 1986, 1978; Tustian, 1983; Barrese, 1983; Maabs-Zeno, 1981; Woodbury, 1975).

A second wave of TDR programs began in the 1980s. These second-generation TDR programs included those in Montgomery County, Maryland, the New Jersey Pinelands, Boulder County, Colorado, San Luis Obispo County, California, Tahoe Regional Planning Agency, California/Nevada, Denver, Colorado, Seattle, Washington and San Francisco, California. The literature on these

second generation programs emphasizes the importance of stakeholders and their inclusion in program design and implementation (Johnston and Madison, 1997; Pruetz, 1997; Redman/Johnson Associates, 1994; Heiberg, 1991).

The emphasis on program participants and incentives was incorporated into so-called “third-generation” programs. This third-generation of TDR programs includes both revised earlier TDR programs (e.g. Chesterfield Township, New Jersey) and completely new TDR programs (e.g. Thurston County, Washington). There has been recent research on developing an evaluative framework for analyzing TDR and other growth management programs (Machemer and Kaplowitz, 2002). There have also been highly regarded case studies of TDR programs, especially the work of Pruetz (2003, 1997). However, there has been little empirical research on the strengths and weaknesses of US TDR programs.

Mail surveys and planners

Mail surveys are valuable tools for collecting information from populations that are geographically dispersed; they allow respondents to self-administer the questionnaire and are lower in cost relative to interview surveys (e.g., telephone or face-to-face) (Dillman, 2000). In the field of landscape and urban planning, mail surveys have been used, among other things, to learn about similarities and differences of landowners’ land use and natural resource management (Erickson et al. (2002), obtain stakeholder information on environmental risks (Lomnický et al., 2002), and collect information on landowners’ attitudes towards collaborative planning (Ryan and Walker, 2004). Mail surveys have been used successfully to learn from planners about their attitudes, beliefs, practices, and understanding regarding land use decisions and decision-making.

The literature reports mail survey use in a variety of circumstances with professional planners as respondents—to address a gap in knowledge concerning the opinions of city planning directors towards regional governments (Baldassare et al., 1996); to examine the extent of planners’ attitudes and perceptions as factors accounting for variations in restrictions on local residential development (Neiman and Fernandez, 2000); to explore differences and commonalities of the attitudes of residents, planners, and homebuilders towards alternative types of development (Ryan, 2006); to measure the extent to which the opinions and values held by US planners comport with an ecological definition of sustainable development (Jepson, 2003); as well as to survey of “small town” and “rural planning” planners’ perceptions of their role in socially responsive neighborhood designs (Lawhon, 2003). Therefore, this study builds on the demonstrated utility and appropriateness of self-administered, mail surveys to collect and analyze information from planners concerning implementation and success of TDR programs.

Objectives

The goal of the reported research was to collect and analyze empirical data from the nation’s professional planners involved with the design and implementation of TDR programs. The research objectives operationalized in this project focused on obtaining adequate data from TDR program managers to test whether and to what extent TDR program characteristics impact TDR program success. The reported research was designed to empirically test whether

- H1.** TDR programs that combine with PDR programs are more successful than those without such PDR programs
- H2.** TDR programs that incorporate TDR banks are more successful than those without such banks
- H3.** TDR programs in states with state enabling statutes are more successful than TDR programs in states without such enabling statutes
- H4.** It matters to TDR program success who and how many parties initiate the TDR planning and implementation process
- H5.** It matters to TDR program success what and how many goals guide the creation and implementation of TDR program
- H6.** It matters to TDR program success if there is high demand for housing stock in the TDR program area
- H7.** It matters to TDR program success if studies that analyze the local context are conducted

Materials and methods

The reported research used a self-administered, mail survey to collect information from US planning officials overseeing such programs. In addition to responses to closed ended-questions, respondents also provided responses to open-ended questions. The open-ended responses were iteratively coded so that they too could be statistically analyzed.

