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A Framework for Evaluating Transferable Development Rights Programmes

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ABSTRACT *While theoretical aspects of transferable development rights (TDR) programmes have been explored, there is little research into programmatic elements of successful TDR programmes. The reported research systematically analyses characteristics of TDR programmes that correspond with successful programme implementation. After describing the basic elements of TDR programmes, this paper uses an iterative, case-study approach to: (1) identify and classify TDR programmatic characteristics; and (2) develop a TDR evaluative framework. This TDR evaluative framework is then used to examine three TDR programmes: Manheim Township, PA; Montgomery County, MD; and New Jersey Pinelands. A comparison of these programmes' strengths and weaknesses, and discussion of their programme elements, demonstrate the utility of the TDR evaluative framework for analysing TDR and other growth management programmes. Furthermore, the analysis reveals that a high degree of knowledge of local land use demands and patterns, programme leadership and presence of a TDR bank are important for TDR programme success.*

Introduction

Too often communities focus on land use issues in isolation, addressing each 'problem' with individual land use controls. However, land use issues tend to be interconnected, complex problems requiring integrated and systemic policy choices for compatible protection and development (Kuhn, 2000). Transferable development rights (TDR) programmes may provide a systematic tool to help communities achieve comprehensive long-range environmental and economic goals (Pizor, 1986; Gottsegen, 1992). There are more than 129 TDR programmes in local, county and regional governments throughout the USA with stated goals ranging from protecting environmentally sensitive areas and conserving historical sites to promoting affordable housing and rehabilitating urban areas (Pruetz, 1997; Machemer, 1998).

While there seems to be increased interest in the adoption of TDR programmes by some communities, little is known about the characteristics that make for successful and effective TDR programmes. Therefore, this paper

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presents a systematic analysis of characteristics of TDR programmes that appear to correspond with successful programmatic implementation. This reported research develops an evaluative framework of TDR programmatic characteristics, and uses that framework to examine three well-documented TDR programmes, one each at the local, county and regional levels.

Background of TDR

The conceptual key to TDR programmes (like purchase of development rights (PDR) programmes) is 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 (Rose, 1975; Barlowe, 1978; Hagman & Juergensmeyer, 1986; Wright, 1993). For example, New York City has allowed the purchase, sale and use of vertical development rights, so-called 'air rights', among and between neighbouring landowners for more than 30 years (Roddewig & Inghram, 1987; Pruetz, 1997). Once a parcel's development right has been severed, regardless of whether it is subsequently used or retired, a conservation easement is placed on the property parting with its development rights limiting the parcel's future use. Conservation easements are legal encumbrances on land that restrict and bar current and subsequent owners of the parcel from certain identified actions and land uses (Michigan Department of Environmental Quality, 1995).

In the USA, the TDR concept was first introduced by Lloyd (1961). Chavooshian *et al.* (1973) explored the applicability of TDR approaches for environmental planning and open space preservation. While Rose (1975) and Carmichael (1975) examined the legal and economic underpinnings of TDR programmes, others, including Costonis (1975), have explored the use of TDR for historic landmark preservation. TDR programmes have also been studied as means of encouraging redevelopment, preserving farmland or rehabilitating low-income housing (e.g. Rory, 1975; Roddewig & Inghram, 1987).

When several pioneering TDR programmes were under way, scholars attempted to examine the efficacy of those first-generation TDR programmes. Some of these first-generation TDR programmes were in such places as New York City, Collier County, FL, and Calvert County, MD. The literature concerning these early programmes focuses on practical aspects of TDR programming and suggestions for second-generation TDR programmes (e.g. Woodbury, 1975; Pizor, 1978, 1986; Maabs-Zeno, 1981; Barrese, 1983; Tustian, 1983; Roddewig & Inghram, 1987). A second wave of TDR programmes began to be implemented in the 1980s. These second-generation TDR programmes include those in the New Jersey Pinelands, Denver and Pittsburgh. The literature on these second-generation programmes emphasizes the importance of stakeholders and their inclusion in programme design and implementation (Heiberg, 1991; Redman/Johnson Associates, 1994; Johnston & Madison, 1997; Pruetz, 1997). This literature, with its emphasis on programme participants and incentives, was taken into account by so-called third-generation programmes. These programmes include both revised earlier TDR programmes (e.g. Chesterfield Township, NJ) and completely new TDR programmes (e.g. Thurston County, WA). Many third-generation TDR programmes have tried to incorporate lessons from earlier programmes.

Basic Structure of TDR

The basic elements of a TDR programme are: (1) sending areas; (2) receiving areas; (3) the definition and specification of parcels' severable development rights; and (4) the process by which development rights may be transferred.

The sending area represents the region of a community that stakeholders wish to preserve and protect from increased land use change. Development potential (i.e. development rights) is transferred or 'sent' from the sending area to designated regions (i.e. receiving areas) for development in that area. Typically, landowners in 'protected' or sending areas receive a payment in exchange for the sale or transfer of their properties' development rights. After selling their parcel's development rights, landowners may continue permitted land uses on their property (e.g. pre-development activities such as agriculture or passive recreation), as defined in the easement or deed restrictions. The purchaser of development rights (e.g. a nature conservancy or private individual) does not have to actually use the purchased rights for development.

As mentioned, TDR programmes' receiving areas are those regions designated for more intensive growth and development. TDR usually permit development of a particular type and density beyond those permissible under the receiving area's standard (base) zoning and regulation. For example, the use of TDR may allow for increases in the number of dwelling units per unit area and increases in floor area ratios. As a result, parcels in TDR receiving areas are often subject to dual zoning regulations—a base zoning regime and a bonus zoning regime for parcels with applicable TDR.

As communities define and delineate the severable development rights for their programme they should consider the maximum projected and acceptable amounts of future development in their region. There are two general approaches for calculating a programme's number of TDR. The top-down approach starts with a community determining the total amount of appropriate future development. That projection/estimate is then used to establish base zoning and TDR (bonus) opportunities. In contrast, the bottom-up approach first uses some metric or categorization of land (e.g. area, zoning or land type) in the sending area to calculate the total number of TDR to be made available. This total number of TDR is then allocated to the landowners in the sending area based on a distribution scheme (e.g. x per unit area) often with some consideration of property characteristics and previous zoning. As Woodbury (1975) points out, successful TDR programmes must ensure that a TDR market exists and that TDR have value so that there is adequate incentive for their use (i.e. transfer).

