An Assessment of the Factors Affecting Residential Land Prices in Negombo Area

I.A. SURIGE, T.P.S.R. GURUGE and U.K. JAYASINGHE-MUDALIGE

Department of Agribusiness Management, Faculty of Agriculture & Plantation Management, Wayamba University of Sri Lanka, Makandura, Gonawila, (NWP), 60170, Sri Lanka

ABSTRACT

Determination of factors that affect to land prices is important to avoid price exploitation of lands. This empirical study investigates the factors that explain the variation in property value in Sri Lanka. Further, it determines the impact of an environmental attribute in determining property value in urban area. The data were gathered by means of questionnaire-based personal interview carried out with 10 land sellers from 100 land plots at 10 different locations in Negombo area during January to March 2016. Data were analyzed by using linear form of hedonic function. The result suggest that there are eight independent variables (number of roads access to land, distance to main bus route, distance to drainage main, distance to nearest school, distance to nearest hospital, distance to nearest supermarket, distance to lagoon and lagoon view) that affect on land prices of Negombo area. The presence of lagoon view is found to increase the market price of an otherwise comparable property by Rs. 11, 090.

KEYWORDS: Hedonic method, Negombo lagoon view, Property valuation

INTRODUCTION

Determining factors affecting land prices is important to avoid price exploitation of lands. Overall, it is important to identify factors that affecting on land to estimate land prices more accurate and realistic.

Each factor that affecting on land has specific value and this value contributes to estimate some portion of the final land price. Likewise, land price is an allocation on its several factors.

Residential lands are always demanded according to human basic needs. The land price depend on the physical factors and as well as the environmental factors.

Urban green spaces, water bodies and good environments provide amenities and services that contribute fundamentally to the quality of urban life (Shafer *et al.*, 2000; Van Herzele and Wiedemann, 2003; Chiesura, 2004). Environment's largely intangible benefits are usually difficult to assess and quantify due to their un-priced nature. Their importance to the well-being of cities and citizens is often neglected in mainstream urban planning and policy making related to development (Luttik, 2000; Tyrvainen and Miettinen, 2000; Tajima, 2003).

According to the previous researches, people who live near green spaces such as urban parks and nature reserves have better physical and mental health. Especially with the mental health, researchers found that there is a positive relationship between access to green space and stress relief. With regard to price of the land, environment value is also added to its market price implicitly.

In Sri Lanka, currently there are no known studies examining the implicit value of an environment factors that effect on land prices.

With this background (Table 1), the primary objective of this study was to identify the factors affecting on urban land price. Deriving an economic value of an environment attribute in property valuation was indicated as secondary objective of this study.

Table 1. Historical studies about property pricing

Issue	Region	Authors
Factors affecting residential use land values in the inter development segment of the Colombo city	Sri Lanka	Premathilaka and Abeygunawardena, (1992)
Pricing residential amenities: the value of a view.	United States	Benson *et al.*, (1998)
Impacts of urban environmental elements on residential housing prices in Guangzhou	China	Jim *et al.*, (2006)
Brand value of property in Bangkok metropolitan region (MR), Thailand	Thailand	Rinchumphu *et al.*, (2013)
Property prices and urban forest amenities	Finland	Tyrvainen and Miettinen, (2000)
The effect of water quality on rural nonfarm residential property values	United States	Epp and Al-Ani, (1979)

METHODOLOGY

The Hedonic pricing method is used to determine the factors that affect on urban land prices. This theory is described in depth by Rosen (1974). It reveals that collection of characteristics of the good directly or indirectly involve to its price. Environmental amenities such as open green space (Bolitzer and Netusil, 2000), and urban wetlands (Mahan et al., 2000) have been found to positively affect property values through the use of hedonic modeling.

Hedonic price function can be expressed by;

$$P = \int (S, N, Q) \tag{1}$$

Where S is a vector of structural characteristics of property (size, no: of road access etc.), N is a vector of characteristics of the neighborhood (distance to school, distance to hospital etc.) and Q is a vector of location of specific environmental amenities. Thus, the hedonic approach involves estimation of the implicit prices of property is located such as accessibility to parks, stores and workplace the neighborhood, structural and environmental location.

For interpretation and estimation, linear functional form is usually applied in hedonic theory.

