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## **Do Outdoor Recreation Participants Place their Lands in Conservation Easements?**

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**Abstract:**

In addition to encouraging people to become more physically active and healthy, participation in outdoor recreation helps to expose people to different instances of environmental degradation in places where they recreate. This exposure may also help people to become more environmentally aware and subsequently informed about environmental conservation programs such as conservation easements. Hence, this paper examined whether people participating in outdoor recreation activities have also placed their lands in conservation easements. Using national level data from the National Survey on Recreation and the Environment (NSRE) people who participated in land-based and water-based recreation activities were examined and grouped into consumptive and non-consumptive activities. Results indicated people who participated in land-based non-consumptive recreations have greater odds of placing their lands in conservation easements than people who participated in consumptive recreation activities.

*Keywords:* Conservation Easements, Environmental Concerns or Awareness, Natural Resources, Open Space, Outdoor Recreation Participation.

JEL Classification: Q24; Q26

## **Do Outdoor Recreation Participants Place their Lands in Conservation Easement?**

### **1. Introduction**

It has been argued that participation in outdoor recreation activities increase people's awareness of environmental issues (Nord, Luloff, and Bridger 1998, Tarrant and Green 1999, Thapa and Graefe 2003, Theodori, Luloff, and Willits 1998). While this relationship makes intuitive sense, empirical results examining this relationship are mixed (Dunlap and Heffernan 1975, Van Liere and Noe 1981, Link and Oldendick 1998, Berns and Simpson 2009). The relationship between outdoor recreation participation and pro-environmental attitudes or behaviour has been shown to exist in regards to local environmental issues, such as concern for local forests or natural resources, but this relationship weakens in regards to broad scale environmental issues, such as environmental pollution (Porter and Bright 2003). Furthermore, the relationship between outdoor recreation participation and environmental attitudes or behaviours often depends upon the types of recreation activities people participate in. For instance, people participating in non-consumptive activities tend to be more concern with environment issues than those participating in consumptive activities because of the utility oriented behaviour of the later compared to the former (Dunlap and Heffernan 1975, Jackson 1986, Theodori, Luloff, and Willits 1998).

Additionally, people participating in outdoor recreation activities are likely to show their pro-environmental behaviours by donating money or time for environment or wildlife conservation, boycotting products causing environmental degradation or voting for pro-environmentalists (Theodori, Luloff, and Willits 1998, Bright and Barro 2000). People participating in outdoor activities may also show their pro-environmental attitude or behaviour by placing a conservation easement on a piece of land, ensuring that it will be protected from

development in perpetuity (Merenlender et al. 2004). However, placing a conservation easement on a piece of a land is different from donating money or time, boycotting products or voting to pro-environmentalists because the former is a property with relatively inelastic supply and significant opportunity costs, and may also be a source of income, while the latter are more of behavioural oriented actions.

However, despite the significant policy relevance of this topic, no previous studies have yet analyzed whether people participating in outdoor recreation activities place their lands in conservation easement. Hence, using data from the National Survey on Recreation and the Environment (NSRE) collected in 2005, this study analyzes whether people participating in outdoor recreation activities place their lands in conservation easements in the United States. This study also took into account land-based and water-based recreation activities and divided them into consumptive and non-consumptive subgroups, assuming people participating in consumptive activities are more utility oriented and hence unwilling to designate their lands for conservation easement than those participating in non-consumptive recreation activities.

Examination into a possible link between outdoor recreation participation and conservation easements is policy relevant for several different reasons . Participation in outdoor recreation has huge benefits.<sup>1</sup> However only 33 percent of Americans age 6 and older are active in physical activities to a healthy level, while still 28 percent are inactive (Physical Activity Council 2013).<sup>2</sup> In this regard, availability of open space to a community has the potential to help people become more physically active and healthy; counties with more physical facilities and

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<sup>1</sup> A sedentary lifestyle doubles the risk of heart disease; physically inactive individuals can cut their risk of coronary heart disease by 90 percent by adopting a very active life style (Rothenbacher, Koenig and Brenne 2006) Regular physical exercises also significantly reduce medical expenses and absenteeism from work (CCH, 2007); employees with active life style take 27 percent fewer sick days and report 14-25 percent fewer disability days than inactive employees (Plotnikoff et al. 2003).