The components of TDR programmes are tied together by the procedures adopted for transferring TDR from sending area landowners to receiving area landowners. TDR transfers may take place (1) between adjacent parcels, (2) within a designated district, (3) from non-urban to urban areas within a jurisdiction and (4) within a region between jurisdictions. Transfers between adjacent parcels may involve parcels under the same ownership, as is the case in several townships in York County, PA (American Farmland Trust, 1997), or parcels owned by several landowners (e.g. the New York City programme). The Chicago programme offers an example of the second type of transfer, transfer within a designated district. These two types of development rights transfers

were prevalent during the first wave of TDR programmes in the late 1960s and 1970s. Transfers within a local jurisdiction between rural (non-urban) and urban areas gained strength with second-generation programmes during the 1980s. These programmes sought environmental and agricultural land preservation (e.g. Dade County, FL, and Montgomery County, MD). This type of transfer may or may not include the designation of sending and receiving areas. The last type of transfer, within a region and between local jurisdictions, is the most complex. Sending and receiving zones may exist in all jurisdictions, but most often some jurisdictions contain sending areas and others contain receiving areas. Therefore, these types of transfers require co-operation between jurisdictions and, most likely, enabling legislation permitting cross-jurisdictional planning. This type of transfer programme is found in the New Jersey Pinelands and Thurston County, WA, the former under state and federal legislation and the latter under state growth management legislation. For more information on TDR programme structure and details, see Machemer *et al.* (1999), Machemer (1998), Pruetz (1997), Johnston & Madison (1997), Gottsegen (1992) and Roddewig & Inghram (1987).

Research Hypotheses

Although the TDR literature addresses some theoretical aspects of TDR programmes (e.g. Chavooshian *et al.*, 1973; Coughlin, 1981; Roddewig & Inghram, 1987; Redman/Johnson Associates, 1994), there is little reported research on programmatic elements of successful TDR programmes. Therefore, it was hypothesized (1) that programmatic characteristics and elements of TDR programmes could be identified and classified, (2) that TDR programme characteristics could be used to structure a TDR programme evaluative framework and (3) that a TDR evaluative framework would be useful for measuring the relative success of individual TDR programmes.

Research Design

The investigators used an iterative, case-study approach to: (1) identify and classify programmatic characteristics of a wide range of TDR programmes; (2) develop an evaluative framework of characteristics correlated with successful TDR programmes; and (3) examine three well-documented TDR programmes using the TDR evaluative framework. The case-study approach is well-suited for learning about, obtaining data from and understanding processes and phenomena occurring in local contexts (Miles & Huberman, 1984; Marshall & Rossman, 1989; Yin, 1994).

First, the 14 TDR programmes listed in Table 1 were systematically selected based on their general characteristics, level of implementation, age and programmatic goals (Stake, 1995). These programmes were: (1) initiated between 1968 and 1997; (2) well-documented; and (3) staffed by accessible, helpful programme administrators. In most instances, a copy of each of these TDR programme's enabling legislation, charter and other organizing documents was obtained and reviewed. Altogether, approximately 1600 pages of documents, 10 hours of interview tape and 50 pages of transcripts/interview notes concerning the 14 selected cases were assembled and analysed.

The analysis of the data collected of the 14 TDR programmes' characteristics proceeded based on an iterative grounded-theory approach (Strauss & Corbin,

Table 1. TDR programmes analysed for characteristics and elements

Programme	Year initiated	Scale	Programme goals
Buckingham, PA	1975	Township	Agricultural land preservation
Calvert County, MD	1978	County	Agricultural land preservation
Chesterfield, NJ	1975	Township	Farmland preservation Growth management
Collier County, FL	1974	County	Protect environmentally significant areas
East Nantmeal, PA	1994	Township	Farmland preservation
Harford County, MD	1982	County	Farmland preservation
Hillsborough, NJ	1975	Township	Environmental protection Farmland preservation
Lexington-Fayette, KY	Pending	Regional	Agricultural land preservation
New York, NY	1968	City	Protect historic landmark buildings
San Francisco, CA	1985	City	Historic preservation
San Mateo County, CA	1988	County	Farmland preservation
Southampton, NY	1972	Township	Environmental protection Groundwater protection
Thurston County, WA	1996	County	Farmland preservation Growth management Affordable housing
West Bradford, PA	1997	Township	Farmland preservation Sensitive natural area protection Rural character protection

1990). Such an approach is not about producing simple counts of things; rather, it is aimed at 'fracturing' the data and organizing them into categories that facilitate understanding and comparisons (Strauss & Corbin, 1990; Maxwell, 1996). The data were iteratively analysed (coded). The TDR programmatic elements in the data were identified and grouped into initial categories (see Table 2). As Table 2 also illustrates, the researchers identified and documented 'evidence' or examples of each of these programmatic elements. Next, the researchers used a selective coding process to systematically relate the major TDR themes and their elements to the data and to existing TDR literature. This final iteration of coding and categorizing the case-study data resulted in the genesis of an evaluative framework that categorizes the TDR programme as one of 13 elements under three themes (see Table 3). Like Table 2, Table 3 includes examples of each theme and programmatic element.

To test and evaluate the efficacy of the derived evaluative framework as well as identify characteristics of TDR programmes that appear to correspond with programmatic success, the final phase of the reported research used the developed framework to evaluate three well-documented TDR programmes. The three TDR programmes selected—Manheim Township, PA, Montgomery County, MD, and the New Jersey Pinelands—are: (1) located in the same region of the USA (see Figure 1); (2) extensively documented; and (3) staffed by highly

