HOW DOES ENVIRONMENTAL AMENITY INFLUENCE PROPERTY VALUES? A MALAYSIAN CASE

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Abstract

There has been no empirical evidence of the importance of environmental amenity to property price reported from developing markets. This paper fills in the gap by taking Malaysia as a case study. Based on the stated preferences for environmental amenity among potential homebuyers and 442 sale transactions recorded between 2006 and 2010, property environmental attributes in terms of geographic orientation, position, and proximity were included in the regression equation of home price. The regression results were generally consistent with those obtained from respondents" feedback. This paper concludes that there is evidence to show that homebuyers in a developing market place a significant importance of environmental amenity on property price. As an implication, environmental quality of the environment should remain as a major element inasustainable property market.

Keywords: *environmental amenity, regression model, house price, property market*

1.0 INTRODUCTION

While a mature property market has traditionally given attention to the role of environmental amenity on property value, it is yet to be ascertained whether the same occurs in a less mature market. A mature market is often associated with the one found in a developed country while a less mature market exists in a developing country. We simply base our paper on this later notion to avoid from being entangled in the fundamental issue of market maturity itself as discussed by Keogh and D'arcy (1994).The price paid for a property measures the differences in people's desirability based on the environmental service rendered by the property (Amrusch, 2007). From human ecology perspective, the natural environment influences housing choice

As a result of human interaction with environmental components such as land, water, air, land cover, and other natural resources (Bubolz and Sontag, 1993; Garrod, 1994). A study has disclosed that omitted house characteristics may bias estimates of amenity value (Thorsnes, 2002). Thus, accounting for amenity (or disamenity) is important in assessing people's willingness to pay for a property.

In particular, views from a residential unit could supply amenities or disamenities to residents due to the different characteristics of the views presented (Jim and Chen, 2009). Basically, people will pay a premium for attractive views (Jim and Chen, 2009). However, views of landscape do not actually yield an evidently quantifiable price in the market. Nevertheless, the implicit amenity prices could be examined by regressing residential site"s prices on amenity levels inherent in home sites due to the fact that it is treated as one of the amenities that contribute to the total value of property itself. This is different from the popular option for valuing the value of environmental amenity that is often based on the stated preferences methodology (Quah and Tan, 1999).

However, no attempt has been made to account for the estimation of the implicit value of this natural aesthetic or to differentiate between the types and qualities of view in Malaysia. This could be attributed to the difficulty in determining the level of house price differences attributable to particular distinguishing features, especially from the perspective of "a good view"(Rodriguez and Sirmans, 1994).

Views observable from homes are sometimes embedded in price modeling as independent variables, with limited analysis on the value of environmental amenity (Jim and Chen, 2009). Properties are commonly classified as "view" property or "non-view" property, with no attempt to distinguish between different qualities of view (Benson et al, 1998). Pacione (1984) stated that there is a real need for a comprehensive measurement on the quality (e.g. panoramic, partial, or poor) and type (e.g. water, mountain, valley) of environmental amenity. Thus, the measurement on the quality and type of environmental amenity is vital in order to measure the impact of environmental amenity. Generally, the regression price method can be used to estimate the contribution of a particular characteristic (in this case, environmental amenity such as aesthetic views) on some composite commodity (in this case, residential) from the property itself (Pompe and Rinehart, 1994; Wolverton, 1996; Hamid and Shahwahid, 2005).

In view of the realization of environmental view to homebuyers, this study attempts to examine the differentiation of view amenity by both type and quality, in assessing the premium offered by residents for home purchase. This study is unique in that it tests four main variations of measuring view in value modelling and evaluates their relative contributions to house price. These variations are geographic surrounding, presence of view, view impact, and view proximity.

The state of Terengganu, Malaysia is chosen for the study case for two main reasons. First, being an oil-rich state, it is a state, catching up with the more industrialized states such as the Federal Territory of Kuala Lumpur, Selangor, Pulau Pinang, and Johor. Second, in spite of the first situation, our analysis of property data from the Property Market Reports (various years) shows that the state of Terengganu still stands at the bottom four of the least dominant property markets in Peninsular Malaysia, in terms of volume of property transaction. Based on data for 2007, the state's property market is dominated by residential (54%) and agriculture (30%); the rest is made of development land (12%), commercial (3.5%), industrial (0.2%), and others (0.3%) (Hamid, 2012). In terms of price, Terengganu still has among the "cheapest" properties in the country, reflecting a less mature market stage (Figure 1). Further scrutiny of the data disclosed that this trend has persisted over a long period of time from 1978 to 2012.[1]

