What's in a View ?

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Abstract

The impact of views on property values has not been the specific focus of as much research as has the impact of other externalities on property values. When the impact of views is assessed, this is often done by simply adding a dummy variable for views in hedonic regression equations. This paper provides a detailed literature review as well as an empirical analysis of the impact of a view on residential property values using a very rich database of nearly 5,000 sales in Auckland, New Zealand. Several dimensions of a view are analyzed (type of view, scope of view, distance to coast, and quality of surrounding improvements). It is found that wide views of water add an average of 59% to the value of a waterfront property, but that this effect diminishes quite rapidly as the distance from the coast increases. Attractive landscaping and buildings in a property's neighborhood on average add 5% and 37% to value, respectively. Particularly attractive improvements in the immediate surroundings of a property add another 27% to value on average. Our results lead to the conclusion that aesthetic externalities are multi-dimensional and can have a substantial impact on residential property values.

Keywords: Views, Property Values, Hedonic Models, Externalities

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1. Introduction

The value of a residential property depends on its physical and locational characteristics. The number of rooms, age of the property, condition of the building, and size of the lot are important physical characteristics that are usually easily measurable. Variables pertaining to the location of a property should comprise neighborhood quality variables, but also variables measuring the relative location of properties within a city. The quality of neighborhoods is often measured using socio-economic variables such as median income or the unemployment rate (see Lang and Jones, 1979, for an early discussion). Variables pertaining to the location of properties can in some cases be measured using a Geographic Information System (GIS). Examples of this include distance to the central business district (CBD), to shops, or to schools. Other variables such as the quality of landscaping require an on-site inspection. Assessing the quality of a view also requires an inspection of the property, although advances in GIS could permit the precise measurement of views in the future using topographical data (Lake *et al*., 1998, 2000a, 2000b; Paterson and Boyle, 2002).

The analysis of views should be placed in the wider context of the analysis of the impact of externalities on property values. The impact on property values of several externalities is reviewed in Boyle and Kiel (2001), but surprisingly papers that have analyzed the benefits of a view on property values are not reviewed in that article. Historically, a view was sought primarily for strategic reasons: a dominating spot would enable the owner to be aware of possible intruders. Today, a view is sought mainly for aesthetic reasons.[1] Although good views are often associated with easy access to nature, the two effects should clearly be disentangled. Access to

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[1] Researchers who measure the value of water views and other aesthetic attributes of the environment usually assume that certain types of views and scenery are attractive without attempting to understand why. An interesting attempt to explain the appeal of views is provided by Appleton (1975) who suggests that humans are biologically programmed to prefer vantage points where it is possible to see a good deal without necessarily being seen. This 'prospect-refuge' theory is summarized along with a number of other theories of environmental aesthetics in Bourassa (1991).

nature permits various physical activities and can be measured using distance variables. Views on the other hand are more difficult to measure. Most studies have used a dummy variable to capture the impact of a view. Some recent studies have used a number of dummy variables to measure different types and qualities of views. For example, Benson *et al.* (1998) examine the impact of views in Bellingham, Washington. They use four levels of ocean view (full, superior partial, good partial, and poor partial), two levels of lake view (view from a lakefront property and view from a non-lakefront property), and whether or not the property has a mountain view. A full ocean view commands an average premium of 59%, while a lakefront property would sell at a 127% premium. Also, they find that for properties with an ocean view, the premium decreases with distance from the coast.

Views are found to have positive impacts on value in most empirical studies (Darling, 1973; Pollard, 1980; Do and Sirmans, 1984; Tyrväinen and Miettinen, 2000; Bond *et al*., 2002), although some studies have reported insignificant impacts (Davies, 1974; Brown and Pollakowski, 1977; Correll *et al*., 1978; Paterson and Boyle, 2002). Also, it is generally found that value decreases as distance from the view feature increases (McLeod, 1984; Smith, 1994; Tyrväinen and Miettinen, 2000). Several studies suffer, however, from a poor definition of view, from measurement error or from a small sample size.

