Windfalls for Wilderness: Land Protection and Land Value in the Green Mountains

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Abstract—Land is a composite good, the price of which varies with its characteristics, including proximity to amenities. Using data from sales of land near Green Mountain National Forest wilderness areas in a hedonic price model, a positive relationship between proximity to protected wilderness and market values is revealed. The applications of this result include improved consideration of the positive economic impacts of land conservation and new mechanisms for financing land conservation.

> Nature's grace in the East offers the most important kind of hope, not only to a region that has been given a second chance to decide how to inhabit itself, but to a world in terrible need of models.
>
> - Bill McKibben

The paucity of information about the effect of land protection on rural land values hampers the development of cost-effective solutions to Northern Forest—the 26 million acre northern tier of Maine, New Hampshire, Vermont and New York—land management issues. For better or for worse, policy proposals addressing those issues are moving forward at local, state and federal levels. Among them, proposals for additional public land ownership and conservation-oriented management, while popular by many measures, are bound to be opposed, in part, out of fear that such management will erode private land values. Even the most modest land protection proposals, if and when accepted politically, would require significant increases in appropriations through established public land funding mechanisms—increases that may be unlikely in the near term and unsustainable in the longer term. (For elaboration on the conditions from which the issues arise, please see a longer version of this paper forthcoming from The Wilderness Society as Volume 3 of "The Northern Forest: Strategies for Sustainability.")

The Conservation Challenge

While the discipline of economics has long been concerned with certain determinants of land prices (e.g. soil productivity, commuting time to a central business district), it has not produced either information or policy tools for connecting rural land prices to the conservation of areas in a wild condition. To fill this gap in the context of immediate conservation needs in the Northern Forest I provide: 1) evidence, based on an analysis of land prices, of the enhancement value of publicly protected wildlands; and 2) an overview of possible programs for capturing such enhancement value in order to fund land protection.

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Amenity, Scarcity and Rent

The notion that the characteristics and location of a parcel of land can influence its price is as old as economics itself, with David Ricardo and Johann von Thünen credited with organizing a theory of land rent. In their construction, as now, rent is the unearned portion of the price of an asset. Ricardo focused on the fertility or agricultural productivity of parcels, which in his day was generally not earnable in the sense that farmers or landlords could affect fertility through the application of labor. Instead, site productivity came to landowners as an endowment from nature. Sites with the greatest endowment are the first ones brought into production, for returns are highest on these sites. As demand for agricultural produce increases, bringing progressively less fertile land into production becomes financially feasible.

Von Thünen enriches Ricardo's model by considering characteristics of different agricultural production systems and their spatial distribution on the landscape. In von Thünen's model, the salient characteristic is the cost of transporting agricultural goods to market in the central city. Agricultural systems for which transportation costs were high (dairy, for instance) would locate nearer the market, while lower-transportation-cost systems would occupy land farther away. (See Brooks 1987 for a more complete introduction to these concepts and models.)

Land Protection and Rent

Ricardo and von Thünen's farmers and landlords located production systems to maximize the returns from production. Freed from the limits of organic soil productivity and the slow pace of animal-powered transportation, agricultural production is now much more footloose—it need not locate particularly near markets for their produce or on the most fertile soil. Other considerations, such as minimizing land acquisition costs or satisfying preferences unrelated to farms' cost structure, can play a larger role in determining agricultural land use. (Indeed, authors including Alig (1986), Phillips (1991) and Alig, White & Murray (1988) find that returns from farm operations are seldom found to play a strong role at all.)

The same is increasingly true of non-agricultural production. New technologies, services and infrastructure, from the fax/modem and Federal Express to the Internet and Interstate Highway System have freed more and more industries from their former need to be close to either input supplies or output markets.

Overnight package delivery service allowed Numberall, a machine tool manufacturer, to move from Long Island, New York, to Guilford, Maine, for the latter's pace of life, small town atmosphere and opportunities for backcountry recreation. Similarly, Essex Junction, Vermont, boasts a large IBM facility located there due to a key IBM manager's enthusiasm for Vermont skiing. Beyond such anecdotes, economic development researchers have concluded that rural job creation occurs not so much as a result of firms locating where costs are low, but from the entrepreneurial activity of managers and others choosing locations where amenity values are high (Johnson and Rasker 1995; Knapp and Graves 1989, Rasker 1994; and Rasker and Glick 1994).