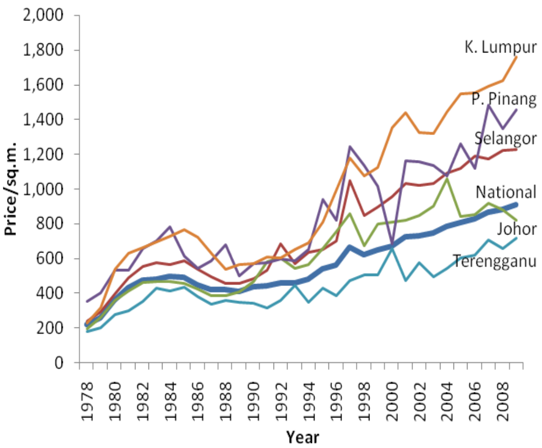

Figure 1: Profile of property price represented by the single-storey terraced houses (*Source:* Gathered, summarized, and analyzed from Property Market Reports, 1978-2008)

[1] This is based on our analysis of property transaction data from various issues of Property Market Reports (1978-2012) published by the Property Consultancy and Valuation Services Section, Ministry of Finance Malaysia.

Our analysis of the transaction data and field inspections also discovered that despite being in urban, semi-urban, and semi-country-side, many properties are still surrounded by multiple landscape views, providing elements of environmental amenity (or perhaps, disamenity) to these properties. The question is, with such a conspicuous phenomenon, do homebuyers notice its significance and, thus, attach it to the asking price of residential properties in the area?

2.0 LITERATURE REVIEW

2.1 Environmental Amenity

In the simplest terms, environmental amenity refers to a view of scenery of a portion of a territory whose eyes can comprehend in a single view (Daniel, 2001). It is a scene generated via observation, either on natural or built environment from one focal stand point that provides inspiring vistas and pleasing environment while contributing to the economic value and comfortable enjoyment of real property (Maulan et al., 2006; Diao and Jr, 2010). Past research on the impact of environmental amenity on house prices include Pacione (1984), Garrod and Willis (1992a, 1992b), Boyle and Kiel (2001), and Jim and Chen (2006).

The number of past studies measuring the effects of environmental amenity on house price has come to the hundred and listing all of them would be counter-productive. With this sheer number, perhaps, there are little new issues to be learnt from any new study. Notwithstanding this, the specific amenity elements that significantly influence house price and their magnitudes of effect will never be the same from one case to another and, therefore, the actual outcomes remain to be determined empirically.

Overall, the most prevailing types of amenity measured are „view" and „distance" or „proximity". Examples of view include general view (Rodriguez and Sirmans, 1994; Benson, et al., 1998); ocean view (Benson et al., 1998; Pompe and Rinehart, 1994; Jim and Chen, 2009); water view including lake and river (Lansford and Jones, 1995; Benson, et al., 1998; Luttik, 2000; Bourassa et al., 2003a,b; Jim and Chen, 2007); open space, park, garden, woodland, green strip/space (Pacione, 1984; Bolitzer and Netusil, 2000; Garrod and Willis 1992a; Luttik, 2000; Irwin, 2002; Morancho, 2003; Jim and Chen, 2006; Sander and Polasky, 2009); and mountain view (Benson, et al., 1998; Song and Knaap, 2004; Jim and Chen, 2009). Examples of distance or proximity are distance to water bodies such as beach, coast, seashore, river, lake (Garrod and Willis, 1992a; Pompe and Rinehart, 1994; Lansford and Jones, 1995; Peterson and Boyle, 2001; Jim and Chen, 2006; 2009); proximity to forest, public park, garden, urban landscape (Peterson and Boyle, 2001; Des Rosiers et al., 2002; Arriaza et al., 2004; Song and Knaap, 2004; Baranzini and Schaerer, 2007; Jim and Chen, 2007; 2009); distance to agriculture and water (Boyle and Kiel, 2001; Peterson and Boyle, 2001); and distance to nearest mountain (Jim and Chen, 2009).

To illustrate a few cases, Pacione (1984) evaluated the relationship between residential property value and residential environmental quality such as appearance of the residential area, air quality, area of trees and greenery nearby while Garrod and Willis (1992a) examined the impact of landscape characteristics on house price such as views of woodland, urban area, and open water area. Boyle and Kiel (2001) studied the impact of land uses, air and water quality on residential property value. Jim and Chen (2006) investigated the environmental attributes related to house price such as view of green spaces and proximity to wood and water bodies. They furthered their study in the same area with a focus on environmental externalities such as view of green space, water body, street, and building (Jim and Chen, 2007; 2009).