Table 2. TDR initial (axial) coding categories and examples

Axial category	Examples
Foundation	Enabling legislation Comprehensive plan Zoning ordinances Growth management legislation Preservation legislation
Regulatory integrity	Exclusive agricultural zone A comprehensive plan Master plan Zoning ordinances that support and permit TDR
Sense of place	Both sending and receiving areas must identify with the benefits Sending area landowners identify with benefits of redirecting growth
Valuable enough to preserve	Best if the resource has multiple values Support of entire preservation community, not just the well organized Resource to be preserved is valued by community's diverse stakeholders
Sufficient development atmosphere	Rapidly growing area Presence of an active and diverse real estate market
Understanding development demands and patterns	Locate sending and receiving sites appropriately Set zoning base and bonus densities TDRs required in areas where development is demanded TDRs required for type of development most in demand
Viable receiving areas	Market for intensity and type of development allowed by TDR Receiving sites politically acceptable Receiving areas physically feasible: centralized sewers and water Meet comprehensive plan, zoning conditions and design standards
Public support	TDR education programmes Stakeholders within the programme area well informed Community support for TDR programme A facilitating agency or bank supports the education process
Leadership	Leadership within and across stakeholder groups (e.g. farmers and developers) Involvement of private sector interests Political leadership is critical
Mandatory programmes	Downzoning of either the sending or receiving areas Downzoning in sending area, an incentive for landowners to sell TDRs Downzoning in receiving area, an incentive for developers to acquire TDRs Comprehensive and mandatory prohibitions on development
TDR bank	Bank can purchase and sell TDRs to balance the market Buyer of last resort TDR banks strengthen credibility with banking institutions and lenders Bank functions as a facilitator, bringing together TDR buyers and sellers
Easement purchase programmes (e.g. PDR)	TDR and PDR are complementary programmes Utilizing PDR funds strategically TDR used to strengthen the PDR efforts
Simple and cost-efficient	TDR programme options should be simple Complex TDR programmes keep TDR sellers and buyers from being involved TDR programmes structured clearly TDR concepts should be applied with as much simplicity as possible

Table 3. Evaluative framework: regulatory, community and programme characteristics

Theme	Elements	Evidence/examples
Regulatory characteristics	Political foundation	Enabling legislation for TDR
		Growth management legislation
		Agricultural or historic land preservation legislation
		Planning history (e.g. comprehensive plan and zoning ordinances)
	Consistent regulatory process	Minimal zoning changes and variances
		Agricultural zoning (e.g. security districts and exclusive zoning)
		Design standards (e.g. architectural)
Community characteristics	Sense of place	Well-defined geological boundary
		Well-defined cultural or historical boundary
		Landowners identify with entire programme
	Resources in area seen as valuable	Regulatory mechanisms identify and protect resource
		Activities promoting the 'protected' resource (e.g. farm tour)
		Resource is of value to many and diverse stakeholder groups
	Rapidly growing area	High rate of home construction
		High rate of population growth in programme area
		Existence of diverse types of housing in the market
		Demand for increased-density development
	Public acceptance	TDR education programmes
		Public support (e.g. meetings, hearings and votes)
		TDR facilitating departments, agencies or banks
Programme characteristics	Appropriate receiving areas	Market for intensity and type of TDR-based development
		Physical capability to handle increased density
		Fit with master plan, zoning plan and design standards
		Politically acceptable
	TDR leadership	TDR programme co-ordinator
		Key farming community participants
		Key development community participants
		Key lending institution participants
		Timely key participant involvement
	Mandatory programmes	Downzoning of sending areas
		Downzoning of receiving areas
	TDR bank	Public funds (federal, state or local)
		Line-item in budget for TDR programme
		Municipality able to purchase or sell TDRs
		Bank acting as facilitator
	TDR compatible with PDR	Opportunity to participate in both TDR and PDR programmes
		Comparable price for PDR per unit area and TDR per unit area
		PDR programme makes strategic purchases
	Simple and cost-efficient	TDR allocation formula easy to understand
		Developers and sending area landowners understand programme
		Low transaction costs for developers to participate
		TDR tied to planning processes (e.g. subdivision regulations)
	Knowledge of development, local land use demands and patterns	Studies completed on residential development
		Studies completed on land values
		Land use studies
		Studies on resource use and demand

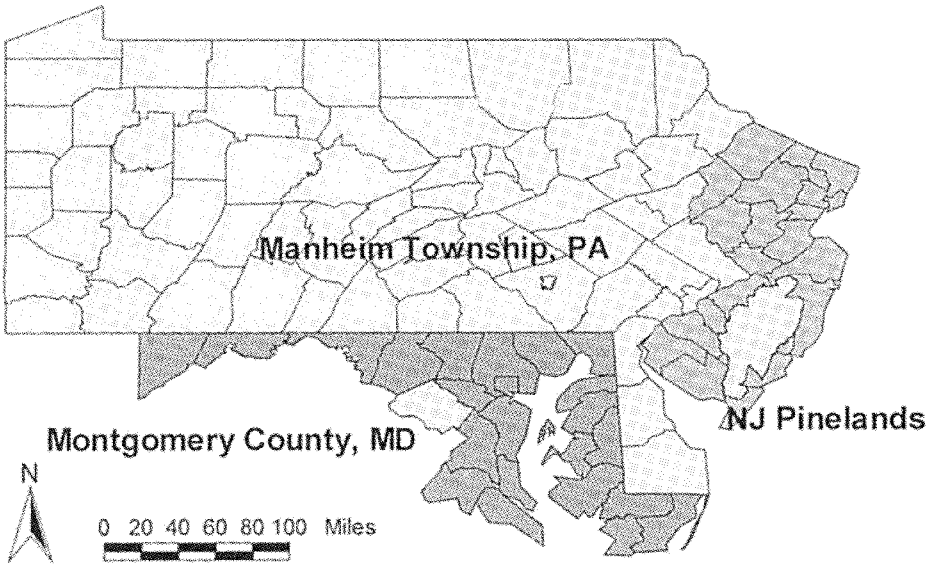

Figure 1. Case-study areas.

accessible and co-operative programme personnel. The documentary and interview data on these three programmes were systematically analysed using the themes and elements of Table 3's TDR evaluative framework. Doing so allowed the researchers to compare apparent strengths and weaknesses of TDR programmes as well as discern the relative importance of particular programme elements. For this study, TDR programme success was operationally defined using two landscape characteristics: number of development right transactions; and number of acres preserved. The number of transactions is a proxy for the level of activity in the development rights market and the level of participation. The number of acres under preservation indicates one measure of the extent of landscape protection.

Results

As mentioned, the results of the multiple-phased analysis are summarized in Tables 2, 3 and 4. Table 2 illustrates the initial or axial categories that seemed to best describe and group together the programmatic characteristics of the 14 TDR programmes studied. Subsequent iterative analysis of the data resulted in selective coding of TDR programme thematic areas and their elements into a framework that addresses regulatory, community and programmatic characteristics by focusing on 13 key TDR programme elements. Table 3 illustrates the results of the selective coding of the data, an evaluative framework with examples of each programmatic element. As Table 2 and Table 3 illustrate, TDR programmes and their institutional settings touch on a wide range of regulatory, community and programmatic characteristics.