As Rasker and Glick note, while so-called "amenity-based growth" does alleviate rural unemployment and other problems associated with declines in resource extraction industries, it often brings its own set of problems, not the least of which are manifest in land markets.

> Scarce housing goes to the highest bidder—often the big-city transplant. Gentrification is pushing many local house hunters out of the market. In Jackson Hole, for example, few employees in tourism services can afford housing in town. Land and housing prices have tripled in the last 15 years . . . . In Bozeman, mid- to low-priced housing is practically nonexistent, and the competition for such properties is fierce. A "feeding frenzy" has ensued in the real estate market, further driving up prices . . . (Rasker and Glick 1994).

Jackson and Bozeman are gateway communities to Yellowstone National Park and its surrounding national forests. It is reasonable to speculate that their rising land prices reflect their proximity to the open space, scenic, recreational and other amenities associated with publicly protected land. Because national parks and wilderness areas are unlikely to be converted to other uses, whatever rent accrues to nearby land as a result of that protection may be greater than what would accrue if the same open space were privately owned and simply not yet developed, or if a greater portion of the national forests were open to resource extraction.

Back in the region of interest here, two recent studies examine the relationship between land conservation and property taxes—a dim reflection of property values. In New York's Adirondack Park, where towns are reimbursed for property taxes forgone on land added to the state-owned forest preserve, the first study found no relationship between tax bills and land consevation (Ad Hoc Associates 1996). This suggests that, at a minimum, land conservation does not diminish property values.

The second study, which focused on public and private conservation of land in three coastal Maine towns, found that land protection is often associated with higher tax **bills** in the short run (Ad Hoc Associates 1997). Because the study also found that tax **rates** are generally lower in towns with more open land, it is possible that the increase in tax bills are due to increases in property values, rather than conscious decisions on the part of town authorities to make up for tax revenue lost when conserved land is removed from the tax base.

For now, however, such possibilities must remain speculation, for little is known about the spatial relationship between land protection and land value in rural areas. More than 20 years of research into similar issues in urban settings, however, does suggest that proximity to open space amenities is a significant source of location rent (Weicher and Zerbst 1973). Still more research suggests that by restricting the supply of land available for development, protecting those amenities also enhances scarcity rent. Both bodies of research identify other characteristics of land parcels and the overall land base that influence land prices.

Existing Evidence

Farmers in the Ricardo/von Thünen model sketched above exhibit a willingness to pay for a farm parcel that depends on a small set of factors, namely, the value of crops produced (net of the cost of producing them), and the cost of overcoming the parcel's distance to the market. Similarly, purchasers of land for other uses exhibit a willingness to pay that depends on their incomes (like net revenues from the sale of crops) and various characteristics of the parcel and its surroundings.

For urban office workers, commuting distance to the central business district may take the place of the farm's distance to the market. For the "modem cowboys" of the Greater Yellowstone, distance to scenic amenities may become the distance most relevant to willingness to pay for land. In the Northern Forest, whether a ski lift is nearby could be more important.

More generally, bids for land are likely to vary with the use intended for the land, the type of buildings (if any) present on the parcel, local property tax rates, the character of the community in which the parcel is located (population and housing growth rates and the level of rental and seasonal housing, for example) and owners' income. Characteristics of the land base, including its overall size and distribution among protected and unprotected uses—that is, the degree to which development is restricted—are also likely to influence land prices.

In economic parlance, the many factors that influence the price of land render it a *composite good* and the value at which it is exchanged a *hedonic price* (Rosen 1974). When the demand-relevant characteristics of a composite good are known, it becomes possible, at least conceptually, to decompose the price of the good into the marginal value of each characteristic.

More formally, Rosen describes a composite good $\mathbf{z}$ as the collection of its m characteristics $-z \equiv (z_1, z_2, \quad z_m)$. The price of the composite good, then, is described by $p(z) = p(z_1, z_2, \ldots z_m)$. Products with different combinations of the m attributes will trade for different prices in the market. Researchers interested in the value of one particular attribute, say z_i, would compare prices of composite goods that differ only in that attribute. Mathematically, that means computing the first derivative of the price function with respect to the level of the attribute. Econometrically, it means regressing prices for the composite good on the level of each attribute and examining the attribute's estimated coefficient. Either way, the marginal price function, $p_i(\mathbf{z}) = dp(\mathbf{z})/dz_i$, or regression coefficient, β_i, represents the value of the last unit of attribute z_i in composite good z.