Environmental beauty is often embedded in the landscape components, as it is a physical trait of the landscape. Thus, it is a usual phenomenon that researchers often relate the environmental view to the landscape background such as sea, river, and mountain. Pleasant environmental amenity usually contributes to the positive impacts of residential property value such as ocean frontage, ocean, and lake views (Lansford and Jones, 1995; Benson et al, 1998). However, it does not mean that all the visual impacts on these landscapes will definitely give a positive impact on housing price. Unappealing views such as weak quality of view and cemetery view lead to the reduction in residential property value (Jim and Chen, 2009).

Due to the heterogeneity of preferences towards the variety of environmental amenity, consumers‟ fondness is considered to be a major problem in estimating the willingness to pay for environmental attributes. Several researchers presumed that preference on environmental aesthetics actually depends on the views observed, which would possess a knowledgeable perception or prospective functional significance for the perceiver (Scott and Canter, 1997; Han, 2010). Therefore, it is important to have an understanding of people‟s evaluation and preference decisions in environmental view assessment.

Due to the increasing awareness towards the effect of environmental view amenities on residential property value, factors such as lake, ocean, mountain or panoramic open spaces have also been examined. Several overseas studies have classified environmental amenity according to natural and built environment and discovered that people prefer view of natural environment to built environment (Scott and Canter, 1997; Han, 2010). This paper is also scoped to natural environment to represent environmental amenity.

With the exception of China, most of the studies cited above focused on the developed property market - simply perceived as a market existing in a developed country. Do homebuyers in a less mature property market like Malaysia also consider environmental amenities in their home purchase? If yes, are these amenities being capitalized into home price? In a study, residential waterfront development in Malaysia is said to have significant impact, via the advantages of water amenities, on the available development land, where the panoramic view of water amenities add improvement to the value of waterfront property for a total of 59% (Azlina *et al*., 2009).

2.2 Modeling the Effect of Environmental Amenity

Almost all studies dealing with the valuation of view in housing price apply the regression models (Damigos and Anyfantis, 2011). They are voluminous and their complete listing in this study is not desirable. The regression method is well established for assessing the market value of individual characteristics of a given good (Eye and Schuster, 1998; Behrer, 2010). Let say, we have a simple property price model as follows (adapted from Freeman, 1979; Schroeder et al., 1986; Grimm and Wozniak, 1990; Garrod and Willis,1992a; Lind et al., 2003; 2009).

$$P_i = \alpha + \beta X_i + u_i \qquad (1)$$

Where P_i is the i^{th}. Observation of property price and X_i is the i^{th}. observation of property attribute; α is regression intercept, β is regression slope, and u_i is error term.

The treatment of “view” and “non-view” properties can use single-dummy (“with” and “without view”) or multi-dummy variables (combining view with other factors such as visual quality, distance, and other environmental features) (Benson *et al*., 1998; Luttik, 2000; Beron *et al*., 2001; Bourassa *et al*., 2003a, 2003b; Jim and Chen, 2009). Thus, equation (1) can generally be specified as:

$$P_i = \alpha + \beta X_i + \lambda D_j + u_i \qquad (2)$$

Where D_j denotes (1,0) dummy variable representing a given element of environmental view*j*, and all other variables as already defined.

The expected regression function of "view" properties is given in equation (3) while that of pollution "non-view" properties in equation (4).

$$E(Pi \mid D = 0, Xi) = \alpha + \beta Xi \qquad (3)$$

$$E(Pi \mid D = 1, Xi) = (\alpha + \lambda) + \beta Xi \qquad (4)$$

Equations (3) and (4) assume that the slope of regression equation of a given profile, β, is the same as that of other profiles. The differential effect of environmental amenity on residential values between "view" and "non-view" properties is obtained by subtracting equation (3) from equation (4). Thus,

$$\Delta Pi = \delta Pi/\delta D = ((\alpha + \lambda) + \beta Xi) - (\alpha + \beta Xi) = \lambda$$

This λ quantity is exactly equivalent to the value of dichotomous variable's slope in equation (2), which is in effect is an intercept term. Note that since one of the two groups is made the control group, λ should be interpreted as the amount of differential effect of environmental amenity a on residential values between the "included" and "control" group properties, particularly between "view" and "non-view" properties. The λ from the regression model is a parameter that is used to estimate price discount or price premium resulting from environmental amenity.

The results for λ can vary. In particular, Benson *et al*. (1998) found that full ocean view added 68% premium to property price, indicating that sea ranks first as the most pleasant view. In terms of measuring the view, some studies adopt visual impact assessment rather than simple view assessment (Garrod and Willis, 1992a; Jim and Chen, 2009). An observer's field of vision or view from ground is being analysed in the measurement of degree to the view observed on the landscape. This paper measures both visual impact and simple view effects.