It is important to point out that the regulatory characteristics of TDR programmes include enabling legislation, which some planning authorities believe is necessary for TDR programmes to withstand legal challenges. However, the

Table 4. Comparative analysis of selected TDR programmes

TDR elements	Manheim Township, PA	Montgomery County, MD	New Jersey Pinelands
Political foundation	Low	Medium	High
Consistent regulatory process	Low	High	Medium
Sense of place	Low	High	Medium
Resource perceived as valuable	Medium	High	Medium
Rapidly growing area	High	High	Low
Knowledge of local land use	Low	High	High
Appropriate receiving areas	Medium	High	Low
Public support	Low	High	Medium
Leadership	Low	High	High
Mandatory programmes	High	Medium	Low
TDR bank	Low	High	High
TDR working with PDR	Low	High	Low
Simple and cost-efficient	High	Medium	Low
Summary	Number of highs = 3	Number of highs = 10	Number of highs = 4
	Number of mediums = 2	Number of mediums = 3	Number of mediums = 4
	Number of lows = 8	Number of lows = 0	Number of lows = 5

case-study research and literature on TDR programmes indicates that state police power may itself provide a sufficient legal basis. For example, Pruetz (1997) notes that 13 states have TDR programmes yet have not adopted state TDR legislation. Therefore, TDR programmes may or may not have enabling legislation, a consistent land use regulatory environment, communities that understand and embrace them, appropriate sending/receiving zones and many other regulatory, community and regulatory characteristics. A detailed discussion of the data and analysis underlying Table 2 and Table 3 will be forgone in light of the following in-depth discussion of the application of the derived TDR evaluative framework. More information on the particulars concerning the detailed case studies used in earlier iterations of analysis may be found elsewhere (Machemer, 1998). This paper focuses on the proffered TDR evaluative framework (Table 3) and results of a systematic analysis of three TDR programmes (Table 4).

Evaluating TDR Programmes

TDR programmes do not lend themselves to simple, quantitative analyses. TDR programmes may involve local, regional and state-wide land uses; they may focus on agricultural land preservation, environmental protection or growth management; and they each have their own rules, requirements and implementation mechanisms. Furthermore, uniform data and reporting on TDR programmes do not yet exist. As a result, the researchers designed an evaluative framework (see Table 3), grounded in the TDR literature, that could be a useful tool for understanding relative strengths and weaknesses of TDR programmes. To test the efficacy of the framework as an evaluative tool, three TDR programmes were systematically analysed using the framework. The three programmes were Manheim Township, PA (Manheim), Montgomery County, MD

(Montgomery), and the New Jersey Pinelands (the Pinelands). They are located in the same region of the USA (see Figure 1).

Following a brief description of the three communities, the discussion explores the extent to which evaluative framework elements appear in these three programmes. In order to summarize the results of such a comparative analysis in a table, some sort of heuristic was needed. Since it is not possible *a priori* to determine the relative import of each element or its component parts, the researchers decided that some general indication of the 'weight of the evidence' of each element would be useful. Table 4 illustrates the extent to which a programme appeared to evidence each element as being high, medium or low. Table 4, while not definitive, does prove useful as a tool for critically evaluating and comparing TDR programmes.

Three TDR Programme Areas

Manheim is centrally located in Lancaster County in south-central Pennsylvania, giving its residents convenient access to major cities such as Philadelphia, Baltimore and Wilmington. As a suburb of Lancaster City, the township's southern boundary is irregular due to land annexation. In fact, there are islands of township land surrounded by Lancaster City. The township contains 14 464 acres (5856 ha), of which approximately only 2000 acres (810 ha) are farmland. In 1990 nearly 36% of the township was undeveloped. Manheim's estimated population in 1999 was 33 000. Although the township population continues to grow, county-wide growth has shifted to other municipalities as a result of the expansion of municipal services in other townships. Manheim's projected population for 2010 ranges from 34 228 to 36 770. Since designation as an agricultural district in 1944, Manheim's agricultural lands have been perceived as a valuable natural resource in need of protection. Manheim's 1987 comprehensive plan, among other things, recommended the reduction of residential densities. Manheim's TDR programme was adopted in 1991 as an amendment to its existing zoning ordinance.

Montgomery is located north-west of the District of Columbia. The county's population in 1994 was 795 600 and its area is 316 800 acres (128 259 ha). The county has been successful in accommodating growth and avoiding suburban sprawl while protecting its farmland resources (Daniels & Bowers, 1997). The county is a mix of rural (including 14 townships) and urban areas (including the municipalities of Bethesda, Chevy Chase, Rockville and Silver Spring). With a population projection of 945 000 by 2010, Montgomery must address the sufficiency of its agricultural preservation efforts to accommodate such growth while sustaining the county's agricultural resource and rural character. This challenge is not new. Since the 1950s, Montgomery has addressed development concerns with a number of plans and actions, including the downzoning of certain rural areas in 1974. By 1980, the Montgomery County Council had prepared a plan to preserve agriculture while recognizing public sector costs. The county considered three options: buy the land; rezone the land; or strike a compromise between the two. The compromise involved downzoning to prevent the fragmentation of the land, combined with a method to compensate landowners for at least part of the resultant loss in land value. TDR offered a mechanism to accomplish these goals, and thus Montgomery initiated its TDR programme in 1980 (Heiberg, 1991; Maryland-National Capital Park & Planning Commission, 1992).

The Pinelands area includes approximately 938 000 acres (379 757 ha) in south-eastern New Jersey that contains forest, farms and scenic towns. The Pinelands encompasses portions of seven counties and all or part of 53 municipalities. About 700 000 people live and work in and around the Pinelands area. Major activities within the Pinelands include farming, recreation, resource extraction, shell fishing, public service and construction. Because of its proximity to New York, Philadelphia and Atlantic City, the Pinelands' perimeter faces development pressure. The Pinelands' combination of natural features and development potential makes it an area in need of protection. The region is too large to stop all development or purchase all the land. In 1978, Congress responded by creating the Pinelands National Reserve. The New Jersey Legislature supplemented the federal law by passing the Pinelands Protection Act in June 1979. These acts, among other things, established a requirement that county and municipal master plans and ordinances should conform to a comprehensive management plan (CMP) for the Pinelands. The CMP includes a transfer of the development rights programme using Pinelands development credits (PDCs) as defined in the CMP. On 14 January 1981, the CMP became effective under state law.

Legal and Political Foundations of TDR

The analysis of 14 baseline TDR programmes revealed the benefit of a strong political foundation for some communities to effectively initiate and implement a TDR programme. Johnston & Madison (1997) observed that political structure influences TDR programme characteristics. The political and legal foundation for TDR programmes may vary from nothing more than general police powers to specific state enabling legislation. Therefore, the evaluative framework classifies such things as ordinances, master plans and specific legislation as evidence of good political and legal foundations for successful TDR programmes.