According to this study, it was assumed that there is a linear relationship between unit price (dependent variable) and k number of independent variables; namely X_1 to X_k. Error term is indicated by (e). The functional relationship between land value and selected independent variables is expressed by;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k + e \tag{2}$$

Where Y is the unit price in rupees per perch and X's are the independent variables namely,

X_1 = Size of the land (sl)
X_2 = Number of roads access to land (roads)
X_3 = Distance to main bus route (dibu)
X_4 = Distance to drainage main (ddm)
X_5 = Distance to nearest school (dschool)
X_6 = Distance to nearest hospital (dhos)
X_7 = Distance to nearest supermarket (dsuper)
X_8 = Distance to lagoon (dl)
X_9 = Lagoon view (lv)

Collection of Data

Both primary and secondary data were collected for this study. Data were collected from ten land locations which were available for selling during January to March, 2016 in Negombo area (Figure 1). From these ten land locations, hundreds of plots were selected randomly as ten plots per each. Random number generator application was used to select plots from the land locations.

Secondary data were collected from the Negombo Municipal Council.
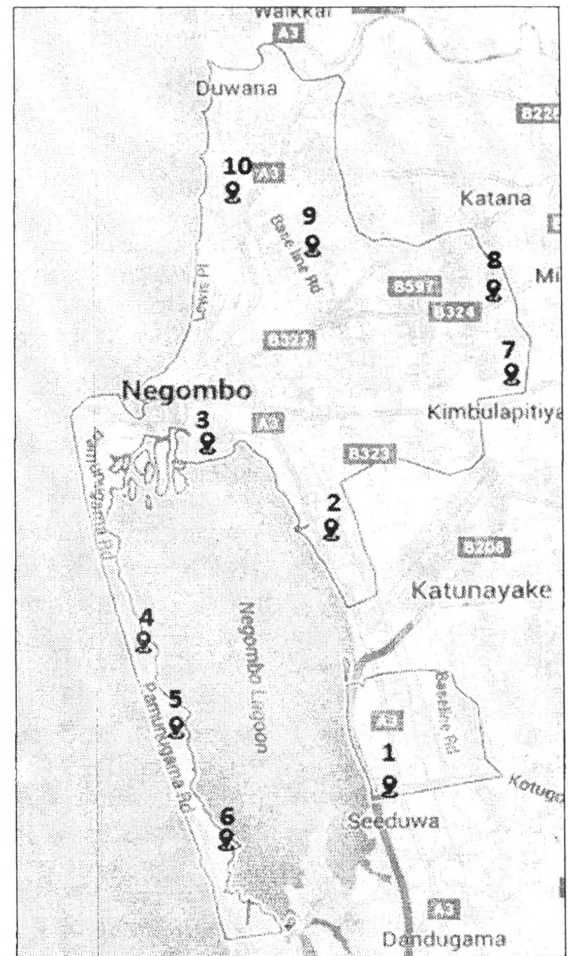

Figure 1. Map of the site locations. *Note: 1-Seeduwa, 2-Kurana, 3-Negombo (Kadolkele), 4-Pitipana, 5-Pamunugama, 6-Kepungoda, 7-Kadirana, 8-Katiyala, 9-Kattuwa, 10-Daluwakotuwa*

The data collection was conducted representing five areas adjacent to Negombo lagoon and five others away from lagoon.

Analysis of Data

In this study, Ordinary Least Square (OLS) method was used to estimate the parameters of the regression model fitted to data. Ordinary Least Square method provides best results when all the assumptions are met, such as avoidance of outliers, linearity, homoscedasticity, auto-correlation and avoidance of multicolinearity.

The data set was analyzed using Minitab 15 statistical package. And as a first step the data set was checked for outliers using normal probability plot. It was found that the residuals were normally distributed and there were no outliers (Figure 2).
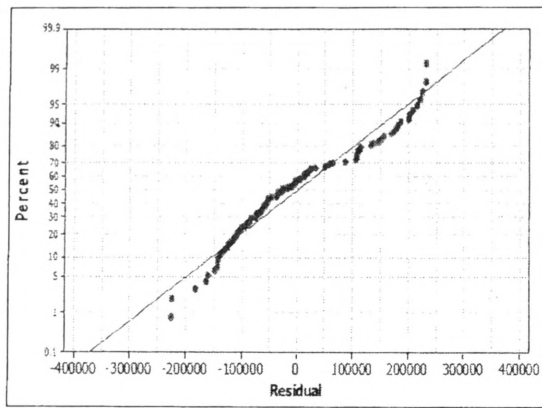
Figure 2. Normal probability plot for residuals