It is important to inspect and observe from the respective properties to account for surface elements like vegetation or buildings that may cause obstruction or may block views. Several measurements that may affect the outcome of view qualities, observed from the landscape context, are also considered such as presence of views, level of visibility, proximity from the views, position from the views, etc.

In our study, we assume a situation where the regression intercepts, not the slope, are different between the two discriminating groups, water and noise pollutions, in this case. This is because we only investigate a dichotomous situation of "existence" or "non-existence" (and not the "levels") of environmental amenity among the sampled properties so that only differentiation of the intercept dummies is required to measure environmental view effects on residential values.

For capturing such effects, statistical analysis is applied for analysing property prices against environmental amenity or otherwise disamenity (Palmquist, 1982). The theoretical foundation of measuring such phenomena dated back in the 1970s, whereby property data were used in the regression equation of residential values. The verdict of this method is that, all else equal, if similar homes sell for less the closer they are to the source of disamenity, the conditional difference in price is interpreted as the market discount attributed to that problem. In the same way, all else equal, if similar homes sell for more the closer they are to the source of amenity, the conditional difference in price is interpreted as the market premium attributed to that factor.

3.0 DATA AND ANALYSIS PROCEDURE

The study covered thirteen localities in the state of Terengganu, Malaysia. Data collection was carried out in two stages. The first stage involved interviews with sixty randomly picked potential homebuyers in the study area to simulate buyers' preferences for environmental amenity. The stratified sampling method on the study area's population was adopted to choose homebuyers for interview. We asked about their stated preference, in terms of willingness-to-pay for views of certain landscapes in the study area. A brief interview was conducted in order to identify the elements of amenity that they may be willing to pay if they buy a house. Seven types of environmental amenity were available as options, namely sea, river, lake, mountain, open space, green spaceand urban view. Each respondent was given the option to choose three types of environmental amenity that he/she preferred most.

The number of buyers' nominations for these views were found to be in the following order: sea view (53), river view (41), mountains view (38), green space view (31), urban landscape view (15), lake view (2), and open space view (1). The result shows three key elements of environmental amenity – sea, river, and mountain – which could have been most preferred by homebuyers. Lake view and open space views were ranked lowest; lake view was almost physically absent in the study area while open space view was not chosen by the respondents at all. Therefore, these two types of landscape view were excluded from this study.

In the second stage of data collection, state-wide house transactions were randomly selected from thirteen localities, namely Kuala Terengganu (15), Batu Buruk (66), Bukit Besar (45), Cabang Tiga (11), Cenering (59), Gelugur Kedai (42), Kepung (46), Kuala Ibai (55), Kubang Parit (18), Losong (18), Manir (44), Paluh (6), Tok Jamal (17). These gave a sample of 442 transactions comprising terraced, semi-detached, and detached houses. The data were obtained from the Department of Valuation and Property Services, Kuala Terengganu. The assessment of environmental view was carried out on-site based on appraiser's judgement.

The assessment of environmental amenity was made on four aspects, namely simple geographic orientation, simple view assessment, proximity from views, and position of property from views. For a simple view assessment, we simply identified the "presence" of a particular environmental view observable from each inspected property. For visual impact assessment, the method of measurement was relatively complicated. Generally, we followed Benson *et al.* (1998) who used a four-way classification of environmental amenity, namely "panoramic", "partial", "poor", and "no view". In doing so, we assessed a particular type of view using a camera and a protractor as observation measuring tools. Since the quality of environmental view observed might vary according to distance from property, the elements of measurement such as "proximity" from the landscapes or views and the "position" of property from the surrounding environmental view were included in the visual impact assessment.

In both types of assessment, the presence of general views was being identified in reference to sea, river, mountain, green space, street view and building view. Dummy variables were used for these views, where the type/presence or quality/impact of environmental view was coded "1" and "0" otherwise. Literally, this method of measurement was applied to differentiate different types of environmental view. To examine the effects of environmental amenity on house price, these dummy variables were specified together with other variables of property attributes in five model specifications (see Table 1). Model 1 (base model) specifies the basic property attributes, Model 2 incorporates geographic surrounding, Model 3 incorporates presence of view (position of property with respect to a certain environmental view), and Model 4 incorporates view proximity; while Model 5 incorporates view impact of the environment. The Statistical Package for Social Sciences (SPSS) is used to analyse the data (see Babbie and Halley, 1995; Coakes and Steed, 2003; Pavkov and Pierce, 2007).