Sample

The target population of this study was municipal planners charged with directing and operating TDR programs in the United States. While there are several well-known TDR programs, there is no central repository of information on TDR programs. In 1997, a total of 130 TDR programs were identified by Pruetz (1997). Machemer (1998) identified an additional 12 TDR programs a year or so later. These 142 programs were used as an initial population list of TDR programs in the United States. Each program on the initial list was contacted by phone to confirm TDR program existence and to identify a program contact. After removing errors, duplicate program, and programs outside the target population, 109

TDR programs were identified for the study. Given the relatively small number of TDR programs as well as the geographic diversity of these programs, it was decided that a mail survey ‘census’ of all these programs would be an appropriate sampling scheme.

Questionnaire design and implementation

A multiple-method approach was used to design and pretest the mail questionnaire (Kaplowitz et al., 2004; Presser et al., 2004). First, a review of scholarly as well as professional literature concerning TDR programs was conducted. This review was augmented by interview with planning professionals and scholars that resulted in the identification of key gaps in knowledge concerning how TDR programs have performed in the United States. Subsequently, a draft survey questionnaire was developed, pretested, and revised with the help of input from land use experts and planning professionals. This design approach resulted in a self-administered questionnaire that was believed to communicate effectively and obtain reliable responses from planners charged with managing TDR programs.

The final questionnaire was a letter-sized, booklet with a color cover and back. The covers of the survey booklet contained color images and brief introductory language. The survey’s 56 items were divided into six sections: (1) Program Origination; (2) Sending Zones; (3) Receiving Areas; (4) Market History; (5) Program Complements; and (6) Identify TDR Programs (a copy of the survey may be found at http://www.msu.edu/~kaplowit/TDR_Survey.pdf). Prior to implementation, the survey instrument and consent procedures were reviewed and approved by the Michigan State University Institutional Review Board. The questionnaires were distributed to the sample by mail using a “Dillman Tailored Design” approach with multiple contacts (Dillman, 2000). Each member of the sample was contacted a maximum of five times in order to increase the likelihood of receiving a response.

Statistical analysis

The responses to the survey questions were coded and statistically analyzed using SPSS[®]. This paper reports results based on tests of association between variables using a Pearson’s approximation of χ^2 test, using a 2×2 matrix. In those instances where at least one cell in the matrix had an expected count of less than five, additional statistical tests were performed, including Fisher’s exact test.

Results

Response rates

For this paper, only questionnaires returned complete (i.e., all pertinent sections of instrument were filled-out)

were considered responses so that AAPOR Response Rate 1 (RR1) the “minimum response rate” was computed (American Association for Public Opinion Research (AAPOR), 2005). According to AAPOR, Response Rate 1 is the number of complete questionnaires divided by the number of questionnaires returned (complete plus partial) plus the number of non-responses (refusals plus non-contacts plus others) plus all cases of unknown eligibility. The minimum response rate (RR1) for the survey was 52.53% (see Table 1).

Respondent program characteristics

Of the 57 returned survey booklets, 52 indicated that there was a TDR program in their community, while five indicated no such TDR program. The distribution of respondent TDR program initiation dates reflects the first, second and third waves of TDR programming outlined by previous researchers (Machemer and Kaplowitz, 2002; Johnston and Madison, 1997; Pruetz, 1997). Most of respondent programs (42.3% or 22 programs) were initiated during the third generation of TDR programs in the 1990s, 36.5% of respondent programs (19 programs) were initiated in the 1980s, and only 7.7% of respondent programs (4 programs) were first-generation programs from the 1970s. Only three respondent programs were initiated during the three-year-period from 2000–2002. Data on the remainder of the respondent programs did not permit their generational classification.

Surveys were returned from respondents in 19 states, with 55% of program respondents coming from California, Florida, Maryland, and Colorado. This is in line with a previous study that found over half the TDR programs in the entire country were located in four states associated with growth pressure: California, Florida, Pennsylvania and Maryland (Pruetz, 2003).

In response to the questionnaire’s inquiry concerning respondent programs’ legal basis, 42.1% of respondents (24 programs) indicated that there was state enabling legislation for TDR in their states. This may show a change from Pruetz (1997), who reported that 13% of TDR programs in his study did not have state enabling legislation.