<sup>2</sup> Inactives are those who do not take part in any active sport (Physical Activity Council 2013).

more acreage devoted to outdoor recreations also have a lower proportion of the population reporting insufficient physical activity (Physical Activity Council 2013). However, because of urbanization and population growth, demand for open space, like other consumer goods is increasing, while its supply is relatively inelastic, posing a challenge for policy makers to provide open space for physical activities. One solution to this problem is to increase supply of open space through conservation easements.

A conservation easement program provides open space amenities, slows suburban sprawl, provides wildlife habitat, and reduces pollution in suburbanizing areas at expenses of individuals (Bromley and Hodge 1990, Fischel 1987, Gardner 1977, McConnell 1989). In other words, it can be viewed as a public provision of private goods; individuals supply public good at their expenses. In this regard, it is important to know determinants of conservation easements in general, and their relationship with outdoor recreation participation in particular. Findings of this study could be useful to communities, public organization, local government, and land trusts in helping to identify potential suppliers of open space.

## **2. Link between Outdoor Recreation Participation and Pro-Environmental Attitudes or Behaviors**

Participation in outdoor recreation helps to foster people's pro-environment attitude or awareness with environmental issues, directly and indirectly, and social scientists have explained and tested this proposition since Dunlap and Heffernan (1975). Participation in outdoor recreation activities increases peoples' direct contact with nature and this increased contact with nature plays a major role in generating more concern with environment or pro-environmentalist (Dunlap and Heffernan 1975, Thapa and Graefe 2003). Participation in outdoor recreation also helps to expose people to different instances of environmental degradation in places where they

recreate. This exposure then leads to increase awareness of and concern about such degradation (Porter and Bright 2003).

Beside increasing people direct contact with nature, outdoor recreation participation also offers an education values that influences recreationists' environmental attitude or behavior toward management and protection of natural areas (Dunlap and Heffernan 1975, Thapa 2000). For example, there are many interpretative messages and information on bulletin boards in the areas where people recreate. Participation in outdoor recreation in these areas helps recreationalists to be familiar with the environmental issues or problem displayed over there and get inspired to do something to conserve environment. Further, if participation in outdoor recreation makes people pro-environmentalist, this could make a promising future for the environmental movement as recreationalists can be targeted for membership and support by environmental organization (Teisl and O'Brien 2003). In addition, outdoor recreation areas are the most potential source to further expand environmental educational information and interpretation to promote protection and stewardship (Thapa and Graefe 2003).

However, people participating in different outdoor recreation activities have different level of environmental orientation or concern (Dunlap and Heffernan 1975, Jackson 1986, Theodori, Luloff, and Willits 1998). For example, people participating in consumptive recreation activities, such as hunting and fishing takes resources directly from environment for their own welfare, and thus showing utility oriented behaviour. People in this groups care for their own welfare and show little or no concern towards welfare of others or environment. On the other hand, people participating in non-consumptive activities, such as bird watching, picnicking, and sightseeing are less utility oriented; they do not take resources directly from environment for their welfare. They are more concern with conservation of resources for their future recreation

activities. This behaviour makes them pro-environmentalist or more aware with environment issues (Dunlap and Heffernan 1975, Jackson 1986, Theodori, Luloff, and Willits 1998).

### **3. Literature Review**

A conservation easement is a voluntary legal agreement between a landowner and an easement holder by which the landowner imposes permanent restrictions on the way the property will be used. The easement provides landowners with a legal means of protecting their properties' conservation values while maintaining ownership, retaining certain uses of their land and earning significant tax benefits (Georgia Land Conservation Program 2012, Rosenblatt 2002). Easements may also yield financial benefits for the landowner. The income tax benefits of qualified donations of lands or revenues from the sale of an easement, makes the mechanism attractive for many land holders (Rosenblatt 2002, D'Amato et al. 2010). The property protected may be agricultural land, forest, wetlands, or natural open space. The landowner may also sell the property or pass it onto heirs, but the property remains bound by the terms of the conservation easement – conservation easements are usually perpetual unless the easement stipulates otherwise (Morrisette 2001, D'Amato et al. 2010). Conservation easements are, thus, a common tool used for protecting private lands that provide public goods, such as open space, fresh air, wildlife habitat, aesthetic views or historical significance and sustaining the land-based cultural heritage (Bergstrom, Dillman, and Stoll 1985).