Independent Variables	Unit of Measurement	Description	
General attributes:			
Semi-detached house (SD)	Dummy (Yes = 1; 0 = otherwise)	Whether or not the property is a semi-detached house	Terraced house made as the 'control group'
Detached house (DT)	Dummy (Yes = 1; 0 = otherwise)	Whether or not the property is a detached house	
Number of storey (No_Sto)	Unit	Number of storey above ground	
Number of bed (No_Bed)	Unit	Number of bedrooms in a property	
Freehold property (FREE)	Dummy (Freehold = 1; 0 = otherwise)	Tenure (freehold)	
Open title holding (HOLD)	Dummy (Open title = 1; 0 = otherwise)	Holding (open title)7	
Date of transaction (DATE)	Dummy (transaction from year 2009 onwards = 1; 0 otherwise)	Date of transaction	
Design	Dummy (Dev = 1; 0 = otherwise)	Design of property, i.e. developer's standard design	
Building condition (COND)	Score (1-3)	Condition of building, i.e. state of repair	
Land area (L_area)	Square metres	Land area	
Building area (B_area)	Square metres	Building area	
Distance to CBD (D_CBD)	Kilometres	Distance to Central Business District	
Distance to major road (D_major)	Kilometres	Distance to major road	
Presence of club house (ClubH)	Dummy (Yes = 1)	Availability of club house within 1 km radius	
Scenic View attributes:	**Unit of Measurement**	**Description of measurement**	
Geographic surrounding			
Sea surrounding (S_Sea)	Dummy (Yes=1)	Located in the surrounding of sea area	
River surrounding (S_Riv)	Dummy (Yes=1)	Located in the surrounding of river area	
Mountain surrounding (S_Mout)	Dummy (Yes=1)	Located in the surrounding of mountain area	
Other type of surrounding (S_Oth)	Dummy (Yes=1)	Located in the surrounding of other than sea, river or mountain area	
Presence of view			
Presence of sea view (V_Sea)	Dummy (Yes=1)	Presence of sea view from the property	
Presence of river view (V_River)	Dummy (Yes=1)	Presence of river view from the property	
Presence of mount view (V_Mout)	Dummy (Yes=1)	Presence of mountain view from the property	
Presence of green space (V_Gree)	Dummy (Yes=1)	Presence of green space from the property	
Presence of street view (V_Strt)	Dummy (Yes=1)	Presence of street view from the property	
Presence of building view (V_Bldg)	Dummy (Yes=1)	Presence of building view from the property	
View impact			
Panoramic sea visibility (Sea_1)	Dummy (Yes=1)	Visibility level of sea view observed from the property – Panoramic	
Partial sea visibility (Sea_2)	Dummy (Yes=1)	Visibility level of sea view observed from the property – Partial	
Poor sea visibility (Sea_3)	Dummy (Yes=1)	Visibility level of sea view observed from the property - Poor	
Absence of sea visibility (Sea_4)	Dummy (Yes=1)	Visibility level of sea view observed from the property – Absent	
Panoramic river visibility (River_1)	Dummy (Yes=1)	Visibility level of river view observed from the property – Panoramic	
Partial river visibility (River_2)	Dummy (Yes=1)	Visibility level of river view observed from the property – Partial	
Poor river visibility (River_3)	Dummy (Yes=1)	Visibility level of river view observed from the property – Poor	
Absence of river visibility (River_4)	Dummy (Yes=1)	Visibility level of river view observed from the property – Absent	
Panoramic mountain visibility (Mout_1)	Dummy (Yes=1)	Visibility level of mountain view observed from the property – Panoramic	
Partial mountain visibility (Mout_2)	Dummy (Yes=1)	Visibility level of mountain view observed from the property – Partial	
Poor mountain visibility (Mout_3)	Dummy (Yes=1)	Visibility level of mountain view observed from the property – Poor	
Absence of mountain visibility (Mout_4)	Dummy (Yes=1)	Visibility level of mountain view observed from the property – Absent	
View proximity			
Sea frontage (Frt_Sea)	Dummy (Yes=1)	Property located at sea frontage	
River frontage (Frt_Riv)	Dummy (Yes=1)	Property located at river frontage	
Mountain frontage (Frt_Mou)	Dummy (Yes=1)	Property located at foot of mountain	

4.0 RESULTS AND DISCUSSION

4.1 Sample Profile

The general profile of the sample is summarized in Table 2. The sample comprised 31% of terraced houses, 35% of semi-detached houses, and 34% of detached houses priced at the mean of RM 220,114 per unit. These houses have 2-6 bedrooms.

The sample comprised 76% freehold and 21% open-title[1] residential properties, respectively. Out of the sample, 26% of the houses were transacted after 2009 while the rest were transacted at earlier dates. Almost all, i.e. 95% of the houses were developer-designed and they were in good condition. The mean land area was 306.12 sq. m. while that of the building was 144.64 sq. m. giving the meanbuilt-up area of 47.25% per property. The houses were quite close to the town whereby the mean distance was about 8.5 km. With the mean distance of only about 1.0 km away, many houses were also close to major roads. However, only 10% of the houses were located close to clubhouse.