The literature suggests that TDR programs may be initiated by a variety of stakeholder groups (Pruetz, 2003; Johnston and Madison, 1997; Gottsegen, 1992). The respondent programs did evidence a variety of TDR

Table 1
Minimum response rate

	Number
Surveys mailed	109
Ineligible cases	10
Potential respondents	99
Completed surveys	52
Response rate (RR1)	52.53%

program initiators with many programs indicating more than one TDR initiator. Answers to the initiator question with multiple response options shows that 42.1% of respondents indicated farmers and ranchers as initiators of their TDR program, 42.1% of respondents indicated non-farm landowners and residents as initiators of their program, 49.1% of respondent programs indicated developers and builders as program initiators, and 57.9% indicated preservationists and non-profit organizations as TDR program initiators. However, the largest number of respondent programs (80.7% or 46) indicated government agencies, officials, and planners as those who initiated their TDR program.

Respondent programs also provided information about their TDR program's multiple goals and objectives. The results indicated that 28.1% of respondent programs had rehabilitation of low-income housing as an original goal/objective of their program; 45.6% indicated that focusing on land development and encouraging redevelopment were initial goals. However, land preservation, whether for agricultural lands, open space, historical values, or environmentally sensitive areas, was, by far, the most frequently indicated initial program goal (82.5% of respondent TDR programs). Furthermore, of those TDR programs reporting land preservation as a goal, 63.5% of respondent programs indicated that agricultural and open space preservation was a goal, 38.6% indicated that historical area preservation was a goal, and 70.2% indicated that preserving environmentally sensitive lands was a goal. The second most frequent TDR program goal reported was growth management (61.4%).

The questionnaire also inquired about respondents' use of market analysis, build-out analysis, and other studies in the design and implementation of their TDR program. Such analyses have been suggested as possible positive contributory factors to TDR program success (Pruetz, 2003; Machemer and Kaplowitz, 2002; Redman/Johnson Associates, 1994; Roddewig and Inghram, 1987). Of the respondents, 26.3% of the programs indicated that public opinion studies were conducted; 15.8% indicated that prior to TDR implementation economic studies were undertaken; 10.5% reported performing land use and suitability studies; and 8.8% reported having done environmental studies. Of the program respondents, 15.8% reported no knowledge of any studies undertaken prior to TDR program design and implementation.

Respondents were also asked about program success. The literature suggests two measures for TDR program success, namely acres preserved and number of transfers. Given the diversity of programs, with a wide range of sending area sizes and number of TDRs available, the survey asked respondents for information on acres preserved, number of transfers, as well as respondent managers' opinion on program success. Thus, the survey yielded three potential measures of success: respondent opinion, acres preserved and number of transfers. However, there were gaps in the acreage and number of transfer

data because some programs were urban while others were rural (e.g., difficultly counting urban transfer on same scale as rural), different programs used different numbers of TDR for an exchange, and other data concordance issues. However, virtually every respondent answered the survey question about how their program was working with 22 (38.6%) respondents reporting that their TDR program was working successfully.

Statistical tests

The data collected on program characteristics were used to test the research hypotheses. Table 2 presents the number of cases reporting on whether or not their program had a particular characteristic, the percent of "successful" and "unsuccessful" programs with their characteristics, as well as the results of Pearson χ^2 tests for program characteristics and the program success variables. For those cases where the cell count was too small for the Pearson test, the table reports the Fishers' exact test significance. But for the enabling legislation characteristic, only program characteristics are reported in Table 2.

Discussion and conclusions

PDR programs

It has been asserted that communities with PDR programs will have successful TDR programs because they will be more familiar with the concept of separating development rights from parcels. The results (see Table 2) indicate that TDR programs with PDR are more successful than those without it, at the 5% level. An examination of respondents' written comments sheds some light on this finding. Some respondents with PDR did report that their PDR program seemed to interfere with their TDR program's ability to develop receiving sites because opponents of development could argue in favor of use of PDR to retire the development rights rather than allowing the transfer of these rights to a receiving site for additional development density. In reality, tax revenues and grants are insufficient in size to allow most PDR programs to achieve all of a community's preservation goals. Nevertheless, opponents of higher-density development are often able to argue that their elected officials should rely on PDR to the detriment of the TDR program.