Pattern of the residuals *vs.* fitted values plot shows that residuals were scattered around the zero randomly. It indicated that linearity was not violated. Then data set was checked for homoscedasticity using residuals *vs.* fitted values plot. Pattern of this graph showed that residuals have constant variance (Figure 3).
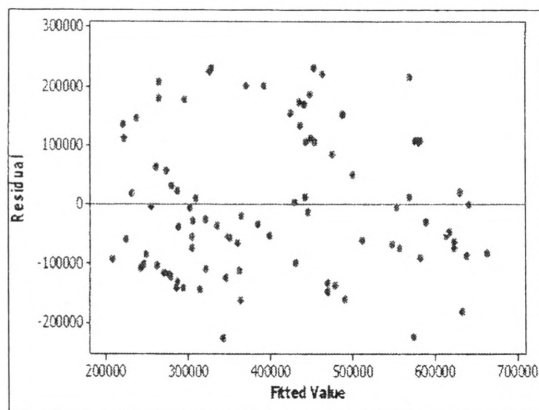

Figure 3. Residuals *vs.* fitted values plot

Auto-correlation was checked by using Durbin-Watson (DW) statistic method. The value for the study was 1.99380 DW. According to the DW statistic (5 per cent significance points of dL and dU (lower and upper values) dL is 1.462 and dU is 1.898 under 10 regressors of 'k' values and hundreds of 'n' values. It indicated that DW result for this study which was 1.9938 was greater than dU. That implies that auto-correlation was not present in this study.

Variance Inflation Factor (VIF) was used to check the multicollinearity. Among VIF values for all variables, the minimum was 1.224 and the maximum was 5.540, both values are smaller than 10, which indicated that the multicollinearity among the independent variables were not serious.

RESULTS AND DISCUSSION

According to the secondary data (Table 2), Negombo land space consume by Negombo lagoon (39.5%), buildings (32.5%) and others (28%).

Table 2. Land consumption in Negombo

Description	Extent (Hectares)	Percentage (%)
Building	1523.25	32.49
Non-Agricultural lands	119.08	2.54
Home garden	651.21	13.89
Coconut lands	272.86	5.82
Agricultural lands	30.94	0.66
Grass lands	222.22	4.74
Common places	17.81	0.38
Lagoon	1851.43	39.49

Property space has been used for domestic housing (78.16%), commercial (18.07%), government (3.38%) and other (Figure 4).
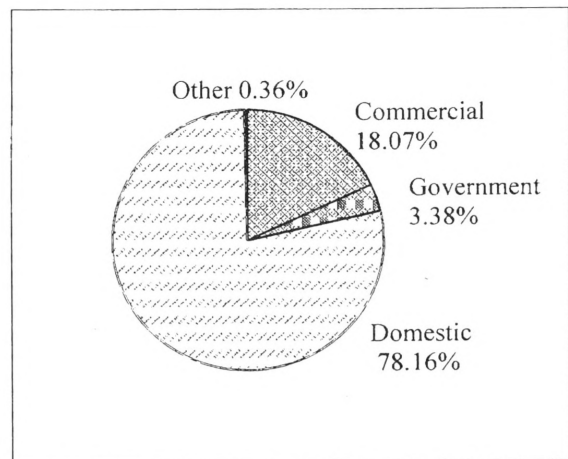

Figure 4. Property types of Negombo

Data set has not violated the assumptions of OLS method. So it is suitable to apply the OLS method to this data set.

As the result of linear regression, coefficient represents the implicit marginal price for the change of attribute.

All the lands had the electricity, water and telephone facilities. Therefore, these factors were eliminated from the regression equation. Lagoon view was taken as dummy variable. No view indicated by zero and lagoon view indicated by 1.

Except the size of the land, all the other variables were significant in the study.

Unit price = $686766 + 33236 \, X_2 - 739598 \, X_3 + 225690 \, X_4 - 204071 \, X_5 - 114323 \, X_6 + 753140 \, X_7 - 40991 \, X_8 - 11090 \, X_9$ (No view)

R-Sq = 95.8%   R-Sq (adj) = 95.3%

Hedonic regression function explained unit price by 95.3% of its independent variables.

When all other variables are kept constant, with increase of every additional road access to land, unit price of land increase by Rs.33, 236. With every additional kilometer from main bus route to land, unit price decrease by Rs.739, 598. With every additional kilometer from drainage main to land, unit price increase by Rs.225, 690. With every additional kilometer from nearest school to land, unit price decrease by Rs.204, 071. With every additional kilometer from nearest hospital to land, unit price decrease by Rs.114, 323. With every additional kilometer from nearest supermarket to land, unit price increase by Rs.753, 140. With every additional kilometer from lagoon to land, unit price decrease by Rs.40, 991.