In this paper, we argue that the benefits from having a view should not be limited to natural features such as the ocean, a lake, mountains, or a forest, but should also include the benefits associated with attractive landscaping in the area and with quality of surrounding improvements. In other words, when analyzing the impact of views one should include measures of the visual quality of the immediate surroundings of the property in question as well as the overall appearance of the neighborhood in which the property is located. McLeod (1984) addresses this issue but only considers one dummy variable for view and one for above average landscaping in the neighborhood. Both variables are found to be highly significant. Using a rich database of sales transactions for Auckland, New Zealand, we are able to consider two types of view (over water and land), three scopes of view (wide, medium, and narrow), and the distance to the coast for properties with water views.[2] Additionally, we consider the appearance of properties

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[2] Auckland data have been used in previous studies (Kask and Maani, 1992; Bourassa *et al*., 2003), but with a single views dummy variable only.

immediately surrounding the property in question as well as the appearance of landscaping and structures in the general neighborhood of each property.

As no comprehensive review exists of the methods used and of the results obtained when investigating the impact of a view on residential property prices, the paper first provides a detailed analysis of such research (section 2). This section includes a summary table of the methods used and results reported in previous studies. The remainder of the paper is organized as follows. In section 3 we present our hypotheses, while we outline the data and method in section 4. Section 5 summarizes our results. Finally, section 6 offers some concluding remarks, including suggestions for further research.

2. Literature Review

The analysis of the impact of a view should be placed in the wider context of the impact of externalities on property values. Boyle and Kiel (2001) survey hedonic house price studies of the impact of environmental externalities. The reviewed externalities are air quality, water quality, and distance from toxic or potentially toxic sites. The reported coefficients on water quality and undesirable land uses are mostly significant, while those on air pollutants are usually insignificant. The survey by Boyle and Kiel does not cover all types of externalities. A large body of literature exists on other types of externalities. Willis and Garrod (1993a) for instance examine the impact on property values attributable to a canal or inland waterways. They find that waterside frontage commands a premium of 2% in London and 6% in the Midlands, while waterway proximity adds 1% in value in London but nothing in the Midlands. Mahan *et al*. (2000) analyze the value of wetland amenities in the Portland, Oregon, metropolitan area. Property values are shown to be influenced by size of the nearest wetland, but not by wetland type. Further, values are negatively related to distance to a stream and to a lake, but no significant relation is found between values and distance to a river or to a park. Also, Thorsnes (2002) finds that building lots that border forest preserves sell at premiums of 19% to 35%.

Although most studies that analyze the impact of externalities on property values use the hedonic pricing method, other methods have also been used.[3] Willis and Garrod (1993a, 1993b)

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[3] Price (1978) provides an overview of various methods that have been used to assess the economic value of aesthetic aspects of the environment.

use opinions of the incremental value of property attributable to an environmental feature.[4] This is known as the contingent valuation approach. Willis and Garrod (1993a) use both this approach and the hedonic method and report substantially different results. The authors suggest various reasons that could help explain the discrepancies in results, but no definite answer is given as to the superiority of one approach over the other. The contingent valuation method is also discussed by Cropper and Oates (1992) who state that 'perhaps the most serious criticism is that responses to contingent valuation questions are hypothetical—they represent professed, rather than actual willingness to pay' (p. 710). A good example of this that is related to the current study is the article by Vadnjal and O'Connor (1994). Contingent valuation is used to examine how much people would be willing to pay to keep their views of Rangitoto Island (in Auckland, New Zealand). They conclude that 'respondents might be seen to be expressing views about how things ought to be in society' (p. 369). Earnhart (2001) argues that a stated-preference method, choice-based conjoint analysis, can be used in combination with hedonic models to estimate more accurately the aesthetic benefits generated by environmental amenities. As for any stated preference method this approach's drawback resides in the hypothetical nature of the questions and choices. This method is useful in valuing uncommon attributes, however. Another method that has been used to measure the impact of externalities is the artificial neural network (ANN) approach. Collins and Evans (1994) for instance examine the impact of airport noise on residential values, while the effect of air pollution is investigated by Shaaf and Erfani (1996). The ANN method, however, has been severely criticized for being a 'black box' approach.

Table 1 contains a chronological list of the studies that have analyzed the impact of a view on house values.[5] The table lists the authors, year of publication, location of the study, type of data, number of observations, type of view, method used, and main results. Several features emerge from the table. First, most articles have used data pertaining to a U.S. city for their empirical analysis. The non-U.S. cities that are analyzed are Nottingham (England), Perth and Sydney (Australia), the district of Salo (Finland), Saskatoon (Canada), Auckland (New Zealand), and Glasgow (Scotland). Second, most studies have examined the impact of a water view (ocean, lake or river), while the other types of view have less often been the focus of research. Third,

[4] See also Brookshire *et al*. (1982) who compare survey and hedonic approaches.