Other respondents indicated that their PDR and TDR programs are complementary; for example, using funds from one program to leverage the other, or using one program to target preservation in one geographic area, while using the other to target additional areas. Similarly, TDR and PDR programs can target the same area and reinforce one another in several ways. For example, owners of farmland often need to be convinced that their land can remain permanently viable as agriculture. As farms in an area are preserved, whether by PDR or TDR, the owners of the still-unpreserved farms may become more confident

Table 2
Relationship of program characteristics and program success

Program characteristic	n	% Yes		Program success		
		Successful	Not successful	χ^2	Fisher's exact	
				Value	Sig.	Sig.
PDR	52	11.5	3.8	4.140**	0.042	0.050
TDR bank	52	13.5	1.9	7.911*	0.005	0.007
State enabling legislation	52	21.2	25.0	2.335	0.311	
Background studies	52	30.8	19.2	7.879*	0.005	
Initiators—who						
Farmers/ranchers	52	21.2	25.0	0.227	0.634	
Non-farm landowners	52	19.2	26.9	0.008	0.931	
Developers/builders	52	25.0	28.8	0.422	0.516	
Preservationists/non-profit	52	34.6	28.8	5.542**	0.019	
Government agencies/officials/planners	52	42.3	46.2	4.974**	0.026	0.029
Initiators—how many						
1	52	5.8	17.3	1.915	0.166	
2 or 3	52	19.2	9.6	5.125*	0.024	
≥ 4	52	17.3	23.1	0.004	0.947	
Demand						
Housing	52	36.5	32.7	5.255**	0.022	
Commercial/industrial/office	52	7.7	5.8	0.729	0.393	0.326
PUD/master plan community	52	0.0	1.9	0.748	0.387	0.577
Farmland	52	0.0	1.9	0.748	0.387	0.577

*Significant at $\leq 1\%$ -level. **Significant at $\leq 5\%$ -level.

that the agricultural reserve area will not only be spared urban encroachment but may also retain the critical mass needed. Additionally, TDR programs often falter in the beginning if few or no easement acquisitions have occurred locally to establish easement value. But a local PDR program establishes easement value and allows landowners to sell their TDRs for what they know to be a reasonable price.

Still other respondents reported a recognition that their PDR program was a valuable tool and totally independent of their TDR program. These responses support the notion that the existence of both PDR and TDR programs may be an indication of a community's commitment to accomplishing preservation goals and successful TDR programs. In fact, many communities that have preserved significant acreage with TDR also have PDR programs such as Boulder County, Colorado, the New Jersey Pinelands and Montgomery County, Maryland.

TDR banks

TDR programs that incorporate TDR banks have been perceived as more successful than those without such banks. The rationale for that seems to rest on the notion that TDR banks may serve many functions that positively influence the development and effectiveness of a development rights market. Such functions include kick starting the market through the purchase of TDRs, acting as a clearinghouse for identifying potential TDR sellers and buyers, and providing credibility to local lending institu-

tions. The results in Table 2 do support the hypothesis that TDR programs with TDR banks are more often seen as successful by TDR program managers.

The open-ended responses bear out managers' positive association of TDR banks with their respective TDR programs success. Respondents point out how their TDR bank provides a known transaction location for both buyers and sellers. One respondent went so far as to report that their bank is "essential, for it provides confidence and a guarantee of value." The findings suggest that communities interested in developing a TDR program should consider the formation of a TDR bank, and that they could benefit from learning from other TDR programs about their TDR banks. The actual institutionalization of a TDR bank as a market for TDR transaction may not be as important to programmatic success as the informal, informational, and psychological functions they may provide. Perhaps another entity or entities such as township planning offices, or land conservancies may be able to provide such functions. Survey respondents described numerous supportive functions provided by their TDR banks including financing, acting as a facilitator/clearinghouse, educating the community, making TDR buyers and sellers aware of each other, recording transactions, issuing certificates of transfer, and providing program credibility and confidence.

Regarding credibility and confidence, TDR banks provide some assurance to sending area property owners that they will be able to find a buyer for their development rights. Similarly, a TDR bank creates a pool of available

TDRs, thereby assuring receiving area developers that they will be able to buy TDRs when they are needed, often at a pre-established price that can be included in the development's economic feasibility analysis. Additionally, TDR banks help to establish TDR value, a function which can be critical at program start-up when sending area property owners are unsure of what might become a fair price for TDRs. And finally, TDR banks can be used to leverage limited preservation funding. These organizations can use grants and other funding sources to buy TDRs, sell these TDRs and use the resulting proceeds to buy additional TDRs, creating an ongoing revolving fund for preservation out of funds that normally would only accomplish individual acquisitions.