Leaving the estimation of the price of land near Vermont's wilderness areas for the next section, it is now instructive to consider the range of land attributes found important in

other areas. Table 1 summarizes the most applicable results of several studies of land prices and land attributes. For each study included in the table, the attributes of most interest to this application are listed, along with the direction of each attribute's influence (+ or -) when the influence is statistically significant.

Two of the studies most clearly illuminate the effect of proximity to amenities and disamenities, such as a polluting industrial facility or other so-called "locally undesirable land use" ("LULU" in the literature), in determining land prices. The almost canonical study of land prices in suburban Boulder, Colorado, by Correll, Lillydahl and Singell

Table 1—Summary of land price influences.

Study author(s)/dependent variable selected independent variables	Direction of influence
Pollakowski and Wachter 1990 / housing price index	
zoning restrictiveness index	+
relative restrictiveness of adjacent planning areas	+
Knaap 1985 / land price	
whether land is outside urban growth boundary	-
Tang 1995 / land price	
location inside greenline	+
distance to development center	-
Hushak and Sadr 1979 / land price per acre	
parcel size	-
commercial use	+
agricultural use	-
distance to the urban center	-
distance to a highway	-
Turner, Newton & Dennis 1991 / forest land price per acre	
parcel size	not significant
portion of parcel that is not forested	+
portion of parcel with > 15% slope (which would make the parcel less suitable for timber management)	-
parcel fronts on a road	+
population growth rate for the town in which the parcel is located	+
distance to major road	-
distance to ski area	-
property tax rate	-
Chicoine 1981 / farmland price per acre	
distance to Chicago	-
distance to nearest town	not significant
distance to freeway exchange	-
soil productivity	not significant
septic tank soil limitations	-
zoned residential	not significant
zoned industrial / commercial	+
parcel size	-
Coffin 1989 / residential housing price	
size of unit	+
distance to central business district	-
location in historic district	+ in one sample not significant in another
Correll, Lillydahl and Singell 1978 / residential property price	
distance to greenbelt	-
number of rooms	+
finished square footage	+
larger than average lot size	+
neighborhood distance to city center	+
neighborhood distance to city center squared	-
Hamilton and Schwann 1995 / residential property price	
distance to electric transmission tower	-

(1978) reveals that residential property prices decline with distance from greenbelts, strips of protected open space amounting to some 8,000 acres in the city at the time. "Other things being equal," they conclude, "there is a $4.20 decrease in the price of a residential property for every foot one moves away from the greenbelt."

Hamilton and Schwann (1995) explore the possibility that proximity to disamenities can reduce property values. After controlling for various site characteristics, they find that property values do decline with distance to high-voltage transmission towers, with the greatest effect evident for properties adjacent to the transmission line. The authors attribute the reduction in value to visual externalities, rather than other possible impacts of the transmission lines.

These studies support traditional notions of what influences land rents—distance from city centers and transportation networks, for example—and expand those notions to include site characteristics unrelated to agricultural, silvicultural, or even sheer residential productivity (that is, proximity of a residence to central business districts). The literature to date suggests that urban and suburban amenities, including historic districts and greenbelts, can increase nearby land values.

Turner, Newton and Dennis' (1991) result that forest land prices decline with distance from ski areas may suggest a similar effect in rural areas. With that exception, however, little is known about the effect of amenities on rural land prices.

Enhancement Value in the Green Mountains

Empirical Model

The theory of land rent and previous statistical results reviewed in the preceding section suggest a model of land values that can be summarized as follows: Land is a composite good, the price of which varies with its characteristics. These characteristics include a parcel's own physical attributes (size, improvements, road frontage), prevailing economic and demographic factors (income level, population density), public policy factors (tax rates, zoning restrictions) and the parcel's proximity to land uses that may represent either a nuisance or an amenity for the parcel's prospective owner. Given sufficient information about parcel prices and characteristics, the total price of a parcel can be decomposed econometrically into the set of prices for its individual characteristics.

Again, following Rosen (1974), the hedonic price of a parcel of land may be represented by a price function:

$$p(\mathbf{z}) = p(z_1, z_2, \ldots z_m)$$

where z_1 through z_m represent the presence or quantity of m attributes of the parcel. The price of each attribute would then be:

$$p_i(\mathbf{z}) = dp(\mathbf{z})/dz_i$$

The "z_i's" of greatest interest here are those that reflect the extent to which a parcel's purchaser might expect to enjoy amenities associated with national forest wilderness areas and/or the degree to which the allocation of land to federal ownership and protected status restricts the supply of land for private uses. In order to distill the effect such attributes from the overall price function, the overall price function must be known. Therefore, additional parcel attributes, such as parcel size, improvements and other factors such as local population density and income levels, are considered as well.