[5] The impact of views has also been examined for other types of properties (for ranches, see e.g. Spahr and Sunderman, 1995; for agricultural land values, see Bastian *et al*., 2002).

some authors do not specify the type of view that is considered. This reflects the fact that an appropriate definition of a view is no easy task. Fourth, while most of the earlier studies have used only a dummy variable for view, most of the more recent studies use both a dummy variable and a variable measuring distance to the view source. Only one study (Benson *et al*., 1998) has examined the impact of different types of view and of the scope of the view on property values. Finally, some recent studies have used GIS to analyze topographic and remotely sensed land cover data, but due to measurement error the results are in many cases counter-intuitive or inconclusive.

[Insert Table 1 here.]

Most studies conclude that view has a positive impact on residential values, with a wide range of 1% (Beron *et al*., 2001) to 147% (Benson *et al*., 1997).[6] A wide range for the positive impact of a view would be expected for at least three reasons. First, different types of views are considered, in different cities and for different time periods. Second, methods vary substantially across studies. When one single dummy variable is used, an average effect is obtained, while when several view scopes and types are considered, a range of impacts is obtained rather than an average value. Third, some studies account for distance from the water body, while others do not. Studies that control for distance find that the impact of a view is greatest at the waterfront (e.g. the 147% figure cited).

The study by Benson *et al*. (1998) requires careful consideration as it considers different types and scopes of view. Four dummy variables for different scopes of ocean views, one dummy variable for lakefront properties, one dummy variable for non-lakefront properties, and one dummy variable for mountain views are used. A full ocean view commands a premium of 59%, a superior partial ocean view a premium of 31%, a good partial ocean view a premium of 29%, a poor partial ocean view a premium of 8%, a lakefront location a premium of 127%, a lake view from a non-lakefront property a premium of 18%, while the premium amounts to 9% for a mountain view. McLeod (1984) finds that both river views and a views-related variable have positive impacts upon values. The views-related variable pertains to the quality of landscaping in

[6] A few early studies have concluded that view does not significantly affect property values (Davies, 1974; Brown and Pollakowski, 1977; Correll *et al*., 1978). Not much emphasis should be placed on the results contained in these studies, however, as the type of view is not specified (Davies, 1974) and sample sizes are very small (all three studies).

the neighborhood as compared to the city as a whole. Views command a premium of 28%, while the premium is 3% when the quality of neighborhood gardens is above average.

Recent research efforts have also focused on deriving various visibility measures using GIS data, in some cases without inspections of the properties. Although great progress has been achieved in developing such data, current results should still be considered with caution as the visibility measures are prone to measurement error. Lake *et al*. (1998) for instance find that the visual impact of a road depresses the average property price by 2.5%. However, estimates for individual variables show that a road visible from the back of a property has a positive impact upon prices whereas a road visible from the front has a negative impact, a result that is counter-intuitive. Also, Paterson and Boyle (2002) find that visible developed property has a negative impact on property values, but that forest visibility also has a negative impact upon values. Finally, Lake *et al*. (2000a) report that, out of a variety of visual impact variables considered, only railways visible from the back of the property have an impact that is consistent with prior expectations.

The quality of the surrounding landscaping and improvements generates aesthetic benefits and should clearly also be taken into account when analyzing the impact of a view on property values.[7] Li and Brown (1980) consider a variable that measures the quality of views from each site on a five-point scale. They find that property value increases by 2.1% for each category. Des Rosiers *et al*. (2002) examine the impact of landscaping characteristics of homes and their immediate environment (i.e. the adjacent neighborhood visible from the transacted properties) in Quebec City. Environmental information was captured from the front and side of houses and includes 31 attributes dealing with trees, flowers, roof arrangements, balcony arrangements, etc. Not all variables relate to externalities, but it is found for instance that landscaped curbs increase value by 4.4%. However, a variable measuring density of visible vegetation is found to be negatively related to house values. Considering the distribution of this variable, the authors argue that this result is due to excess tree cover.