In two of the three TDR cases evaluated in depth here, TDR enabling legislation did not exist when the programmes were initiated. Although Pennsylvania permitted TDR programmes under the state's municipalities planning code, it appears that the legal foundation for Manheim was the general police power of the community to regulate land use through planning and zoning. Further evidencing a weak political foundation for TDR in Manheim, the Manheim TDR was not included in that community's comprehensive plan. The unclear legislative and administrative foundation for the Manheim TDR programme has contributed to the programme's limited use (Butler, 1997).

The legal foundation for the Pinelands TDR programme (PDC) was both state and federal legislation establishing the Pinelands reserve. Furthermore, the PDC is part of a comprehensive Pinelands protection programme that includes the comprehensive management and land use regulatory programmes. Similarly, the Montgomery TDR programme was implemented as part of the county's wedges and corridors plan. Furthermore, Montgomery made TDR a basic element in its comprehensive master planning process and broader agricultural preservation programmes. Table 4 captures these three cases' disparate levels of legal/political foundation for their TDR programmes.

Consistent Regulatory Process

The analysis of TDR programmes revealed that programme areas with consistent and stable land use regulatory processes had greater and more assured TDR participation, and that participants were more confident that the TDR programmes would be maintained over time. Communities with exclusive agricultural zones and those with comprehensive planning or zoning ordinances that support and permit TDR implementation illustrate desired consistency in land use regulations. Regulatory consistency sends the signal that TDR sending area zoning will not change and that bonus densities in receiving areas will only be achieved through TDR participation (not through zoning changes and variances).

The Manheim TDR programme, it was learned, was designed to be only a small aspect of that community's overall land use control strategy. Apparently, the community adopted such a strategy for fear the 'failure' of TDR would adversely impact Manheim's overall growth management strategy. One reported result of that approach has been few TDR transfers in Manheim. In contrast, Montgomery's TDR programme was made an integral part of the region's master planning process; specifically, TDR is part of their functional master plan for the preservation of agricultural and rural open space. These programmes have been in place in Montgomery for nearly 20 years and have a long history of continuity. It should be pointed out that, despite increasing development pressure, Montgomery County Council has maintained its agricultural reserve line for more than 18 years. Therefore, the TDR programme in Montgomery seems well integrated into a stable and consistent land use regulatory process.

Because New Jersey's Pinelands covers 53 municipalities, it is difficult to discuss, let alone actually establish and maintain, regulatory integrity across the diverse region. While analysis of the regulatory integrity of each individual municipality in the Pinelands is beyond the scope of this paper, the data do allow for some insight into the overall regulatory integrity of the Pinelands comprehensive plan and land use programme. Although the Pinelands Commission does not have regulatory authority to adopt region-wide zoning ordinances, municipalities within the Pinelands are required to conform with and incorporate Pinelands Commission policies and requirements. As a result, there is increasing land use regulatory integrity in the Pinelands. The Pinelands Commission has worked well with the municipalities and these partnerships have enabled the Pinelands TDR programme to function with consistency. The three programmes' different levels of regulatory consistency are captured in Table 4.

Sense of Place

The review of TDR programmes revealed that successful programmes tended to correspond with communities that evidenced a positive sense of place for the TDR programme areas, both the sending and receiving areas. TDR programmes impact all citizens in the programmes' jurisdiction, not only those community members directly associated with the sending areas and the receiving areas. That is, residents in TDR programme communities with no direct connection to either sending or receiving areas may also benefit from the advantages of preservation

(Barrese, 1983). Because TDR programme success depends on transfers of rights from one area to another, residents ought to appreciate the benefits of preserving sending area land as well as the benefits of directing growth to receiving areas. Such appreciation of the range and extent of land uses and land cover in a community (i.e. sense of place) seems to correspond with those communities that have successful TDR programmes.

To differing degrees, the three TDR programmes under investigation evidence some overall community sense of place and vision of the importance of protecting and maintaining land cover and land uses in sending areas. In Manheim, it was revealed that residents within the sending and receiving areas have a stronger sense of place than do residents living outside the sending and receiving areas. That is, residents outside either sending or receiving areas in Manheim did not associate themselves with or subject themselves to perceived benefits of the TDR programme. Similarly, residents in the Pinelands evidenced a disassociation from the TDR programme areas. While the ecological uniqueness is readily apparent to residents in the Pinelands—people recognize that they are in the Pinelands when they drive by cranberry bogs or walk through the pygmy forests—most residents think of place in terms of their municipal identity. People in the Pinelands have a municipal sense of place that is stronger than any identification with the Pinelands or the benefits associated with protecting Pineland resources. In contrast, Montgomery has acted and builds upon a strong overall association of residents with the county. This county sense of place has been identified as critical to Montgomery's programme because the vast majority (approximately 97%) of county residents do not live in TDR sending areas. Montgomery has instituted an aggressive agricultural marketing programme that has helped foster a strong sense of place across the county. Of the three cases, Montgomery clearly has the most apparent programme area sense of place. It should also be pointed out that Montgomery also has the greatest area of land preserved and number of TDR opportunities utilized in receiving areas.

Area Resources Seen as Valuable

The baseline analysis of 14 TDR programmes indicated the importance of having the resources targeted for preservation perceived as valuable by the community. Furthermore, it was observed that resources were seen as more valuable when the target for preservation had multiple sources of value and support from a variety of stakeholders. In the three cases analysed in depth here, the resources targeted for preservation are to some extent valued by the communities. However, the extent that the resource is valued and whether this translates into action within the TDR market remains to be determined.

In Manheim and Montgomery the resources in question are agricultural land and open space. In both cases the land is valued for economic and aesthetic reasons. When the TDR programme was initiated in these communities, the emphasis was on the economic value of agricultural lands. Currently it appears that the residents of Manheim value rural character more than agricultural lands, whereas in Montgomery the economic value of agricultural lands still dominates. The farming community may be better organized and more motivated to make the TDR programme work than stakeholders interested in preserving open space. The Pinelands offers a contrast because, at programme initiation, the resource was not perceived as valuable at the local level. Rather,

federal and state legislative bodies deemed the resource valuable enough for protection. The slow start of the PDC programme indicates that initially Pinelands citizens may not have been in agreement.