Previous studies have analyzed factors affecting individuals' decision to participate in conservation easements (e.g., Duke 2004, Gan et al. 2005, Johnston and Duke 2007; Hoag et al. 2005, Miller et al. 2010, Lynch and Lovell 2003). These studies found parcel size, distance from municipal or developed areas (Johnston and Duke 2007, Pitt, Phipps, and Lessley 1986, Duke 2004, Lynch and Lovell 2003, Gan et al. 2005), land value (Cooper and Osborn 1998, Konyar



and Osborn 1990), and land rents (crop production or yield) (Lynch and Lovell 2003, Pitt, Phipps, and Lessley 1986, Zollinger and Krannich 2002) are determinants of whether a piece of land is placed in a conservation easement.

The number of parcels or area of land holding has also been shown to be positively associated with individuals' participation in conservation easement (Johnston and Duke 2007, Lynch and Lovell 2003). Individuals with more acreage may also donate some part of their land for conservation easement because of diminishing marginal utility of holding additional acreage. If the land trust or local government is to purchase conservation rights from landholders, larger parcels usually have a lower per acre market price, making them more likely to be placed in a conservation easement (Lynch and Lovell 2003). People with private forests are likely to participate in forest conservation easements to conserve that land from development and to take advantage of the forest conservation easement programs (Pacific Forest Trust 2013, Rosenblatt 2002). Lands near a city, highway or developed areas have higher net returns from converting these lands. Hence these lands are less likely to be placed in conservation easement (Lynch and Lovell 2003). Higher land rents (agricultural returns) should increase the probability of participating in a conservation easement program because the owner of a profitable farm would expect a future in farming and hence want to conserve that land from development (Lynch and Lovell 2003).

Some owners may wish to preserve their land due to non-consumptive values (Lynch and Lovell 2003). According to Rilla and Sokolow (2000), non-consumptive values, such as a desire to preserve the land in agriculture or for one's heirs was frequently mentioned as a reason to place land in conservation easement. Thus family legacy, proxied by the years of land tenure

and having a family member who may take over the farm may increase participation in an easement program (Lynch and Lovell 2003).

Although empirical research on outdoor recreation participation and conservation easement is limited, studies have examined outdoor recreation participation and environmental attitudes or behaviors (e.g., Bright 2000, Dunlap and Heffernan 1975, Geisler, Martinson and Wilkening 1977, Pinhey and Grimes 1979, Van Liere and Noe 1981) that may help understanding of how outdoor recreation participation affects people's decisions to place land in conservation easement. For instance, Dunlap and Heffernan (1975) tested three hypotheses and found evidence of the relationship between outdoor recreation participation and environmental concerns.<sup>3</sup> In subsequent studies, Pinhey and Grimes (1979) and Jackson (1986) also found support for Dunlap and Heffernan hypotheses, while Geisler, Martinson and Wilkening (1977) and Van Liere and Noe (1981) found weak or no support for these hypothesis.

People's socioeconomic and demographic characteristics, such as income, education, age, sex, and household size are also key determinants of pro-environmental attitudes or behaviors (Berger 1997, Gatersleben et al. 2002, Guerin, Crete and Mercier 2001). For instance, people with higher incomes tend to be more pro-environmentalist. The most common justification for this belief is people at higher income levels bear the marginal increase in cost associated with supporting environment (Straughan and Roberts 1999, Zimmer, Stafford, and Stafford 1994). Likewise, people with higher education understand the issues involved more fully and, hence, are more concerned about environmental quality and more motivated to participate in

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<sup>3</sup> Their three hypotheses were: involvement in outdoor recreation is positively associated with environmental concern; involvement in non-consumptive outdoor recreation is more strongly associated with environmental concern than that in consumptive outdoor recreation; and the association between outdoor recreation involvement and protecting those aspects of the environment necessary for pursuing such activities is stronger than the association between outdoor recreation and other environmental issues such as air and water pollution. They found weak support for their first hypothesis, modest support for their second hypothesis, and somewhat stronger support for their third hypothesis.

environmentally responsible behaviors (Diamantopoulos et al. 2003, Zimmer, Stafford, and Stafford 1994)

Additionally, younger people are more likely to be sensitive to environmental issues and pro-environmentalists because of their broad horizons (Zimmer, Stafford, and Stafford 1994, Straughan and Roberts 1999). Females are more likely to be pro-environmentalists than males due to their social development and sex role differences, and because they more carefully consider the impacts of their actions on others (Straughan and Roberts 1999, Stern, Dietz, and Kalof 1993). Studies also posit that ethnic minorities are more concerned with environment issues (Greenberg 2005, Leiserowitz and Akerlof 2010) because they are disproportionately victimized by environmental hazards on account of institutional barriers (Brown 1995, U.S. Environmental Protection Agency 2003, Bullard 2000). Despite these studies, limited research has explored the relationship between outdoor recreation participation and conservation easement. This study, hence, is an attempt to understand the potential link between outdoor recreation and conservation easements.