Several studies have considered both a dummy variable (or dummy variables) for views and a distance to the view feature variable. A negative relationship is always reported between

[7] Landscaping of the property itself is not an externality and, therefore, is not an example of the kind of characteristic we focus on here. Examples of papers that have examined the impact on value of the property's landscaping are Anderson and Cordell (1985, 1988) and Dombrow *et al*. (2000).

distance and property values. Pollard (1980) for instance reports that advertised rents in Chicago decline by 9% per mile with distance from Lake Michigan, and by 4% per mile with distance from the Loop (Chicago's CBD). In their study of Salo, Finland, Tyrväinen and Miettinen (2000) find that an increase of one kilometer in the distance to the nearest forested area decreases value by 6%. If the impact on value is to be measured accurately it is probably best to include a distance variable that is interacted with the view variable. Such an approach is used by Benson *et al*. (1998), who interact distance from the ocean with view of the ocean. At 0.1 mile from the coast, the value of a property with a full view is 68% higher than that of a property without a view, while a property with a poor partial view commands a premium of 26%. The positive impact of a view diminishes with distance to coast. At a distance of two miles, properties with a full view have a premium of 31%, while the premium is only 4% for properties with a poor partial view.

3. Research Questions

Our objective is to comprehensively measure the price impacts of the various components of a view. Stated somewhat differently, we seek to measure the impacts of environmental externalities that could be classified as 'aesthetic'. To a fairly standard hedonic price model, we add indicators of panoramas and vistas of bodies of water and of landscapes that fall within the typical definition of view. As noted above, numerous previous studies have included these kinds of measures in hedonic analyses. We also add variables measuring distance from the coast for properties with water views; our review of the literature suggests that this kind of variable has been employed only once before, by Benson *et al.* (1998).

To those variables, we add a series of variables measuring: the quality of the properties immediately surrounding the property in question; the quality of landscaping in the neighborhood; and the quality of the houses in the neighborhood. These quality measures are based on the appearance, or aesthetic appeal, of the view from the property in question or the landscape that one views as one is approaching or departing from the property. Relatively few studies have measured the external impacts of these types of environmental features; we are aware of only three such studies: Li and Brown (1980), McLeod (1984), and Des Rosiers *et al.* (2002). Of these, only McLeod includes measures of both water view (a dummy variable for a view of a river) and neighborhood landscaping (a single dummy for above average quality).

We use Auckland, New Zealand, as a case study, in part due to the richness of the transactions data, but also due to the abundance of properties with views. For this analysis, we use data for one year, 1996. Clearly, the results from a limited case study of this sort cannot be generalized to other times and places. The relatively fixed supply of views of water and land suggests that the percentage impact of such externalities will vary depending on where a housing market is in the property cycle. Benson *et al.* (1988) find some evidence of this in their multi-year study of Bellingham, Washington. In Auckland, the housing market was near the top of the property cycle in 1996, suggesting that the percentage impacts we measure will be relatively large. Moreover, as a city grows over time, demand for properties with views will increase and the percentage premium for a view over water or land will increase. In comparing impacts across different cities, the value of a view will vary depending on the relationship between the relatively fixed supply of properties with views and the demand for those properties. In cities with larger populations, larger average household incomes, and smaller percentages of properties with views, the premiums should be higher, all else equal. We suggest that comparisons over time and place would be an interesting topic for future research.

In contrast to the relative fixity of supply of properties with views over water or land, the supply functions for attractive houses and landscaping should be relatively flat, at least in the long run. This suggests that the premiums for these environmental features should not vary so much as the premiums for water and land views vary with the property cycle, as a city grows, or across cities. Again, this would be an interesting hypothesis to explore in future research.

4. Data and Method

The main source of data for this study is the official database of all real estate transactions in New Zealand.[8] We selected transactions involving residential detached and semi-detached properties occurring in the City of Auckland in 1996. Auckland is one of several local government jurisdictions in the largest metropolitan area in New Zealand. Located on an isthmus, Auckland is largely surrounded by water, with the Waitemata Harbour and Hauraki Gulf to the north and Manukau Harbour to the south (see Figure 1). Given the above average potential

[8] We thank Greg Schwann, former Director of the Real Estate Research Unit at the University of Auckland, for providing the data.

for water views and the large number of transactions each year, Auckland is an appealing place to study our research topic.

[Insert Figure 1 here.]