Rapidly Growing Area

The baseline analysis revealed that TDR programmes in and around rapidly growing areas seemed to have better demand for development rights as well as increased concern about losing land-based amenities. As previous research pointed out, TDR programme areas need to encompass a diverse real estate market to be successful (Pizor, 1986). TDR programmes seem to work best in rapidly growing fringe areas where there are opportunities and demands for developers to utilize TDR. Both Manheim and Montgomery, because of their proximity to urban centres, are rapidly growing areas. The Pinelands covers a large area and contains areas with high growth pressure as well as vast areas where development pressure is low. Because there are many alternative areas for growth, the development and growth pressure in the Pinelands' receiving areas appears to be relatively low. It is also important to consider the development pressures and growth rate of a programme area within the regional context to appropriately design a TDR programme. For example, although Manheim is experiencing growth and development pressures, surrounding townships in the Manheim area are experiencing significantly stronger growth and development. In the light of Manheim's relatively lower growth rate, the township would be wise to consider additional incentives for TDR use in its jurisdiction (e.g. incentives in addition to increased density). Unlike Manheim, the development pressure in Montgomery has remained high since the 1950s. Ironically, the county's success in preserving its agricultural land has contributed to the growth pressure that threatens its farmlands and farming communities. Montgomery's success at accommodating growth, protecting agricultural lands and directing development to appropriate locations continues to increase the desirability of the county as a place to live. Consequently, Montgomery is an ideal community for a TDR programme.

Knowledge of Land Use Demands and Patterns

The TDR literature repeatedly points out that TDR programme designs require an understanding of development demands and patterns in order to appropriately locate sending and receiving sites as well as establish zoning base and bonus densities (Roddewig & Inghram, 1987; Redman/Johnson Associates, 1994; Machemer, 1998). For TDR programmes to work, there must be a demand for TDR use in areas where development is permitted.

Looking at the three TDR cases reveals the importance of knowledge of local land use demands for designing successful TDR programmes. In Manheim, single-family detached homes dominate the township's housing market. This pattern of land use combined with the availability of undeveloped land in the township (36% of the township) seems to explain the difficulty that Manheim has had marketing TDR to developers for higher-density homes. As previously mentioned, Montgomery has been confronting strong development pressures for some time. Montgomery seems to have incorporated a good understanding of the local development trends and patterns in its TDR programme. The county

has located TDR receiving areas and establishes base and bonus densities in its master planning process. TDR programme decisions in Montgomery are made in the context of the area's development demands and desired land use patterns. In the Pinelands, the predominant form of development has been residential. Although the Pinelands commissioned studies of land use demands and appears to have a good understanding of the region's development demands and patterns, its TDR programme does not seem to have taken advantage of this understanding. For example, the base densities in the Pinelands receiving areas are so high that there seems to be little incentive for developers to purchase TDR to meet the region's residential housing demands.

Appropriate Receiving Areas

The baseline TDR analysis revealed that viable programmes require appropriate receiving areas, i.e. areas that are appropriate for the intensity and type of development allowed with the use of TDR. TDR receiving sites must be politically acceptable, physically feasible sites (with centralized sewers and water) and feasible from a planning perspective (i.e. meet the comprehensive plan, zoning conditions and design standards).

It seems that all three of the detailed TDR cases identify viable receiving areas. However, only Montgomery has seen extensive transfers of development into receiving areas. While virtually all of Manheim has available more than adequate public water and sewer services, it appears that densities achieved under Manheim's base zoning are sufficient to meet current housing demand. While maintaining high base densities may avoid some resistance to programme implementation, it weakens the TDR market. In Montgomery, receiving areas are identified in approved master plans (thus politically acceptable) and are consistent with environmental, transportation, housing and population guidelines (thus physically feasible). The Pinelands programme area encompasses a large and diverse real estate market. The Pinelands TDR programme allows developers to use TDR for a variety of development projects. In the late 1980s, in response to low use of TDR, it was determined that receiving areas' base densities were too high (Machemer, 1998). Furthermore, the region's targeted growth areas (the receiving areas) did not offer sewer, water and other utility services.

Public Support

The preliminary analysis revealed that strong public acceptance appears to be critical to TDR programme success. It seems that to support TDR programmes, stakeholders must be well informed about TDR concepts, processes and programme characteristics. Two central issues are associated with public acceptance: programme timing and education. Johnston & Madison (1997) noted that TDR programmes, especially those at the local level, might need to elicit community support through consensus building and educational activities.

The Pinelands TDR programme was initiated through state and federal legislation. Public support for the Pinelands programme was not evident during the initial programme years. However, public support for the Pinelands has increased. In Manheim, public acceptance was obvious early on and critical in the community's adoption of their TDR programme. However, once the Man-

heim programme was started, public acceptance decreased. Montgomery has enjoyed a high degree of public acceptance for its TDR programme since the programme's conception. Montgomery TDR programme administrators seem well aware that their programme's success depends on maintaining at least the same level of public support required to implement their programme. As a result, the county has made a commitment to fostering public acceptance of its TDR programme from landowners in both the sending and receiving areas.

The three TDR programmes under investigation here illustrate different approaches to educating their respective communities. In Montgomery, the Office of Economic Development and the Planning Department actively educate sending area landowners and potential receiving area developers, respectively, on the benefits of TDR and how to participate. Likewise, the Pinelands programme evidences concern with maintaining and increasing public acceptance with extensive education efforts. There seems to be a direct correlation between public education and public acceptance of TDR concept and programme elements. Successful TDR programmes need education components capable of informing developers and sending landowners on the TDR process, and its costs and benefits. In Manheim this educational responsibility is left to an overworked planning department; in Montgomery, two well-staffed offices share this responsibility; and in the Pinelands, the PDC bank and Pinelands Commission combine their educational efforts.

TDR Leadership

The analysis of TDR programmes used in developing the evaluative framework revealed the importance of strong leadership within and across stakeholder groups (e.g. farming community, developers, lending institutions and real estate brokers). Political leadership is evident in the three cases being evaluated in this paper. The data about these programmes revealed relatively strong political leadership and commitment in the TDR programmes' initial years. Manheim exhibited initial political leadership and a willingness to preserve agricultural lands by its Board of Commissioners committing itself to administering an agricultural district in 1990. However, TDR programmes in both Montgomery and the Pinelands demonstrate greater and more sustained TDR political leadership. In Montgomery, the political leadership was willing to move forward with their TDR despite the absence of state enabling legislation. Furthermore, the county was able to authorize and establish a TDR fund. While it has not yet been used, Montgomery's TDR fund demonstrates that the county is ready and willing to play a principal role in its TDR programme. In the Pinelands, the Pinelands Commission and the PDC bank were forced into leadership roles by state and federal legislation. One result has been the PDC bank's active role in the PDC programme as facilitator, educator and programme monitor. The Pinelands Commission has played a smaller leadership role because it must administer the entire Pinelands protection programme, of which the PDC programme is only a part.