## **4. Methods**

### **4.1 Econometric model**

This study hypothesized that people participating in consumptive recreation are less likely to place their land in conservation easement, compared to those participating in non-consumptive recreation, assuming the former is utility oriented and wants to maximize their utility from the best options they have. While placing lands in easement restricts landowners for its development or use, it does not contribute to people's utility oriented behaviour, making them less likely to place their land in conservation easement. On the contrary, people who participate in non-consumptive recreation may have objectives other than utility maximization; they may be

philanthropic; they may want to place their lands in conservation easement. To test these hypotheses empirically, this study took into account outdoor recreation activities (land-based and water-based), divided them in consumptive and non-consumptive subgroups (Table A1) and controlled for people's socioeconomic and demographic characteristics, such as income, education, ethnicity, sex, age, parcel of land, area of forest, year of land tenure, and household size, assuming people's characteristics affect decision to participate in easement programs (Lynch and Lovell 2003, Geisler, Martinson, and Wilkening 1977). Besides, community characteristics, such as yield per acre (land rent), distance from major city, and property value were also controlled for to partial out the opportunity costs of holding lands. Since the difference in land availability, topography, and culture across the U.S. may lead to variations in decisions to place lands in conservation easements, geographic region specific dummies were also included in this study.<sup>4</sup>

This study modeled acre placed in conservation easement (*conservation easement*) as a function of outdoor recreation participation (***R***) – land-based consumptive recreation, and water-based consumptive recreation; individuals' socioeconomic and demographic characteristics (***I***) – sex (male/female), income, education, race (Blacks/Whites), age, parcel of land, area of forest, years of land tenure, and family size; community characteristics (***C***) – yield per acre, median housing value, and distance from major cities; and geographic region dummies (***G***) – south, rocky mountain, north, and pacific regions. It may be expressed in a functional form as:

$$\text{conservation easement} = f(\mathbf{R}, \mathbf{I}, \mathbf{C}, \mathbf{G}) \quad (1)$$

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<sup>4</sup> *South region*: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia; *Pacific region*: Alaska, California, Hawaii, Oregon, and Washington; *North region*: Connecticut, Washington DC, Delaware, Iowa, Illinois, Indiana, Massachusetts, Maryland, Maine, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, Wisconsin, and West Virginia; *Rocky Mountain region*: Arizona, Colorado, Idaho, Kansas, Montana, New Mexico, North Dakota, Nebraska, Nevada, South Dakota, Utah, and Wyoming.

Since a total of 11 percent landholders in the sample participated in conservation easement, a maximum likelihood tobit model is preferred over the ordinary least square (OLS) for at least two reasons. First, since the dependent variable is significantly censored (i.e., large numbers of zeros), OLS estimators would be biased and inconsistent. Second, dependent variable – *acre placed in conservation easement* cannot be negative and a tobit model ensures the positive predicated values of the dependent variable, while the OLS does not ensure the positive predicted values (Wooldridge 2002). However, like OLS, a tobit model estimates a linear relationship between variables when there is censoring in the dependent variable. To check robustness of the results, a probit model was also estimated by creating a binary variable that equals one if people placed their land in conservation easement and zero otherwise.

## 4.2 Data

This study used private land data from the National Survey on Recreation and the Environment (NSRE). The NSRE is a random-digit-dialed telephone survey of individuals, living in U.S. households. The NSRE represents only civilian, non-institutionalized Americans, 16 years of age or older.<sup>5</sup> The NSRE telephone survey employed a stratified random sample, based upon urban/rural/near-urban geographic locations.<sup>6</sup>

This study used data from the NSRE conducted in 2005. The survey was conducted using a computer-aided telephone interviewing system (CATI). The CATI system randomly selects a telephone number, the interviewer upon hearing someone answer inquires how many people in

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<sup>5</sup> Non-institutionalized refers to people who are not in retirement facilities, hospitals, and military forces.