Parcel-specific information, such as the sale price, and parcel attributes come from Vermont's land transfer tax return data base. Because the land transfer tax is an ad valorem tax—that is, it is proportional to the value of the property—the land prices are true market prices. In addition to the prices of transferred properties, the data base contains fields describing the properties' attributes and, in varying degrees of detail, their locations.

From an initial set of more than 300,000 tax returns reflecting transfers occurring between 1987 and 1997, I have excluded several classes of returns. These include: returns lacking key fields, such as acreage, price and location (town); returns reflecting transfers of less than full fee ownership; and those that do not represent market transactions (such as the division of property in cases of divorce or the dissolution of a business partnership, transfers to creditors to secure debt, etc.). I have also excluded transfers to government agencies and to nonprofit organizations. All together, these considerations eliminated roughly two thirds of the available transfer returns.

Two further parings of the data set yield the final group of land transfers suitable for this analysis. First, I have excluded all transfers except those of parcels to be used primarily for residential purposes after the transfer. Excluded primary uses include industrial, agricultural, timber management and commercial activities, although any one of these uses may also occur on residential parcels.

Second, to restrict the geographic area to that reasonably proximate to wilderness areas the final data set includes only those parcels in towns that contain wilderness, towns adjacent to towns that contain wilderness, and towns adjacent to the second group of towns. As illustrated in Figure 1, the study area thus comprises towns with wilderness, plus two concentric bands or rings of towns around the wilderness towns. WildTwn0, WildTwn1, and WildTwn2 indicate these on the map, respectively.

These considerations restrict the data set to 6,343 transactions. After removing 195 outliers (per-acre prices in excess of $500,000 and one transaction involving more than 9,000 acres), the final data set includes 6,148 transactions.

Given the importance of the distance between parcels and other points on the map, the return records would ideally include very specific geocoding, such as longitude and latitude or a parcel map reference number, for each land transfer. The data base does include a field for such a reference number, but at least for the towns included in the study area, the data are not available. Many of these towns do not have parcel maps, so the necessary reference number does not exist. And even for those towns that do have maps, the reference has more often than not been omitted from the transfer tax return at the discretion of the town clerk.

For almost all records, however, the town in which the transferred property is located can be identified. Since "town" describes an area of less than 10,000 hectares and because the geographic scope of the study is large, the town

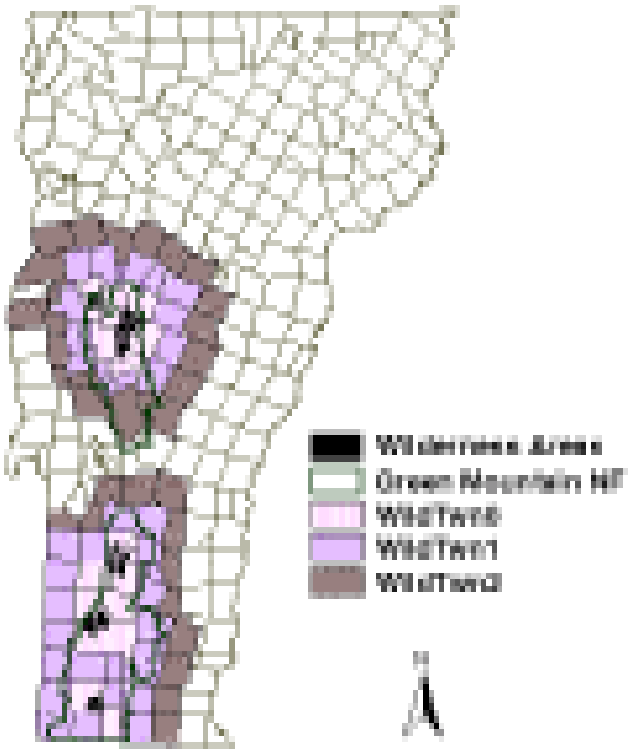

Figure 1—Study area.

identifier provides a fine enough distinction between transfers of parcels at varying distances from the wilderness areas. Note, however, that my continuous measure of proximity (DST_WILD in Table 2) does reflect the unavoidable fiction that all parcels lie at the center of town.