Mandatory versus Voluntary Programmes

The initial TDR programme analysis revealed that whether a TDR programme was mandatory or voluntary influenced programmatic success. It seems that

mandatory programmes are more successful than voluntary programmes. Mandatory programmes are those that require downzoning of either the sending or receiving areas. Downzoning, reducing the development potential of a parcel by rezoning it, in the sending area provides an incentive for landowners to sell their TDR since they cannot be easily used on their property. Downzoning in the receiving area provides an incentive for developers to acquire TDR in order to take advantage of bonus densities available with TDR use.

The three TDR cases examined in this paper have mandatory TDR programmes on the sending side. It must be pointed out that each of these programmes claims to be 'voluntary' because sending area and receiving area landowners are not required to transfer development rights. On the receiving side of their TDR programming, Manheim is mandatory while Montgomery and the Pinelands are voluntary. The Manheim programme design did not include downzoning as part of its 1991 TDR ordinance; thus by definition it was originally voluntary. By promoting the programme as voluntary, Manheim minimized opposition. However, Manheim did downzone its sending areas two years before the TDR programme was implemented (1989). Therefore the Manheim programme is a *de facto* mandatory programme. In Montgomery, on the receiving side, the TDR programme is voluntary in nature. Receiving area landowners can develop at base zoning densities or seek a rezoning to allow a higher density without any TDR. The Pinelands programme is also voluntary on the receiving side with base densities set at levels which roughly approximated the type and intensity of development that were occurring in the region prior to the PDC programme. It seems that only when there is interest in higher-density development will TDR be used in the Pinelands.

TDR Bank

TDR banks may serve several important functions, including the purchase and sale of TDR, being a buyer of last resort, strengthening programme credibility with banking institutions and being a facilitator. The three TDR cases evaluated here evidence varying degrees of TDR bank involvement. While Manheim does not have a formal TDR bank, it does have a line item in its budget for the purchase of development rights. Manheim officials felt unprepared to implement a formal TDR bank because they lacked explicit legislative authority and staff for such an endeavour. Montgomery established a TDR bank as a means of increasing public acceptability and confidence in a TDR programme. Montgomery's TDR bank provides a degree of financial stability, alleviates farmers' concerns, acts as a lender and buyer of last resort and guarantees TDR values. Interestingly, the strength of the private sector in Montgomery has meant that public funds have not been used in the TDR programme or bank (Johnston & Madison, 1997; Stokes, 1997). The Montgomery TDR bank functions as a facilitator, putting buyers and sellers together. Although it did not use its financial authority directly, Montgomery's TDR bank was essential to the establishment of a successful programme as a symbol of programmatic commitment to the farming community. The Montgomery bank has been eliminated because of a sunset provision in its establishing legislation. In the Pinelands, there are two public TDR banks, the Burlington County Pinelands Development Credit Exchange and the New Jersey Pinelands Development Credit Bank. In addition to purchasing PDCs, these banks perform the important roles of TDR

programme facilitator, administrator and educator. The Pinelands banks also work closely with the Pinelands Commission and with the various municipalities regarding the transfer procedure and the utilization of TDR in development activities. Additionally, the Pinelands TDR banks maintain an active role as a clearinghouse of TDR information, including all PDC transfer and potential transfer information.

TDR/PDR Compatibility

Reviewing the range of TDR programmes for the evaluative framework uncovered the importance of the compatibility between TDR and PDR programmes in areas with both types of programmes. TDR and PDR (or other easement purchase programmes) are complementary programmes; the former allows the market to decide what parcels to preserve, while the latter allows communities to target specific parcels for preservation. TDR and PDR may be used in tandem to maximize community resources. Because PDR funds are derived from public revenue sources (Daniels, 1991), such as taxes, fines and fees associated with state land preservation programmes, the funds for PDR are limited and can only preserve portions of land in need of protection. By utilizing PDR funds strategically (e.g. purchasing conservation easements in a ring or buffer zone), communities may use limited PDR funds to help maximize their efforts to preserve open space, agricultural lands and historic areas. TDR, with its use of private funds and market pressures, can strengthen communities' land preservation efforts by placing additional conservation easements throughout a TDR sending area, perhaps strengthening or widening the 'buffer'.

A PDR alternative exists in each of the three TDR programmes being evaluated here, although the degree of compatibility between PDR and TDR programmes differs. Manheim does not have a municipal PDR programme; however, the community is discussing the permanent retirement of township-purchased TDR. Such a system would be, in effect, a township 'PDR programme'. Although Lancaster County, where Manheim is located, has a successful PDR programme (Daniels & Bowers, 1997), the county has not purchased any PDR in Manheim. The Montgomery TDR programme has both PDR and TDR programmes that are effectively co-ordinated. To sustain the county's farming industry, the Montgomery community designed its TDR programme to work in conjunction with an array of other agricultural preservation programmes at the state and county level (Tustian, 1983). For example, the Montgomery Agricultural Easement Programme (AEP) allows the county to purchase agricultural land preservation easements as well as target specific preservation properties. The Montgomery AEP complements the structure and strategy of its TDR programme. The majority of AEP funds, 90%, have been used to purchase easements on parcels a half-mile (800 m) back from the agricultural reserve boundary line, thereby creating a buffer zone.

The Pinelands PDC programme offers an example of PDR and TDR programmes not working well together. While the Pinelands TDR programme has resulted in the protection of 27 225.57 acres (11 022 ha) (as of 9 March 2001), there has been virtually no activity in the state's conservation easement programme (the PDR programme) within the Pinelands (Pinelands Development Credit Bank, 2001). This has been attributed to PDR programme requirements that counties must apply to the state for funding to purchase development

rights. It seems that counties have targeted preservation efforts outside the Pinelands, where farms appear to be under greatest pressure. Furthermore, counties seem to assume that the Pinelands PDC programme will adequately protect agricultural land within the Pinelands.

Simple and Cost-efficient

Analysis of the 14 TDR programmes for insights into programmatic characteristics associated with successful TDR programmes identified programmatic simplicity and cost-efficiency as important aspects of successful TDR programmes. It was found that TDR programmes too complex to be understood or too costly to participate in did not have many potential and actual TDR sellers and buyers. Therefore, TDR programmes should be structured clearly with each programmatic element made to be as simple as possible.