The geographic backdrop of houses in the study area was generally dominated by mountains and rivers. However, most areas have multiple elements of environmental amenity with green space, buildings, mountains, and streets dominating the landscapes. Less than 1% of the houses have sea view background making this type of amenity as a scarce environmental resource.

4.2 The Regression Results

Table 3 shows the regression results for the five model specifications. Model 1 is the base model that includes only essential property attributes. Models 2 through 5 test how much the different ways of environmental amenity impact assessment could have changed the level of explained variation in house price.

Based on the R^2, the variation in house price was mostly explained by Model 5. By assessing environmental amenity as 'view impact' against the explained variation in house price, Model 5 has an improvement of 41.73% over Model 1 (the base model), 32.56% over Model 2 ('geographic surrounding'), 32.89% over Model 3 ('presence of view'), and 30.67% over Model 4 ('view proximity').In the same way, based on the $\overline{R}^2$, Model 5 has an improvement of the explained variation in house price of 43.42%,41.36%, 35.50%, and 32.37% over Models 1, 2, 3, and 4, respectively. Thus, considering both *type* and *quality* of environmental amenity can be the best way to assess the impact of environmental amenity on property value. Accordingly, the following discussion is basically based on Model 5 though some reference is also made to other models.

[2] An open-title property is an unrestricted property that can be owned by other than the Malays.

Table 2: Sample's descriptive profile

	Basic sample profile					Scenic quality and view		
Variables	N	Min.	Max.	Mean	Std. Dev	N	%	% of cases
Price (RM)	442	80000	1000000	220114.17	110470.27	-	-	-
Freehold property	442	0	1	0.76	0.427	-	-	-
Open title holding	442	0	1	0.21	0.408	-	-	-
Date of transaction	442	0	1	0.26	0.438	-	-	-
Terraced house	442	0	1	0.31	0.462	-	-	-
Semi-detached house	442	0	1	0.35	0.478	-	-	-
Detached house	442	0	1	0.34	0.475	-	-	-
Number of storey	442	1	3	1.48	0.524	-	-	-
Number of bedroom	442	2	6	3.51	0.657	-	-	-
Design of building	442	0	1	0.95	0.213	-	-	-
Condition of building	442	1	3	2.01	0.184	-	-	-
Land area	442	61	3439.99	360.107	295.34648	-	-	-
Building area	442	67.23	1173.33	144.64383	80.596837	-	-	-
Distance to CBD	442	0.5	16.1	8.5238	3.59992	-	-	-
Distance to major road	442	0.1	6	1.0048	0.90686	-	-	-
Availability of clubhouse	442	0	1	0.10	0.3	-	-	-
Sea surrounding	442	0	1	0.07	0.252	30	1.00	6.80
River surrounding	442	0	1	0.40	0.49	176	5.60	39.80
Mountain surrounding	442	0	1	0.43	0.495	188	6.00	42.50
Presence of sea view	442	0	1	0.06	0.244	28	0.90	6.30
Presence of river view	442	0	1	0.17	0.374	74	2.40	16.70
Presence of mountain view	442	0	1	0.63	0.482	280	9.00	63.30
Presence of green space view	442	0	1	0.81	0.389	360	11.50	81.40
Presence of street view	442	0	1	0.38	0.487	170	5.40	38.50
Presence of building view	442	0	1	0.66	0.476	290	9.30	65.60
Panoramic sea view	442	0	1	0.02	0.133	8	0.30	1.80
Partial sea view	442	0	1	0.04	0.193	17	0.50	3.80
Poor sea view	442	0	1	0.01	0.082	3	0.10	0.70
Absence of sea view	442	0	1	0.94	0.244	414	13.20	93.70
Panoramic river view	442	0	1	0.03	0.163	12	0.40	2.70
Partial river view	442	0	1	0.08	0.274	36	1.20	8.10
Poor river view	442	0	1	0.06	0.236	26	0.80	5.90
Absence of river view	442	0	1	0.83	0.374	368	11.80	83.30
Panoramic mountain view	442	0	1	0.07	0.252	30	1.00	6.80
Partial mountain view	442	0	1	0.29	0.453	127	4.10	28.70
Poor mountain view	442	0	1	0.28	0.449	123	3.90	27.80
Absence of mountain view	442	0	1	0.37	0.483	163	5.20	36.90
Sea frontage	442	0	1	0.01	0.116	6	0.20	1.40
River frontage	442	0	1	0.09	0.281	38	1.20	8.60
Mountain frontage	442	0	1	0.07	0.259	32	1.00	7.20