<sup>6</sup> Each version consisted of modules of questions and each version was tested to ensure an average time of 15 minutes to complete. Approximately 5,000 people were surveyed in each version. Some over-sampling was done to ensure a minimum sample size of 500 per state (across all versions) or for some modules that focus on rural outdoor recreation use i.e., over-sampling of people living in rural areas. U.S. Department of Commerce, Bureau of the Census, and the 2000 Census data were used to construct post-sample weights to correct for over-sampling. Both English and Spanish versions of the questionnaires were used and interviews were conducted bilingually to overcome language barriers.

the household are 16 years or older. The person with the most recent birthday is selected for interviewing (Link and Oldendick 1998, Oldendick et al. 1988). This particular NSRE survey consisted of five modules or sets of questions related to outdoor recreation activity participation, constraints to participation in wilderness activities, private land, migration, and socioeconomic and demographic characteristics (Cordell et al. 1999, Cordell et al. 2004). The survey took, on average, 15 minutes to be completed.

Table 1 shows summary statistics of the socioeconomic and demographic variables used in this study. The variables outdoor recreation participation, sex, ethnicity, and geographic regions were all binary. From these binary variables, a set of dummy variables were created to represent different categories and to control for category specific effects in the estimation. The income variable was measured using a scale of 1-11 and the education variable was measured using a scale of 1-9, with higher values in both scales denoting higher levels.

In the private land module, people who indicated they owned any parcels of land in rural areas, outside town or city limits, including their current residence, that were five or more acres in size were queried about their participation in conservation easement. These people were further asked if they officially designated any portion of their land (with and without forests) for conservation easement through local or state government or through private organizations. In the survey, a total of 710 people were landholders and 78 (11%) people were found to place their lands in the conservation easement through local, state government, private organizations or associations (NSRE, 2004). However because of nonresponse errors and/or missing values in one or other covariates, a total of 352 observations were used for this analysis.

This study also controlled for community characteristics that are likely to affect peoples' decision to participate in conservation easements. The community level characteristics included

are yield per acre (in \$), with the data from the United States Department of Agriculture (2002); and distance from major city (in mile) and median housing value (in \$), with data from the United States Department of Commerce (2003).

## 5. Results

### 5.1 Outdoor Recreation Participation and Conservation Easement: A Tobit Estimate

Results show the variable *land-based consumptive recreation* is negative and statistically significant at a five percent level, while the variable *water-based consumptive recreation* is not statistically significant at a conventional level though it has a negative sign (See Table 2). These results support the first hypothesis that people participated in land-based consumptive recreation do not place their lands in conservation easement, compared to people participated in land-based non-consumptive recreation. Empirical evidence is weak to support the second hypothesis that people participated in water-based consumptive recreation do not place their land for conservation easement. Results also show that the predicted value of land placed in conservation easement is 47 points lower for those people who participated in land-based consumptive recreation than for those who participated in land-based non-consumptive recreation.<sup>7</sup>

Among individuals' characteristics, the variables *males*, *income*, *African-Americans*, *age*, *area of forest*, *parcel of land*, and *family size* are all significant at ten percent level or better to explain *acre placed in conservation easement*. Results show the predicted value of *acre placed in conservation easement* is 48 points higher for males, compared to females. The coefficient for income shows that one unit increase in income (in a scale of 1-9) is associated with a 12 point increase in the predicted value of *acre placed in conservation easement*. The predicted value of *acre placed in conservation easement* is 106 points higher for African-Americans than Whites. Coefficients for the variables *age* and *age square* are negative and positive respectively,

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<sup>7</sup> For estimates interpretation in Tobit model, please see Bruin (2006).

suggesting a nonlinear relationship between *age* and *acre placed in conservation easement*. Likewise, a one percent increase in parcel of landholding is associated with a 23 point increase in the predicted value of *acre placed in conservation easement*. For one acre increase in forest, there is about a one point increase in the predicted value of *acre placed in conservation easement*. One percent increase in family size is associated with 47 points increase in the predicted value of *acre placed in conservation easement*. The variables *education* and *years of land tenure* appear to be statistically insignificant though they all have their expected sign.

Among community characteristics, the variable *median housing value* is statistically significant at a one percent level to explain the *acre of land placed in conservation easement*. For a one percent increase in median housing value, there is 133 points decrease in the predicted value of *acre placed in conservation easement*. The variables *distance from major city* is statistically insignificant though it has an expected sign. *Yield per acre* is neither significant nor has its expected sign.

Regarding geographic region dummies, dummies for north and pacific are positive and statistically significant, while dummy for rocky mountain is statistically insignificant. For people in north, the predicted value of *acre placed in conservation easement* is 60 points higher, compared to individuals in south. Likewise, for people in pacific region, the predicted value of *acre placed in conservation easement* is 179 points higher, compared to them in south.