Table 2 lists the full set of parcel attributes incorporated into the econometric model below. The table also indicates whether the value of each field originates from parcel-level data (the land transfer tax data base) or from town level data, such as GIS layers or the Census of population and housing. Table 3 provides descriptive statistics for the fields.

Econometric Estimation and Results

Because prices per acre of land are likely to vary (inversely) with the size of the parcel being purchased, the relationship between land price per acre and potentially relevant attributes are estimated using the transcendental form (Chicoine 1981; and Hushak and Sadr 1979; and Turner, Newton and Dennis 1991). That is:

$$\text{ACREPRICE} = \beta_0 \text{ACREAGE}^{\beta 1} \exp(\Sigma_{i=2\text{-}n}\ \beta_i X_i)$$

where ACREPRICE is the purchase price per acre, ACREAGE is the total size (in acres) of the parcel and the X_is are the other parcel attributes. The βs are the estimated coefficients. Converting this equation to logarithmic form allows estimation using ordinary least squares. Thus the estimated model is:

$$\ln(\text{ACREPRICE}) = \ln\beta_0 + \beta_1 \ln(\text{ACREAGE}) + (\Sigma_{i=2\text{-}n}\beta_i X_i) + \mu_i$$

where μ_i is the unexplained error.

Due to heteroskedasticity of the underlying data, the model results summarized in table 3 are estimated using White's correction procedure, which allows use of the standard errors and t-statistics generated by the OLS procedure (White 1980). Table 4 presents the estimation results. With the exception of the coefficient on log(ACREAGE), coefficient estimates may be interpreted as the percentage change in price per acre with a unitary change in the explanatory variable.

The coefficients on WILDTWN0 and DST_WILD both suggest that proximity to wilderness enhances land value. Parcels located in towns that contain wilderness have per-acre sales prices that are 13 percent higher than towns without wilderness. Furthermore, the price of parcels decreases by 0.8 percent per acre with each kilometer (or, as in the table, 0.00077 percent with each meter) farther away from the nearest wilderness boundary. Other things being equal, a parcel that sells for $1,000 per acre in a town without wilderness would be expected to sell for $1,130 per acre if it were in a town with wilderness. Similarly, if the $1,000/acre parcel could be moved to another town, the center of which is 10 kilometers farther away from a wilderness boundary, it would be expected to have a lower price of $923 per acre.

Coefficients on the other explanatory variables have, for the most part, the expected signs. Per-acre price falls with parcel size, for example. Towns with higher population density, higher median household income and alpine ski areas all have higher per-acre land prices for residential property. Properties with no buildings are understandably lower-priced than those with buildings, and properties with mobile homes command lower prices than otherwise similar properties without mobile homes.

One final interesting result concerns the property tax rate. Conventional wisdom suggests that higher property tax rates drive down property values, and the regression results seem to confirm that view. However, since town governments set property tax rates to meet budgetary needs, it is possible that higher tax rates are the effect, rather than the cause of lower property values. When property values are high, towns can meet their budgets with lower tax rates. (Vermont's new state-wide school property tax would complicate this somewhat, but all of the transactions considered here preceded the new system.)

Implications and Applications

The first policy application of the results presented above is the simple observation that wilderness areas do in fact enhance, rather than diminish, nearby land values. Whether used to improve the consideration of the economic impacts of agency decisions or for bolstering the economic argument in favor of further conservation, this information can help correct common misapprehensions about the costs of conservation.

A much more interesting application, however, arises from the question of whether and how public policies can address the negative implications of enhancement value while exploiting the positive implications. That is, can policy both encourage additions to the base of conserved land and foster an equitable distribution of the value—the windfall—created by conservation?

Table 2—Data fields and sources.