From the subset of residential detached and semi-detached properties we further selected those properties for which a special set of mass appraisal variables was provided.[9] Those mass appraisal variables include measures of: the type of view (water or other) and the scope of view (narrow, medium, or wide); whether the property has been modernized; whether the property is elevated, level, or sunken; the quality of landscaping of a given property; and the quality of the improvements surrounding a given property (see Table 2). These special mass appraisal variables supplement the basic variables in the database. The basic variables include measures such as: the age of the house; floor size; land area; quality of the principal structure; and the date of the transaction, which we used to assign transactions to quarters. To these variables we added two more calculated with the aid of a geographic information system (GIS): distance to the central business district (CBD) and the shortest distance to the coast. We used GIS to locate properties within census area units (similar to census tracts in the United States), and then defined a series of dummy variables for the area units. These variables served to control for the overall quality of each neighborhood.

[Insert Table 2 here.]

We also constructed a number of new variables, including one for 'cross-leased' or 'strata-titled' properties. Although a positive land area is provided for a majority of the transacted properties, a significant percentage have a land area of zero. These properties are generally cross-leased, which means that the land is owned collectively by the owners of the dwellings on that site. The collective owners lease a fraction of the land to each owner for a 'peppercorn', or nominal, rent.[10] Alternatively, these properties may be strata-titled, i.e. they may

[9] We deleted transactions for properties that were classified as subdivisible (because the sale price might represent potential for redevelopment), had floor sizes of less than 30 square meters or greater than 360 square meters (probably errors in data entry), or had missing data for any of the variables of interest. We also deleted transactions that were not considered to be 'arm's length' by the appraisers or were identified as 'outliers', meaning that they had some unusual qualities that made them inappropriate for inclusion in a mass appraisal model.

[10] Cross-leasing is a simplified form of condominium ownership. There are no condominium associations or dues or formal arrangements for maintenance of common property. Instead, all owners participating in a cross-lease must

be condominiums. The cross-leased/strata-titled variable captures part of the land value for these properties. Other constructed variables include the neighborhood means for the quality of principal structure variables and the quality of landscaping variables.[11] Finally, we created a series of new view variables by interacting the water view and other view variables with the scope of view variables and interacting the water view variable with the distance to the coast variable.

The dependent variable in the model is a transformation of the sale price net of chattels.[12] We use the natural logarithm of the net sale price in order to make the distribution of the dependent variable more normal. We use the logarithms of floor size and land area to reflect diminishing returns to scale. The logarithms of distance to the CBD and to the coast are used to capture the expected negative exponential relationships between property values and these variables.[13] Finally, we experiment with various powers of the age of the house to capture the cycles of depreciation and refurbishment that take place over the life cycle of dwellings and neighborhoods.

Our strategy is to estimate a series of hedonic equations, the first of which omits view variables. Our second model adds a series of variables related to views over water and land, while the third model adds variables related to the typical appearance of landscaping and structures in the neighborhood of the property in question. This procedure allows us to measure how much explanatory power is added by including measures of view in the model, while also providing us with estimates of the significance and percentage impacts of each of the view-related variables.

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abide by the ad hoc decisions of owners of a majority of the units. Peppercorn rents are on the order of 10 cents per year and are typically not collected.

[11] In these cases the neighborhood boundaries were those defined by the appraisers (referred to as 'valuation rolls') rather than the area units defined for the census.

[12] 'Chattels' refers to any personal property included in a transaction. Alternatively, we could have defined the dependent variable in terms of the gross sales price and included a variable for the value of chattels in the model.

[13] For a review of the theory and empirical evidence that supports the negative exponential relationship between value and distance from the CBD, see Mills and Hamilton (1994).

5. Results

Table 3 contains the results of the hedonic regressions. As mentioned in the previous section, three hedonic regressions were performed. The first model contains none of the aesthetic externalities considered in this paper, i.e. it considers only land and improvement characteristics and the quarter in which the sale took place. In the second model, the views and scope interacted variables are added, as well as the water views and distance to coast interacted variables. Finally, the third model additionally incorporates the quality of improvements and landscaping in the neighborhood, and the quality of immediately surrounding improvements. Model 1 has an adjusted R-squared of .63. As could be expected, the floor size and the land area are important determinants of dwelling values. The leased variable would also be expected to be positive as for these properties the land area is not reported, hence this variable is capturing part of land value. The age variables have signs consistent with a cyclical pattern of depreciation and renovation. Values decrease with distance to CBD, but increase with distance from the coast. The latter relation appears counterintuitive at first glance, but can be explained in the case of the city of Auckland by accessibility to the main road networks. Indeed, in Auckland these networks are not near the coast, so locations close to the coast have more limited access to the main roads, and a negative relation between distance from the coast and property values would be expected. At the more micro level, accessibility also plays a role in that level properties are more desirable than sunken or elevated properties.