State enabling statutes

It has been asserted that state enabling legislation is important for the success of TDR programs. While there are TDR programs in states without such enabling statutes, often communities considering growth management techniques disregard TDR due to an absence of state TDR legislation. The survey results show that state enabling legislation is not a significant characteristic of successful TDR programs according to the nation's TDR program managers (see Table 2). This absence of significance may signal to land-use decision makers that TDR may be a viable additional policy for helping to balance growth and preservation even absent enabling legislation. Furthermore, while 42.1% of the respondent TDR programs indicated that there was state enabling legislation for TDR, 73.7% of respondents attribute the legal basis of their program as a local ordinance. These findings support the notion that the presence of state enabling legislation is not a necessary precursor to successful TDR programming. Many communities fear that a TDR program without state enabling legislation will make the community susceptible to legal challenges. However, of the survey respondents, only six programs (10.5%) indicated there was TDR litigation with their respective program.

The lack of association between successful TDR programs and state enabling legislation may partly occur because states with TDR enabling legislation do not appear to have geographic, growth or political similarities. Florida, Maryland and Pennsylvania have TDR enabling legislation but the presence of successful TDR programs in these states may have more to do with their growth rates and progressive policies toward land preservation. On the other hand, Kansas, Tennessee and West Virginia also have TDR enabling legislation yet no communities in these states have yet adopted a TDR program.

TDR initiators

Does it matter to TDR program success who and how many parties initiate the TDR planning and implementation process? The study results indicate that there is a

statistically significant association between TDR program success and programs that have two or three initiators (see Table 2). However, these same data do not yield significant association between program success and programs with a single initiator or with four or more initiators. It is interesting to observe that the data suggest that participation of land preservationists in TDR program initiation is more important for programmatic success than land developers' participation.

The initiator groups suggested to respondents in the survey were farmers/ranchers, non-farm landowners/residents, developers/builders, preservationists/non-profit organizations and government agencies/officials/planners. The lack of association between perceived program success and a single initiator group may reflect the fact that both TDR buyers and sellers must find the TDR option advantageous for transactions to occur. Of course, just because a TDR program was initiated by, for example, preservationists does not predetermine that the program will not also be attractive to landowners and developers. But, possibly, when a small number of these groups initiate a program, it may be more likely that the outcome provides the market dynamics needed for success.

The lack of association when there are four or more initiators is more difficult to explain. However, it is possible to envision an imbalanced program resulting from a TDR program that fails to take account of the buyers (developers) and sellers (farmers/ranchers) of TDR. For example, a program initiated by preservationists, government officials, farmers and non-farm landowners could conceivably result in a TDR program in which an inadequate TDR allocation rate results in TDRs that are too expensive. When TDRs are too expensive, developers will not be able to profit from using the TDR option and will simply build at the baseline density, resulting in a TDR program that goes unused.

Program goals

Much has been made of programmatic goals in the TDR literature, that it matters to TDR program success what and how many goals guide the creation and implementation of TDR program. The survey results revealed a variety of TDR program goals and objectives. While only 12.3% of the respondent programs have only a single goal, the majority of programs have multiple goals with 26.3% of respondents indicating all eight broad goals listed on the survey as their initial goals and objectives. In theory, TDR programs address goals and objectives of both land development and land preservation. However, the survey results indicate that more TDR programs focus initially on land preservation (82.5%) than land development/redevelopment (45.6%). This parallels the findings discussed above regarding the initiators of TDR programming—land preservationists predominant while land developers are minor. The results that more TDR programs focus on environmental protection (70.2%) than those focusing on

agricultural land preservation (63.5%) is consistent with a prior analysis of TDR programs which found that 111 out of 142 programs, or 78%, were primarily designed for environmental protection or a combination of environmental and farmland protection while 58 out of 142 programs, or 41%, were primarily designed for farmland protection or various combinations of farmland preservation and rural character or farmland preservation and environmental protection (Pruetz, 2003).