Field name	Field description	Data source	Parcel/town
log(ACREPRICE)	log of parcel sale price per acre	Land Transfer Tax Returns	parcel
log(ACREAGE)	log of parcel size, in acres	Land Transfer Tax Returns	parcel
WILDTWN0	dummy for whether town contains wilderness	Town and Green Mountain National Forest GIS layers	town
DST_WILD	distance from town center to nearest wilderness area boundary (meters)	Town and Green Mountain National Forest GIS layers	town
ALP_SKI	dummy for whether town contains an alpine ski area	Various maps	town
MHINC_90	median household income in 1990 (dollars)	Census of Population and housing, 1990	town
GROWTH_N	population growth rate, 1980 – 1990	Census of Population and housing, 1980 and 1990	town
NDENS_90	population density (persons per acre), 1990	Census of Population and housing, 1990	town
B_NONE	dummy for whether parcel includes no buildings	Land Transfer Tax Returns	parcel
B_HOUSE	dummy for whether parcel includes a house	Land Transfer Tax Returns	parcel
B_VAC	dummy for whether parcel includes a vacation home	Land Transfer Tax Returns	parcel
B_BARN	dummy for whether parcel includes a barn	Land Transfer Tax Returns	parcel
B_APT	dummy for whether parcel includes a apartment	Land Transfer Tax Returns	parcel
B_MOBILE	dummy for whether parcel includes a mobile home	Land Transfer Tax Returns	parcel
B_CONDO	dummy for whether parcel includes a condominium	Land Transfer Tax Returns	parcel
B_STORE	dummy for whether parcel includes a store	Land Transfer Tax Returns	parcel
CPI_HSNG	Consumer Price Index for housing in year of transfer	Bureau of Labor Statistics	n/a
TAXRATE	property tax rate ($ per $100 assessed value)	Vermont Department of Taxes	town

Windfalls for Wilderness

Hagman and Misczynski (1978) coined the term "Windfalls for Wipeouts" and explored the concept in their 1978 book of the same name. The concept is based on a recognition that when the public takes some action affecting land, such as siting an interstate exchange, someone gets a windfall (the landowner just down the road from the exchange), and someone gets wiped out (the landowner with a cloverleaf for a front porch). In the parlance of the Ricardo and von Thünen model sketched above, such government actions create rent for some landowners and reduce it for others. Note that the value created is pure rent—the landowners need not have done anything to create the added value. (It is possible that owners would lobby public agencies to take actions likely to enhance the value of their property. This practice is aptly termed "rent-seeking behavior" by public choice literature.)

The case at hand differs in two respects. First, wilderness designations occur only on land already owned by the Federal Government. Therefore, selecting parcels for wilderness designation does not entail a "wipeout" in the sense that the current owner would lose any value. Second, when the Forest Service or other agencies acquire land, including wilderness inholdings, they are generally required to pay fair market value, although determination of fair market value may not consider potential future enhancement due to other agency decisions.

Nevertheless, owners selling land to government agencies may sell for prices below what they might receive were they to keep the parcel and the land around them were conserved

Table 3—Descriptive statistics for data fields.

Field	Minimum	Maximum	Mean	Median	Std. dev.
ACREPRICE	8.33	497,500.00	91,325.37	50,000.91	103,579.30
LOG(ACREPRICE)	2.1203	13.1174	10.6837	10.8198	1.4024
ACREAGE	0.10	464.00	6.52	1.80	21.64
LOG(ACREAGE)	-2.3026	6.1399	0.6792	0.5878	1.3912
WILDTWN0	0	1	0.2511	0.0000	0.4337
DST_WILD	1	16,526	9,392	10,872	4,585.3220
ALP_SKI	0	1	0.0551	0.0000	0.2283
MHINC_90	21,875	37,847	29,720	29,608	3,338.8940
GROWTH_N	-0.0288	0.0426	0.0112	0.0126	0.0085
NDENS_90	0.0042	0.6083	0.1539	0.0796	0.1765
TAXRATE	0.34	5.80	2.01	2.00	0.7086
CPI_HSNG	114.2	156.8	134.3	133.6	14.1
B_NONE	0	1	0.0151	0.0000	0.1221
B_HOUSE	0	1	0.8653	1.0000	0.3414
B_VAC	0	1	0.0316	0.0000	0.1748
B_BARN	0	1	0.0577	0.0000	0.2333
B_APT	0	1	0.0228	0.0000	0.1492
B_MOBILE	0	1	0.0608	0.0000	0.2390
B_CONDO	0	1	0.0028	0.0000	0.0525
B_STORE	0	1	0.0011	0.0000	0.0337

Table 4—Regression results.