## **5.2 Outdoor Recreation Participation and Conservation Easement: A Probit Estimate**

Table 2 column (3) shows that people who participated in land-based consumptive recreation are less likely to place their land in conservation easement, compared to people participated in land-based non-consumptive recreation, while the variable *water-based consumptive recreation* is not statistically significant. The variables *males*, *income*, *age*, *age*



*square*, *African-Americans*, *parcel of land*, and *area of forest* are all statistically significant in the vector of individuals' characteristics. That is, males, people with higher income, younger people, African-Americans, people with larger parcels of land, and people with a large area of forest are more likely to place their lands in conservation easements. However, *family size* appears to be statistically insignificant.

Similar to Tobit estimates in column (2), the variable *median housing value* is significant with a negative sign. For instance, people with land in counties with a higher property value are less likely to place them in a conservation easement. People in north and pacific regions are more likely to place their land in a conservation easement, compared to south.

## **6. Discussion**

This study is the first to examine in the relationship between outdoor recreation participation and conservation easement. Both tobit and probit estimates suggest that people who participated in land-based consumptive recreation have a lower odds of placing their lands in conservation easement, compared to those who participated in land-based non-consumptive recreation. However, this relationship does not hold for water-based consumptive recreation. This finding makes intuitive sense: people participating in non-consumptive outdoor activities, such as hiking, backpacking or mountain biking do not take something directly from environment. On the other hand, consumptive activities, such as hunting, fishing, and berry or mushrooms collection involve taking something from the environment directly and thus reflect an utilitarian orientation behaviors (Dunlap and Heffernan 1975).

However, there is different degree of resources used associated with hunting and fishing. Hunting is a resource-intensive activity and consequently people participating in resource-intensive activities may care little about the local environment and hence are less likely to place

their land in conservation easement. On the other hand, the degree of consumption associated with fishing may vary, depending upon the attitudes and behaviors of fisherman (Theodori, Luloff, and Willits 1998, Dunlap and Heffernan 1975). Bryan (1977) found recreationist fishermen placed less emphasis on fish consumption and more emphasis on resource preservation. Hence, it is not surprising to see a negative relationship between participation in land-based consumptive recreation, such as hunting and mushroom or berry collection and placing land in conservation easement. Further, people participating in land-based non-consumptive recreation are more likely to conserve local environment through conservation easement because both are land-based activities; participating in land-based recreation can influence people's conservation ethic by exposing them to different instances of local environment degradation in the area they recreate.

Contrary to previous findings that females are more pro-environmentalists than males (e.g., Baldassare and Katz 1992, Wolkomir et al. 1997, Zelezny, Chua and Aldrich 2000), this study found males are more likely to place their land in conservation easement than females. This divergence in findings may be because of different environmental behavior represented by participating in conservation easement and others considered in previous studies, such as reading environmental magazines, using recyclable grocery bags instead of plastic bags, and voting for candidates with strong environmental agenda. Here the former involves a decision regarding the use of household property or assets that may have relatively longer term impacts on household economy, while the latter involves a decision which does not impact on household level resource use or allocation. Also, in some traditional male dominated households, males tend to make major decisions regarding the use of income or property. Besides, since males hold majority of lands (forest and non-forest lands) in U.S. (Butler 2008), they are likely to make more decisions

on how to use their lands for future and conservation easement is a way to use land in the future. Hence, it is not surprising to see a positive relationship between males and conservation easement if placing land in easement is viewed as a household resource allocation problem.

Individuals with higher income have higher odds to place their lands in conservation easement. However, it is unknown where the income comes from – either from farm land or other sources, such as services. If the income comes from farm land, people may want to secure that income for the future and thus place their land in conservation easement to conserve that land from development. If the income comes from nonfarm land sources, people may want to donate their lands for easement because they have sources of incomes other than lands. This finding suggests whatever the sources of incomes are, people with higher incomes are more likely to place their land in conservation easement.