Table 3: Comparison of different ways of variable specification

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
	(Base)	(Geographic surrounding)	(Presence of view)	(View proximity)	(View impact)
R^2	0.496	0.506	0.529	0.538	0.703
Adj. R^2	0.479	0.486	0.507	0.519	0.687
F-value	30.017	25.563	23.649	28.993	43.001
SEE	79700.984	79173.188	77589.071	76614.272	61846.149
Sample size	442	442	442	442	442
Independent variables	Coefficient (t-value)	Coefficient (t-value)	Coefficient (t-value)	Coefficient (t-value)	Coefficient (t-value)
(Constant)	-199512.070 (-3.576)**	-194427.206 (-3.459)**	-132964.347 (-2.339)**	-141986.950 (-2.606)**	15608.918 (0.344)
General Attributes:					
Open title holding	54915.294 (5.110)**	53518.311 (4.773)**	55234.004 (5.168)**	47962.654 (4.545)**	47691.755 (5.487)**
Freehold property	5196.740 (0.474)	1374.004 (0.122)	16055.842 (1.423)	7810.603 (0.715)	20039.891 (2.207)*
Date of transaction	28791.895 (3.264)**	28530.584 (3.249)**	23244.849 (2.657)**	27895.335 (3.283)**	14356.318 (2.047)*
Semi-detached house	65828.552 (5.956)**	59398.723 (5.239)**	56391.511 (5.104)**	52798.837 (4.842)**	41909.583 (4.692)**
Detached house	100423.863 (7.433)**	90412.938 (6.489)**	89815.055 (6.556)**	92554.970 (7.091)**	78744.313 (7.250)**
Number of storey	70042.347 (6.523)**	68510.025 (6.392)**	57470.367 (5.237)**	67380.619 (6.513)**	51459.461 (5.859)**
Number of bedrooms	17501.436 (2.552)**	15864.053 (2.311)**	16696.242 (2.490)**	11364.590 (1.681)	-220.359 (-0.040)
Design	45772.090 (2.287)**	38859.396 (1.937)	47298.692 (2.350)**	36108.333 (1.870)	1224.793 (0.076)
Building condition	54949.650 (2.494)**	58699.881 (2.667)**	47963.481 (2.204)**	46969.468 (2.205)*	28923.082 (1.671)
Land area	38.270 (2.065)*	42.895 (2.315)**	44.697 (2.456)**	31.218 (1.748)	1.720 (0.116)
Building area	114.293 (1.751)	117.698 (1.812)	121.272 (1.897)	93.526 (1.488)	12.190 (0.238)
Distance to CBD	-3579.914 (-2.532)**	-3212.847 (-2.203)**	-4545.786 (-3.118)**	-3282.532 (-2.402)**	-4255.688 (-3.784)**
Distance to major roads	12264.988 (2.401)**	14768.549 (2.812)**	9185.410 (1.759)	7569.296 (1.502)	4988.499 (1.172)
Availability of club house	81279.727 (4.843)**	75373.659 (4.306)**	47860.407 (2.565)**	64092.035 (3.782)**	31407.540 (2.074)*
Geographic surrounding					
Sea area surrounding		47475.568 (2.336)**			
River area surrounding		3225.010 (0.238)			
Mountain area surrounding		-1906.858 (-0.142)			
Presence of view					
Presence of sea view			14169.948 (0.850)		
Presence of river view			25365.640 (1.921)		
Presence of mountain view			9324.351 (1.022)		
Presence of green space			-3470.615 (-0.316)		
Presence of street view			-17052.921 (-2.011)*		
Presence of building view			-34797.219 (-3.827)**		
View proximity					
Sea frontage				91602.448 (2.694)**	

River frontage	83871.666 (5.669)**	
Mountain frontage	15853.749 (1.058)	
View impact		
Panoramic sea view		117043.301 (4.805)**
Partial sea view		1778.706 (0.104)
Poor sea view		48008.133 (1.315)
Panoramic river view		332224.932 (13.854)**
Partial river view		46070.853 (3.745)**
Poor river view		7006.485 (0.485)
Panoramic mountain view		78689.960 (5.886)**
Partial mountain view		34757.415 (4.140)**
Poor mountain view		-21509.417 (-2.562)*

* Significant at 5% level (critical t-value = 1.960)
** Significant at 1% level (critical t-value = 2.576)

Based on Model 5, open-title holding, freehold property, date of transaction, semi-detached house, detached house, number of storey, and distance to central business district (CBD), and availability of clubhouse were all essential attributes that have significantly influenced house price. All variables have the correct expected sign. Panoramic sea view, panoramic/partial river view, and panoramic/partial mountains view were three most important environmental amenity elements that have significantly influenced house price in the study area. Except for 'poor mountain view', all variables have correct expected positive sign. ['Absence of view' was used as a control group.] In particular, 'sea' amenity variable was statistically robust as, except for Model 2, it remained statistically significant and theoretically plausible across different variable specifications. As expected, all models show that distance of property to CBD has a significant negative impact on house price. This variable was the most robust of all as it remained statistically significant and theoretically plausible across different variable specifications.