Dependent Variable: LOG(ACREPRICE)				
Variable	**Coefficient**	**Std. error**	**T-statistic**	**Prob.**
C	9.0730910	0.1536	59.0682	0.0000
LOG(ACREAGE)	-0.8316180	0.0066	-125.9302	0.0000
WILDTWN0	0.1318010	0.0418	3.1527	0.0016
DST_WILD	-0.0000077	0.0000	-2.0928	0.0364
ALP_SKI	0.1086500	0.0448	2.4229	0.0154
MHINC_90	0.0000470	0.0000	15.9325	0.0000
GROWTH_N	-7.6812770	1.3416	-5.7254	0.0000
NDENS_90	0.8750110	0.0589	14.8483	0.0000
TAXRATE	-0.0760860	0.0149	-5.1017	0.0000
CPI_HSNG	0.0042650	0.0006	7.1201	0.0000
B_NONE	-0.9562130	0.1384	-6.9085	0.0000
B_HOUSE	0.4349630	0.0816	5.3299	0.0000
B_VAC	0.1334710	0.0931	1.4340	0.1516
B_BARN	0.0908820	0.0448	2.0296	0.0424
B_APT	0.4017520	0.0866	4.6378	0.0000
B_MOBILE	-0.6447300	0.0829	-7.7780	0.0000
B_CONDO	0.6684000	0.1258	5.3150	0.0000
B_STORE	0.5827050	0.1691	3.4451	0.0006
R-squared	0.8026	Mean dependent var		10.6837
Adjusted R-squared	0.8021	S.D. dependent var		1.4024
S.E. of regression	0.6239	Akaike info criterion		-0.9405
Sum squared resid	2386.4580	Schwarz criterion		-0.9208
Log likelihood	-5814.6560	F-statistic		1466.1680
Durbin-Watson stat	1.7474	Prob(F-statistic)		0.0000

through public ownership. The lower price could occur due to good will on the part of the owner, tax advantages of bargain sales, or simply the government agency's relative monopsony power—that is, few other buyers exist—when it comes to purchasing land within a proclamation boundary.

While policies with the potential for either compensating the wiped-out or capturing value from the windfallen have been used in a variety of settings, a balanced system for using captured windfalls to cover the costs of associated wipeouts remains a sort of holy grail to land use planning. It is possible, however, that the Northern Forest might be the place to make such elusive solutions a part of standard land protection practice for the 21st century. One possible solution is sketched below in the context of existing Vermont policy and coming conservation opportunities.

Existing Vermont Programs—The State of Vermont has several programs directly related to land transactions, land taxes and conservation. Briefly, these include:

- Land Transfer Tax. The purchaser pays this ad valorem tax to the state at the time of the land transfer. It is the land transfer tax that generated the data employed in the above econometric model.
- Land Gains Tax. This is an additional tax paid on the capital gain from selling land held for fewer than six years. It is designed to reduce speculative purchase of land and dampen existing incentives for conversion of open space to more highly developed uses.
- Town and (now) statewide property taxes. The statewide property tax now finances local educational expenditures. Its rate is set by the state, and revenues are returned to towns on a per-pupil basis. Town property taxes vary from town to town and finance non-educational expenditures as well as educational expenditures over and above the state per-pupil grant. (The town-to-town revenue sharing provision that apply to such local increments remains very controversial within the state, and further revisions to the system are likely. That state property tax policy remains in flux may provide an opportunity for further adjustments to accommodate conservation-generated land value enhancement.)
- Housing and Conservation Trust Fund. Financed from land transfer tax receipts and other sources, the fund provides money for low income housing and fee and conservation easement purchases by the State.

Enhancement value associated with wilderness areas results in higher revenues from the three taxes and more possible expenditure from the Housing and Conservation Trust Fund. Because different people pay the taxes, and because the enhancement value is unevenly distributed, an effective, equitable and acceptable policy response should consider who pays the various taxes and who collects the enhancement windfall.

The purchaser pays the Land Transfer Tax. He or she would pay a percentage of the higher, conservation-enhanced parcel value. Proximity to the wilderness or other conservation area is simply another attribute of the property considered by the purchaser in making an offer. The higher tax, therefore would not be a surprise and there does not seem to be an argument for relieving purchasers from that increase.

The Land Gains Tax, on the other hand, is paid by the seller. A property acquired prior to the creation of a new conservation unit would experience higher than normal gains due to the creation of a new unit. Landowners who hold such properties for less than six years would therefore be faced with a land gains tax bill that is higher than would have been expected in the absence of the new conservation unit. One might therefore argue that it is unfair to collect that additional portion of the land gain from such landowners. At the same time, it is these same landowners who, by selling their property, realize the enhancement value of the nearby newly protected land.

Property taxes are perhaps another matter. Paid annually by current landowners, property taxes are difficult to avoid, except through enrollment in use-value or "current use" programs. Creation of a new conservation unit would increase property tax bills proportionate to each parcel's enhanced value. Because that enhancement would occur without respect to whether the parcels' owners supported or opposed the new conservation unit, one could argue that existing owners should be shielded from the resulting increase in property tax bills.