African-Americans appear to place their land in conservation easement, compared to Whites. If placing lands in easement is viewed as an environmental attitude or behavior, African-Americans appear to be more pro-environmental than Whites. This result may be because a majority of African-Americans favors democrats (Hawkins 2012, Bositis 2004, 2005) and democrats are more pro-environmentalists than republicans in many environmental issues (Farzin and Bond 2012, Klevans 2012). Besides, people may also donate their lands for conservation easement. If conservation easement is viewed as a donation of lands to land trusts or local government, studies found African-Americans appear to be more philanthropic than Whites; they donate higher percentage of their incomes and properties than Whites for social, environmental and religious purposes (Carlozo 2012, Kellogg Foundation 2012).

This study found a nonlinear relationship between age and conservation easement. That is, as people get older, they place fewer acres in conservation easement, but at an increasing rate.

If conservation easement is viewed as an environmental behavior, age is negatively correlated with environmental concerns and behaviors (Van Liere and Dunlap 1980). This result may be because younger people have greater mobility and are more familiar with local environmental degradation and its consequences than older people. This familiarity may inspire younger people to participate in conservation easement. Further since younger people are at initial stage of their career, they may want to secure incomes that come from agriculture or farmland by conserving their land from development. Some younger people may not like to continue farms or farm related activities (Freund 2012), they may want to sell their land or donate it to a local government or land trust for conservation easement. People with family members are more likely to place their lands in conservation easement because of family legacy; they may expect their family members to take over and continue their farms (Lynch and Lovell 2003).

Parcels of land and area of forest are both positively associated with conservation easement; the more parcel one owns, the more likely they are to place in conservation easement. Since more parcels mean more acreage, one may donate some lands simply because of diminishing marginal utility from holding additional acre of land. If the parcels are dispersed at different places, people may donate or sell some lands to get rid of high transaction or monitoring costs. Individuals with private forests are likely to place their land in conservation easement because these forest owners may want to conserve their forested land from development by participating in conservation easement, while keeping them in private ownership and productive forestry.

People in counties with higher property values are less likely to place their lands in conservation easement simply because of high opportunity costs of placing lands in conservation easement. Regarding the geographic regions, individuals in north and pacific regions are more

likely to place their lands in conservation easement compared to those in south because of greater availability of land resources in these regions. Further there may be differences in values and institutions, and environmental attitudes or behaviors across different geographic regions in the U.S. This difference may explain some variations in conservation easement across geographic regions.

## **7. Conclusion**

People participating in land-based non-consumptive recreation activities, such as picnicking, backpacking, and bird watching have greater odds to place their lands in conservation easement. This finding could have huge policy implications. In addition to improving personal health and being sources of income and employment to thousands of people across the country, expansion of outdoor recreation activities can improve environmental quality through conservation easement, if current outdoor recreation participation trends continue in the future (see Cordell et al. 2004 for trends in outdoor recreation participations). It could be an effective way to increase the supply of public good through private action. This conserves agriculture land and also improve environment. Funding and promoting informational and educational programs in land-based non-consumptive recreation facilities, such as public parks could be an effective strategy to make citizens aware with local environmental issues, such as pollution, congestion, depletion of natural resources, and destruction of ecosystem that may happen over time. Further, factors identified by this study could be important to understand what influence individuals' decision to participate in conservation easement. These findings could be useful for local government or land trusts to design and implement effective easement program to increase open space, particularly in urban areas and to conserve farmland and land-based cultural heritage.

Table 1: Summary Statistics of the Variables Used (N=351 observations)

Variable	Mean	Std. Dev.	Min	Max
<i>Conservation easement</i>				
Acre placed in conservation easement	8.9159	53.5115	0	750
Participation in conservation easement (=1)	0.1082	0.3111	0	1
<i>Outdoor recreation participation</i>				
Land-based consumptive recreation (=1)	0.5954	0.4915	0	1
Water-based consumptive recreation (=1)	0.5071	0.5006	0	1
<i>Individual characteristics</i>				
Males (=1)	0.5128	0.5005	0	1
Females (=1)	0.4871	0.5005	0	1
Incomes (in a scale of 1-11)	7.7514	1.9613	1	11
Education (in a scale of 1-9)	4.7806	1.6768	1	9
African-Americans (=1)	0.0284	0.1666	0	1
Whites (=1)	0.9450	0.2282	0	1
Age	48.5892	13.7710	18	87
Parcel of land	4.2877	10.6639	1	85
Area of forest (in acre)	33.3098	242.3502	0	4500
Years of land tenure	15.0932	16.5749	1	200
Family size		1.3875	1	7
<i>Community characteristics</i>				
Yield per acre (in \$)	26.7232	41.5525	2.36	540.81
Median housing value (in \$)	92973.5	41231.42	32700	293000
Distance from major city (in mile)	61.7075	54.2395	0.4426	397.5811
<i>Geographic regions</i>				
South (=1)	0.3950	0.4894	0	1
Rocky (=1)	0.0997	0.3000	0	1
North (=1)	0.3504	0.4777	0	1
Pacific (=1)	0.1025	0.3038	0	1