The presence of lagoon view is found to increase the market price of an otherwise comparable property by Rs.11, 090 (Table 3).

Table 3. Outcomes of Hedonic regression

Term	Coefficients	P value
Constant	686766.0	0.000
Size	-1056.8	0.115
Number of roads access to land	33236.0	0.006
Distance to main bus route	-739598.0	0.000
Distance to drainage main	225690.0	0.035
Distance to nearest school	-204071.0	0.000
Distance to nearest hospital	-114323.0	0.000
Distance to nearest supermarket	753140.0	0.000
Distance to lagoon	-40991.0	0.000
Lagoon view (No view)	-11090.0	0.000

Note: *Significant level 0.05%

CONCLUSIONS

Land is heterogeneous good. It has characteristics reflecting its location, infrastructures and other amenities. In an exchange economy, the purchase and sale of land parcels of different characteristics establish implicit prices for these characteristics. There is scarcity in literature on appraising environmental attribute as a determinant of property valuation due to unavailability of data sources.

This analysis focused on factors affecting on Negombo area land prices and deriving an economic value of an environmental attribute in property valuation. According to the outcome of this study, there are eight independent variables which affect to land prices of Negombo area such as number of roads access to land, distance to main bus route, distance to drainage main, distance to nearest school, distance to nearest hospital, distance to nearest

supermarket, distance to lagoon and lagoon view.

Outcome of this study implies that lagoon view has a positive relationship with unit price with comparing to the no view of lagoon. It indicated that environmental attribute can affect on property valuation and can derive the economic value for environmental attributes.

These research findings are important to both government and real-estate developers to take proper decisions of land prices. Negombo lagoon view positively supported to enhance the land prices of Negombo area.

REFERENCES

Benson, E.D., Hanson, J.L., Schwartz, A.L. and Smersh, G.T. (1998). Pricing residential amenities: the value of a view. *The Journal of Real Estate Finance and Economics*, 16 (1), 55-73.

Bolitzer, B. and Netusil, N.R. (2000). The impact of open spaces on property values in Portland, Oregon. *Journal of Environmental Management*, 59 (3), 185-193.

Chiesura, A. (2004). The role of urban parks for the sustainable city. *Landscape and Urban Planning*, 68 (1), 129-138.

Epp, D.J. and Al-Ani, K.S. (1979). The effect of water quality on rural nonfarm residential property values. *American Journal of Agricultural Economics*, 61 (3), 529-534.

Jim, C.Y. and Chen, W.Y. (2006). Impacts of urban environmental elements on residential housing prices in Guangzhou (China). *Landscape and Urban Planning*, 78 (4), 422-434.

Luttik, J. (2000). The value of trees, water and open space as reflected by house prices in the Netherlands. *Landscape and Urban Planning*, 48 (3), 161-167.

Mahan, B.L., Polasky, S. and Adams, R.M. (2000). Valuing urban wetlands: a property price approach. *Land Economics*, 100-113.

Premathilaka, H.M. and Abeygunawardena, P. (1992). Factors affecting residential use land values in the inter development segment of the Colombo city. *Journal of Tropical Agricultural Research*, 4, 209-224.

Rinchumphu, D., Eves, C. and Susilawati, C. (2013). Brand value of property in Bangkok metropolitan region (BMR),

Thailand. *International Real Estate Review*, 16 (3), 296-322.

Rosen, S. (1974). Hedonic prices and implicit markets: product differentiation in pure competition. *Journal of Political Economy*, 82 (1), 34-55.

Shafer, C.S., Lee, B.K. and Turner, S. (2000). A tale of three greenway trails: user perceptions related to quality of life. *Landscape and Urban Planning*, 49 (3), 163-178.

Tajima, K. (2003). New estimates of the demand for urban green space:

implications for valuing the environmental benefits of Boston's big dig project. *Journal of Urban Affairs*, 25 (5), 641-655.

Tyrvainen, L. and Miettinen, A. (2000). Property prices and urban forest amenities. *Journal of Environment Economy Management*, 39 (2), 205–223.

Van Herzele, A. and Wiedemann, T. (2003). A monitoring tool for the provision of accessible and attractive urban green spaces. *Landscape and Urban Planning*, 63 (2), 109-126.