Towns may, of course, reduce local property tax rates to keep revenues and expenditures in balance. In addition, open space conservation is often associated with lower local public service costs, so it is also possible that the overall town budget will decrease, or at least not rise as fast, after creation of the conservation unit (American Farmland Trust 1992; Commonwealth Research Group, Inc. 1995; Lerner and Pool 1999; Tibbetts 1998; and U.S. National Park Service, Rivers, Trails and Conservation Assistance 1995). There does remain, however, the state-wide portion of property taxes, so there is a limit to the relief that can be provided by fiscal policy changes at the town level.

Addressing the property tax impacts is particularly important. Increases in land carrying costs due to conservation-related enhancement could prove a burden to owners of working farm and forest land (even if enrolled in use-value-taxation programs) as well as on those on fixed incomes or otherwise "land rich and cash poor." In addition to the issue of distributional equity, an increase in property tax burden could accelerate the conversion of farms, woodlots and other open space to more highly developed uses.

The final consideration is the impact on housing affordability for existing and new residents noted by Rasker and Glick (1994) in the passage quoted above. New conservation units could enhance the value of local land right out of the price range of long-time residents, their children and grandchildren.

A Policy Option—Each of the programs and considerations just described play a critical role a role in the design of a hypothetical "Windfalls for wilderness" policy. One additional element which does not currently exist in the State of Vermont, but which is quite common elsewhere, is public bonds for conservation purchases.

While the Housing and Conservation Trust Fund addresses current conservation funding needs, taking advantage of future conservation opportunities may require additional sources of funds. Issuing tax-exempt bonds is one way for states to increase available funds in the short term while deferring expenditures until current revenue can service the

bond debt. Because of lags between expenditures to establish conservation units and the realization of increased land-based tax revenue, such bonds would be particularly well-suited to the purpose at hand.

In order to finance additional land protection, the State of Vermont could issue bonds in an amount sufficient to cover land or easement acquisition costs and associated short-term management costs. The coupon rate of these bonds would be set according to expectations about future increased revenue from the Land Transfer and Land Gains taxes. A simulation based on the land price model presented above and enhanced to cover different classes of land could assist the State bonding authority in setting an appropriate rate. These bonds would then be sold to investors in the usual fashion, but some bonds would be withheld for a special offering to current residents of towns containing or near new proposed conservation units. For example, the state could give residents bonds, or it could give residents an option to purchase bonds in the future at the current market price.

Meanwhile, towns containing new conservation units would be allowed and encouraged to cap the inflation-adjusted assessed value of existing landowners' parcels at the level current at the time of the unit's establishment. (Under the new statewide school funding law, reassessment is mandatory when assessed value falls below a certain percentage of market value.) This would shield landowners from property tax increase-induced incentives to subdivide or convert land from less developed to more developed uses. Needless to say, federal and/or state payment in lieu of tax programs should be fully funded and implemented to offset the reduced tax base associated with new public ownership.

In addition, the Housing and Conservation Trust Fund would direct additional funds to support the construction and repair of affordable housing in towns containing the new conservation units. Both by providing lower cost units and by increasing the overall housing stock, this measure would help ensure that existing residents would not be priced out of the market.

Finally, the expenditures implied by these measures—debt service, property tax abatement, and increases in affordable housing would be paid for by increased revenue generated by the Land Transfer and Land Gains tax programs. To the extent that all Vermont residents benefit to some degree from land protection anywhere in the state, it would be reasonable to simply leave the Land Gains and Land Transfer tax rates at their current levels. In that way, all Vermont taxpayers would share in the cost of additional conservation.

However, because landowners nearest newly protected units realize the greatest direct financial gain, it would also be reasonable to adjust the Land Gains Tax to reflect and capture a portion of the incremental land rent created by the conservation action. Such adjustments could include an increase in the Land Gains Tax rate, an extension of the period after purchase during which it applies, or both.

Other policy responses to the increases in land rent associated with proximity to protected land are possible. The program sketched above, however, would address the key political and fiscal hurdles to further additions to Vermont's conserved lands.

The analysis and policy options presented here are intended to guide the development of new instruments to take advantage of land conservation opportunities now present in the Northern Forest. In so doing, the region could provide a model for conservation across the nation, particularly in areas with mixed ownerships.

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