Other significant price-distracting factors (based on Model 3), in an ascending order and with *ceteris paribus* assumption, were presence of street view, poor Mountain View, and presence of building view. By contrast, three major environmental amenity elements related to price-contributing factors, in an ascending order and with *ceteris paribus* assumption, were panoramic river view, panoramic sea view, and panoramic mountain view. Others included partial river view, sea frontage, and river frontage.

In general, with a panoramic sea view, a standard house could have significantly added almost RM117,043 more (about 53.17% of the sample's mean price) to its value compared to the one without any sea view. By the same token, a similar house with panoramic river view could have significantly added almost RM332, 325 more (about 150.93% of the sample's mean price) to its value compared to the one without any river view. This suggests that sea view was not considered more valuable than river view in the housing market in the study area. This finding was in contrast to the finding from the interview that sea view ranks first as the most important source of environmental amenity associated with house price. It was also not consistent with some previous studies cited under Section 2.1. Nonetheless, Notie *et al*. (1995) discovered that due to the easy access to public good, river view could have added [a greater] value to house price.

Table 4: Impacts of environmental amenity elements on house price

	Stated preference	Revealed preference			
Environmental amenity element	**Rank**	**Geographic surrounding**	**Rank**	**View impact/ Proximity**	**Rank**
Panel A: Price premium contributing attributes					
Sea	1	Surrounding (M2) Presence (M3)	1 2	Frontage (M4) View impact (M5)	1 2
River	2	Surrounding (M2) Presence (M3)	2 1	Frontage (M4) View impact (M5	2 1
Mountains	3	Surrounding (M3) Presence (M3)	- 3	Frontage (M4) View impact (M5)	3 3
Green space	4	Presence of view (M3)	-	-	-
Urban landscape	5	Presence of view (M3)	-	-	-
Lake**	6	n.a.	n.a.	-	-
Open space**	7	n.a.	n.a.	-	-
Panel B: Price discount contributing attributes					
Sea	1	-	-	-	-
River	2	-	-	-	-
Mountain	3	Surrounding (M2)	1	View impact	1
Green space	4	Presence of view (M3)	2	-	-
Urban landscape	5	Presence of view (M3)	1	-	-
Lake**	6	n.a.	n.a.	-	-
Open space**	7	n.a.	n.a.	-	-

* Significant only at $\alpha = 0.2$ for two-tail test.
** Excluded from regression equation due to lack of nomination from prospective buyers.
n.a. Not available in the study.
M1,…, M5 refer to Models 1,...,5, respectively (as shown in Table 4).

Table 4 indicates how people rank the elements of environmental amenity (based on their expectation) and how these elements were really being priced in the property market. Sea and mountain views were almost consistently regarded as important positive elements of environmental amenity both in terms of people's expectation and actual market transaction. Presence of green space is both important to people's expectation and market transaction while urban landscape is not important to people's expectation and also negatively influencing property price. Presence of sea view, river view, or mountains view, although could have a positive impacton house price, was not found to be statistically significant.

5.0 CONCLUSION

Our study has provided evidence of how people in a developing market value environmental amenity in the context of house purchase. Primary data from a questionnaire survey were collected in order to identify important factors of view. The results have shown that view impact was the most important aspect of environmental amenity that influences house prices in the study area. Besides, homebuyers in Terengganu could have regarded sea, river, and mountain as the key sources of environmental amenity in a descending order. Results from both interviews and regression analysis have indicated that sea view as the most valued environmental amenity. It is interesting to note that this finding was similar to that of Damigos and Anyfantis' (2011).

This study has two main implications. First, property appraisal or valuation tasks in Malaysia need to explicitly account for environmental elements in assessing property value. In particular, a standard approach to examining the influence of environmental factors needs to be in place in property development appraisal or valuation in Malaysia. Environmental amenity should continue to exist to preserve sustainable property market.

This means, while property market should continue to grow in Malaysia, it must not take place at the expense of environmental preservation and protection, especially in the rural areas.

Second, environmental management in Malaysia needs to continue to focus on sustainable tourism by maintaining the rural amenity as much as scenic views are concerned, not only because these can sustain the natural environment and attract visitors but also can maintain the attractiveness of rural land market.

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