The goals presented to respondents in the survey instrument were rehabilitation of low-income housing, land development/redevelopment, preservation of specific area, agriculture/open space protection, historical area preservation, environmental preservation, growth management, balance inequities and maintain/enhance land values. However, this investigation finds that there is no significant association between program success and any number of initial goals. The data do not support assertions in TDR literature that successful TDR programs should be structured to accomplish multiple development as well as preservation goals in order to engage multiple stakeholders in program planning, design and implementation.

Type of development demand

Studies suggest that demand for development is the key driver for successful TDR programs because demand for development generates transfers and therefore preserves land in a TDR program (Pruetz, 2003). Not surprisingly, the TDR programs that have seemed to preserve the greatest acreage are in communities under high growth pressure such as King County, Washington (Seattle), Montgomery County, Maryland (Washington, D.C.), New Jersey Pinelands and Palm Beach County, Florida. One study found that over half the TDR programs in the entire country were located in four states associated with growth pressure: California, Florida, Pennsylvania and Maryland (Pruetz, 2003). Despite such goals as land preservation, it seems to matter a great deal on the type of development pressure (Machemer and Kaplowitz, 2002). Therefore, this study tried to test whether the type and character of market demand in the TDR program area matters to TDR program success.

Respondents were asked to describe the development demand in their TDR program areas. These responses were coded as Housing, Commercial/industrial/office, PUD/master plan community, and Farmland. As Table 2 illustrates, demand for housing was the only development type that was statistically significantly associated with successful TDR programs. It appears that, indeed, the type of development matters and that housing demand drives successful TDR programs.

Background studies

The survey results also allowed for an examination of the possible importance of the preparation and use of back-

ground studies and TDR program success. The results show a statistically significant association between programs that conducted studies prior to program initiation and program success (see Table 2). This finding may provide communities considering TDR with added evidence to support the commitment of resources and time to undertake such analyses as part of TDR program design and development. Analysis of the potential market seems critical to the success of a TDR program. Understanding local development may help determine demand for development scale or density that exceeds the limits of the community's current development code. Estimates may then be made of the amount of bonus development that could occur in the future and the amount of money that developers might be willing to pay for each additional dwelling unit or extra square foot of floor area. Once an estimate is made of likely TDR value, the study should evaluate the number of TDRs that a sending area landowner should be allowed to sever and sell in order to equal or exceed the value decline anticipated from easement recordation. This transfer ratio is important for creating a program in which average sending area property owners feel adequately compensated for preserving their land and in which receiving area developers can make a reasonable profit from the extra development despite having to buy TDRs. Communities that neglect to study such market dynamics may simply adopt programs in which one extra dwelling unit is allowed in a receiving area for each dwelling unit relinquished at a sending site regardless of whether the value increase created by one bonus dwelling unit in the receiving area is comparable with the value decline experienced by foregoing a dwelling unit in the sending area. Of course, comprehensive preliminary studies also look at more than just market forces, including the size, location and characteristics of the optimum sending area as well as the most promising approach to the formation of receiving areas. In addition, these studies may also review the feasibility of alternative mechanisms such as allowing charges in lieu of actual TDR retirement, basing TDR allocation on site-specific appraisal and offering TDRs as a way for developers to deal with permit quota systems.

Conclusions

This national study of TDR program managers demonstrates some empirical evidence on seven program characteristics associated with TDR program success. The results show that the joint existence of a PDR program is positively associated with TDR program success. Moreover, a community's undertaking of background studies, together with the establishment of a TDR bank, were found to be perhaps the most significant characteristics associated with program success. While the results demonstrate that who initiates TDR programming and the number of initiators may influence perceptions of program success, these program characteristics are typically beyond

the control of planners. The results also demonstrate that the type of development demand in the TDR program area seems related to program success, with housing demand significantly related to success. This signals the potential utility of TDR in areas facing substantial housing demand. The importance of these findings is that PDR, TDR banks, and background studies are all factors under the influence of planners and policy makers. TDR program managers seem to be telling us that a complementary PDR program, TDR banks, and background studies are central to a successful TDR program.

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