Table 2: Outdoor Recreation Participation and Conservation Easement (Coefficients)

VARIABLES	Tobit Estimates	Probit Estimates
<i>Outdoor recreation participation</i>		
Land-based consumptive outdoor recreation (=1)	-46.72* (26.27)	-0.711* (0.376)
Water-based consumptive outdoor recreation (=1)	-20.63 (28.56)	-0.180 (0.406)
<i>Individual characteristics</i>		
Males (=1)	48.33** (24.40)	0.599* (0.340)
Income	11.69** (5.533)	0.148* (0.0870)
Education	2.807 (6.432)	-0.0094 (0.0965)
African-Americans (=1)	106.9* (61.43)	2.047** (1.014)
Ln(age)	-1,495** (691.3)	-15.02* (9.382)
Ln(age) square	194.6** (93.11)	1.949* (1.248)
Ln(parcel of land)	22.72** (11.23)	0.305** (0.151)
Area of Forests	1.013*** (0.354)	0.0103*** (0.0036)
Years of land tenure	0.496 (0.843)	0.0021 (0.0106)
Ln(family size)	47.43* (27.43)	0.398 (0.320)
<i>Community characteristics</i>		
Yield per acre	-0.154 (0.865)	-0.0035 (0.0115)
Ln(median housing value)	-132.8*** (39.64)	-1.936*** (0.491)
Ln(distance form major city)	14.58 (16.29)	0.104 (0.222)
<i>Geographic regions (ref: south)</i>		
Rocky (=1)	-56.93 (58.94)	-0.906 (0.758)
North (=1)	60.45*** (21.31)	0.912*** (0.335)
Pacific (=1)	179.3*** (52.07)	2.649*** (0.712)
Constant	3,967*** (1,356)	46.44*** (17.85)
Observations	352	352

Note: Estimates as indicated by column headings. Robust standard errors in parentheses.

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1.

Table A1: Grouping Outdoor Recreation Activities

Groups	Outdoor recreation activities
Water-based	<p><i>Consumptive:</i> Freshwater fishing; fishing in cold water such as mountain rivers, lakes, or streams for trout; fishing in warm water rivers, lakes or streams for bass, bream, catfish, pike, walleye, crappie or perch; saltwater fishing; fishing for ocean-to-freshwater migratory fish such salmon, shad, or steelhead trout.</p> <p><i>Non-consumptive:</i> Sailing; canoeing; kayaking; rowing; motor-boating; waterskiing; boating using a personal watercraft such as jet skis or wave runners; rafting, tubing or any other type of floating on rivers or other flowing water; sailboarding or windsurfing; surfing; swimming, snorkeling, scuba diving or visit a beach or other waterside area; swimming in an outdoor pool; swimming in streams, lakes, ponds or the ocean; snorkeling; scuba diving; visit beaches for any outdoor recreation activities; visit a waterside other than a beach for recreation activities.</p>
Land-based	<p><i>Consumptive:</i> Gather mushrooms, berries, firewood or other natural products; hunting – hunt big game, hunt small game, hunt waterfowl such as ducks or geese.</p> <p><i>Non-consumptive:</i> Picnicking; gathering of family or friends in an outdoor area away from a home; visit an outdoor nature center, a nature trail, a visitor center or a zoo; visit prehistoric structures or archaeological sites; visit any historic sites, buildings or monuments; attend outdoor concerts, plays or other outdoor performances; attend outdoor sports events; walking for exercise or pleasure; day hiking; orienteering; visit a farm or other agricultural setting for recreation; camp at developed sites with facilities such as tables and toilets; camp at a primitive site without facilities; mountain climbing; rock climbing; caving; visit a wilderness or other primitive, road-less area; home gardening or landscaping for pleasure; view, identify or photograph birds; view, identify or photograph wildlife besides birds; view, identify or photograph salt or freshwater fish; view, identify or photograph wildflowers, trees or other natural vegetation; view or photograph natural scenery; sightseeing; driving for pleasure on country roads or in a park, forest or other natural setting; drive off-road for recreation using a 4-wheel drive, ATV or motorcycle.</p>



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