[Insert Table 3 here.]

When the interacted view variables are added into the model (Model 2) the adjusted R-squared increases by one percentage point to .64. The sign and magnitude of the variables that were already included in Model 1 remain by and large unchanged. The distance to coast variable, however, becomes even more negative, emphasizing the accessibility influence once the views and distance to coast interacted effects have been controlled for. Water views have a positive impact on property values and this effect increases with the scope of the view (significant for medium and wide scopes). For properties with a wide scope of water views, the average impact on value at the coastline amounts to 65%. This number may seem large compared to the results reported in some of the studies that are reviewed in section 2. However, most of these studies have used a single dummy variable for views, hence their results represent the average impacts of views, whereas the 65% impact is for properties that have panoramic water views. Moreover, other studies have seldom considered both view dummy variables and a distance to coast variable, so that the coefficients reported in those studies are picking up the average effects of views both with respect to the scope of views and distance to the water. In our case, the coefficients on the views dummy variables are measuring the percentage impact of different scopes of views for properties situated at the coast. This impact diminishes with distance to coast. These reasons explain the discrepancy between the results we report here and those by Bourassa *et al*. (2003), for example, who report an average impact of views of approximately 8%.

Our results further suggest that the negative effect of distance to the coast increases with the scope of the water view, and that the negative impact of distance to the coast is greatest for properties with panoramic water views. This would be expected, as many properties with a wide scope of water views are oceanfront properties. Such a location is highly desirable (see also Benson *et al*., 1998), and property prices will decline quite rapidly with distance to coast. As far as views over land are concerned, they also command a positive premium on values, albeit far more limited than is the case for water views. For these other views, the scope of the view does not matter very much (the impact on value is in the narrow 5.7% to 7.7% range).

Our hypothesis is that a view has many dimensions and should not only encompass type and scope of view, but also the quality of the immediately surrounding improvements as well as the average quality of improvements (both structures and landscaping) in the neighborhood. It could be that some of the coefficients we have been reporting so far are biased by the fact that other dimensions of aesthetic externalities have so far been omitted. The main objective of this paper is to gauge the relative effects of each aesthetic externality on property values. For that purpose we further consider variables pertaining to the quality of surrounding improvements. These variables are the average quality of landscaping in the neighborhood (three levels), the average quality of structures in the neighborhood (three levels), and the quality of immediately surrounding improvements (four levels). The regression results for the full model (Model 3) are reported in the last column of Table 3. Although the adjusted R-squared increases only slightly (to .65), and the signs and significance of variables are mostly unchanged, the magnitudes of some coefficients change. This is, for example, the case for the coefficient on the log of distance to the CBD and for those on the superior quality of principal structures and landscaping (of the property itself). These variables explain less than in previous models, indicating that they were picking up some of the effects of aesthetic externalities in the earlier specifications.

The percentage impacts on property values of the views and of the appearance of immediately surrounding improvements are reported in Table 4. As the effects of water views vary by both scope of the view and distance to the coast, we report the effects of views for three different distances (at the coast, 1,000 meters from coast, and 2,000 meters from coast) for the two scopes of views that are statistically significant (medium and wide).[14] For the appearance of immediately surrounding improvements, the effects are measured as the percentage price difference as compared to a property that is in the category with the larger number of observations (i.e. the 'average' category which contains 75% of observations, see Table 2).[15] For the other two aesthetic characteristics, i.e. the quality of landscaping and that of structures in the neighborhood, it is necessary to take into account both the coefficients and the proportion of properties in a neighborhood in each of the 'superior' and 'poor' categories to examine their percentage impact on property values.[16] As for the appearance of immediately surrounding improvements, the default category is 'average'. For the purposes of estimating price impacts, the proportions of properties in each of the 'superior' and 'poor' categories are bounded at the actual maximum and minimum values observed in our dataset. The impacts of the appearance of landscaping and improvements in the neighborhood on property values are reported in Table 5.

[Insert Tables 4 and 5 here.]