The three TDR cases under examination in this paper support the notion that programmatic simplicity is a key element for success. The Manheim TDR programme has been kept simple and easy to understand. By using familiar planning concepts, Manheim minimized some complexity of TDR programming: for example, the use of the agricultural district as the sending area. Nonetheless, Manheim's TDR programme appears to be the least successful of the three under investigation. Montgomery has made a concerted effort to keep its programme simple by integrating the transfer process into the already familiar subdivision approval process. Similarly, the sending area locations in Montgomery are based on the former rural zone and the TDR allocation rate is based on the previous zoning. The Pinelands programme is one of the most complex TDR programmes in existence, due to its regulatory origins, its inclusion of multiple jurisdictions, its preservation goals, its allocation method and its concept of credits and rights. The Pinelands' lack of simplicity is an often-cited reason for low TDR activity levels in this nearly 20-year-old programme.

Discussion

This study's findings, the evaluative framework (Table 3) and the comparative analysis of the three TDR programmes (Table 4) illustrate the usefulness of a TDR evaluative framework. Furthermore, the findings highlight the importance of several factors in successful TDR programmes. However, the framework may not be a great predictive tool because programmatic success cannot be measured in absolute terms and each element of the framework requires some subjective measures of programmatic characteristics. Table 4 indicates the 'results' of applying the proffered TDR evaluative framework to the three cases. Montgomery, often cited as the most successful TDR programme, has 10 high, three medium and no low measures. The Pinelands, frequently cited as a successful TDR programme, has four high, four medium and five low measures, while Manheim, previously identified as a TDR programme with limited success (Butler, 1997), has three high, two medium and eight low measures.

Table 5 summarizes the measurement rankings as well as presenting some measures of programmatic success. Montgomery, which has easements severed from an area of 43 993 acres (17 811 ha) since 1980, is the programme with the greatest number of high measures (10). It should also be noted that there are no low measures for this programme. However, the number of high measures

Table 5. Summary statistics for selected TDR programmes

Summary statistic	Manheim	Montgomery	Pinelands
Programme initiation	1991	1980	1981
Number of high measures	3	10	4
Number of medium measures	2	3	4
Number of low measures	8	0	5
TDRs transferred	244	6 629	2 959
Acres preserved	234 (99 ha) (28 May 2002)	43 993 (17 811 ha) (1997)	24 568 (9964 ha) (31 December 2001)

cannot be the sole criterion for predicting success. Both the Pinelands and Manheim have four and three high measures respectively, yet these programmes have vastly different success rates as measured by acres preserved. Rather than simply calculating the number of high measures, it may prove more useful to examine which characteristics are associated with successful programmes.

The TDR evaluative framework coupled with the in-depth analysis of the three cases does suggest that three framework elements may have greater significance than others. These elements had high measures for both Montgomery and the Pinelands, the programmes with the greatest acreage preserved. These elements are: (1) knowledge of local land use; (2) leadership; and (3) TDR bank. Further evaluation of TDR programmes using these three elements may prove insightful. These elements have not been raised by many researchers in previous TDR research. The reported research seems to indicate that improving local awareness of land use issues coupled with the use of effective leadership and a TDR bank as a clearinghouse of TDR information may go a long way towards building successful TDR programmes.

An alternative method for understanding which TDR elements are more indicative of TDR success would be to look at which elements rated high for the least successful programme, i.e. Manheim, but rated medium/low for the remaining programmes. One element meets these criteria, namely Mandatory, which was high for Manheim, but medium and low for Montgomery and the Pinelands, respectively. This relative ranking indicates that this TDR element is not as significant in its association with success.

As the evaluative framework illustrates, communities cannot simply focus on having several key elements in order to reasonably expect TDR programme success. The strength of individual TDR programme elements may not hold the same relevance within and across communities. Rather, it seems that the combination of multiple TDR programmatic elements results in successful TDR programmes. The strength of the proffered framework lies in its ability to be used by communities as they assess the range of potential uses, functions and characteristics of TDR programming. An understanding of the TDR evaluative framework elements within a local context will enhance the local efforts in formulating successful TDR policies as well as other growth management policies (e.g. open space developments, PDR and urban growth boundaries).

Conclusions

As communities continue to experience the social, economic and environmental effects of low-density development, the need to develop and understand innova-

tive growth management techniques increases. TDR is based on the presumption that land development and preservation interests are served best when they are accommodated simultaneously. Although communities will continue to wrestle with development and preservation pressures, evidence shows that TDR programmes seem uniquely suited to address both of these seemingly contradictory goals. While TDR offers an alternative to traditional land use management techniques, it remains misunderstood due to its complexity and perceived limited use. This paper advances the theory of TDR and addresses its complexity by developing an evaluative framework. The TDR evaluative framework defines a set of programme characteristics that are pertinent to a myriad of growth management techniques; they are applicable to a broad set of landscape management policies. Using the TDR evaluative framework communities may be better able to determine the variables in the land development process and identify influential programmatic characteristics. Furthermore, the TDR evaluative framework may assist communities in assessing whether TDR or other growth management techniques are appropriate.

The analysis reveals that successful TDR programmes seem to have three elements often overlooked in the literature: (1) a high degree of local knowledge of local land use; (2) good and dynamic leadership; and (3) the use of a TDR bank. It seems that efforts to educate the local community about land use issues, involve them in the development of land use master plans and include them in the design and implementation of TDR programmes may be invaluable to the success of TDR programmes. Likewise, the results demonstrate that it appears equally important for dynamic and capable leadership to be part of TDR programme design and implementation. Good leadership seems to inspire confidence in the ultimate success of TDR programmes. The establishment and use of TDR banks also seem to inspire confidence in and the success of TDR programmes. Independent of whether these banks actively participate in the TDR market, they seem to provide an invaluable clearing house of information as well as a symbolic show of faith in the success of the TDR programme. Planners would be well advised to incorporate these elements in future TDR programming efforts.

Use of a TDR evaluative framework may help communities and others identify both opportunities and challenges in TDR programme creation and implementation. The reported research demonstrates the utility of a framework with potential usefulness to citizens, municipal officials, planners and legislators seeking alternative land preservation and growth management techniques. As more land is developed and communities face diminishing agricultural, ecological and cultural resources, TDR approaches should be increasingly attractive. Used together with existing land planning techniques, TDR may help communities meet both their development and preservation goals.

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