The results contained in Table 4 demonstrate the importance of water views, but only when views have either a medium or a wide (panoramic) scope. At the coastline, a wide view commands a premium of 59% on average, compared with a premium of 33% for medium scope views. These premiums decrease quite rapidly as the distance to the coast increases (Figure 2). At 2,000 meters from the coast, for instance, these premiums are 14% and 12%, respectively. It

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[14] These effects are calculated as $100*[\exp^{(\beta_i + \gamma_i * \ln(\text{distance to coast}))} - 1]$, where β_i are the coefficients on each of the three scopes, i, of water view and γ_i are the coefficients for the distance to the coast and views interacted variables for each scope of water view (see Benson *et al*., 1998).

[15] These are calculated as $100*(\exp^{\beta_j} - 1)$, where β_j are the coefficients on the j dummy variables measuring the quality of immediately surrounding improvements (see Halvorsen and Palmquist, 1980).

[16] These percentage price impacts are calculated as $(\alpha_s\beta_s + \alpha_p\beta_p)*100$, where α_s and α_p refer to the proportion in the superior and poor categories, respectively, and β_s and β_p refer to the estimated coefficients for the 'superior' and 'poor' variables, respectively. We do not take the antilogs of the estimates in this case because the variables are continuous (see Halvorsen and Palmquist, 1980).

would seem worthwhile to compare these figures to those reported in previous research. Benson *et al*. (1998), for example, investigate the impact of water views both according to scope of the view and distance to the ocean. The results they report suggest that the positive impact of views in Bellingham, Washington, is greater than in Auckland, New Zealand. For a property with a full ocean view located 0.1 mile from the coast, for instance, the premium is 68%. Given that approximately 19% of the properties in their sample have an ocean view, as compared to 10% in our sample for Auckland, this result may seem surprising at first glance as one would expect that the implicit price of a characteristic would be affected by the supply of that characteristic. However, this assumes that the proportion of properties with a view in both samples is representative of the percentage of dwellings with a view in the overall population of houses. More to the point, the impact of views should affect primarily land values and not improvement values. Varying intensities of land use should therefore result in varying effects of views on total property values, making cross-city comparisons difficult, as intensity of use will differ across urban areas. Cross-city comparisons are further made difficult by the fact that the value of views is to some extent time-varying (see Benson *et al*., 1998), and market demand as well as supply varies from place to place. Also, the results by Benson *et al*. (1998) pertaining to the impact of ocean views on property values could be influenced to some extent by the fact that they do not consider most other types of aesthetic externalities that are investigated in the current study. On this issue it is interesting to note that the impact of water views for a property at the coast for wide and medium scopes is 65% and 40%, respectively, when we do not consider other aesthetic externalities, while these figures are 59% and 33%, respectively, when other aesthetic features are incorporated into the model. Comparisons with studies that have used a single dummy variable for views would be obviously even less meaningful.

[Insert Figure 2 here.]

Views over land ('other views') have a relatively limited impact as they increase house values by only 4% to 6%. These results are in line with the percentage impacts for mountain views in Bellingham, Washington as reported in Benson *et al*. (1998). Views over land are apparently not as appealing as views of water. The percentage impacts of the appearance of immediately surrounding improvements are substantially more pronounced than the impact of views over land, suggesting that property owners place a premium on having attractive neighboring properties. A 'very good' appearance of surrounding properties can add 27% to the value of a dwelling relative to the value of a house that has average neighboring properties. Poor quality of surrounding improvements will negatively affect property prices (-33%).

A house located in a neighborhood with a superior appearance of landscaping will command a premium of 5% relative to a house in a neighborhood with average landscaping, while the value of a dwelling in a very poorly landscaped neighborhood can be depreciated by as much as 51%. The appearance of landscaping in the neighborhood on property values thus appears to have much more of a downside potential than an upward potential, at least in Auckland where the standard seems to be relatively high. The reverse conclusion prevails for the appearance of structures in the neighborhood. A house located in a neighborhood with superior structures will have a premium of up to 37%, while the potential negative impact is only 14%. As can be seen, the effects of the appearance of the neighborhoods and immediately surrounding improvements are important, and as such they represent a significant part of aesthetic externalities. Thus, aesthetic amenities are important and multi-dimensional. Such dimensions should clearly be recognized when constructing hedonic models of house prices as they constitute an important factor in understanding the formation of house prices.

6. Concluding Remarks

The aim of this paper was to investigate the multi-dimensional nature of aesthetic externalities and to gauge their effects on residential property values. Our extensive discussion of the literature stresses the fact that the impact of aesthetic features on house prices is too often limited to the investigation of the impact of views. Moreover, such impact is usually measured by including a single dummy variable in the hedonic pricing equation. We argue that aesthetic externalities are much broader and could include dimensions such as the quality of landscaping and improvements in the neighborhood as well as a measure of the appearance of immediately surrounding improvements. As far as views are concerned, it is argued that type of view, scope of the view, as well as distance to the water in the case of a water view should be taken into consideration.

The empirical investigation is undertaken using a rich database of nearly 5,000 residential transactions in Auckland, New Zealand. Our results suggest that although water views have a strong positive impact on house values, such views are not the only type of aesthetic externality that is priced in the residential property market. Attractive surrounding improvements add an average premium of 27% to values, while attractive structures in the neighborhood contribute an average premium of 37%. The appearance of landscaping in the neighborhood has more potential for a negative impact on price than for a positive effect relative to the values of houses in neighborhoods with average landscaping. Views over land do not command important premiums on residential property values.

It would seem important to extend this research in at least two ways. The first direction would be to examine the time-varying nature of the premiums on aesthetic externalities and to relate these price impacts to the real estate cycle. It could be for instance that higher premiums are paid for water views in a soaring residential real estate market than in a declining market. The other direction would be to understand how these premiums are formed on the market. Cross-city comparisons would in this respect be useful to try to understand the relation between availability of lots with a view and price of a view, while taking into account differences in the intensity of land use and other housing market characteristics.

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Table 1. Previous studies of the impacts of views

Authors	Location, type of data, and number of observations	Type of view	Method	Results
Darling (1973)	Oakland, San Diego and La Mesa, and Santee (California), assessed values and sales transactions, number of transactions not reported	Lakes	For one lake only a distance to lake variable is used, for the other two lakes both a dummy variable for view and a distance to lake variable are included	Distance is usually negatively related with value for the first lake. View has a positive impact on value, while distance to lake becomes insignificant for the other two lakes
Davies (1974)	Nottingham (England), sales transactions, 114 sales	Not specified	Degrees of panorama variable	Insignificant impact of view
Brown and Pollakowski (1977)	Seattle (Washington), sales transactions, 2 samples (one of 90, the other of 89)	Water	Dummy variable for view, distance to waterfront variable	View dummy insignificant, negative (significant) relationship between distance to waterfront and value
Morton (1977)	Orange County (California), sales transactions, 400 sales	Not specified	Dummy variable	View adds $19,700 to value
Correll *et al*. (1978)	Boulder (Colorado), sales transactions, 36 sales	Valley	Dummy variables for excellent or moderate view, distance from greenbelt variable	Impact of view is insignificant, value decreases with distance to greenbelt
Plattner and Campbell (1978)	Eastern Massachusetts, sales transactions, 63 sales	Lake	Comparison of average prices of new units sold with and without a lake view	Positive impact in the 4%-12% range
Abelson (1979)	Sydney (Australia), sales transactions, 822 sales	Water	View variable with two levels (good and average), also taken into account whether the house is above road level and distance to sea	Good views increase value by 3.4%, average views by 1.7%, elevation from road and proximity to sea also positively impact value

Table 1. Previous studies of the impacts of views (continued)

Authors	Location, type of data, and number of observations	Type of view	Method	Results
Li and Brown (1980)	Boston Metropolitan Area, sales transactions, 781 sales	Aesthetic quality	A visual quality variable is included (scale from 1 to 5), distance variables also included (ocean, river, etc.)	Positive impact of visual quality, moving from one category to another increases value by approximately 2.1%, values decline with distance to ocean and river
Pollard (1980)	Chicago, rental vacancies advertised in newspapers, 232 apartments	Lake and CBD (the Loop)	Dummy variables for the two types of view, distance variables from the two features	Lake view increases value by 7%, Loop view coefficient insignificant, rents decline by 8.5% per mile with distance from the lake and by 4% per mile with distance from the Loop
Gillard (1981)	Los Angeles Metropolitan Area, sales transactions, 392 sales	Not specified	Dummy variable	View adds 9.2%
McLeod (1984)	Perth (Australia), sales transactions, 168 sales	River and quality of gardens in neighborhood	Dummy variable for river view, distance to river variable, distance to park variable	River views add 28% to value, values diminish with distance to river and park, 3% premium for location in neighborhood with higher than average garden quality
Cassel and Mendelsohn (1985)	Seattle and Los Angeles, sales transactions, 423 sales for Seattle and 548 sales for Los Angeles	Mountains, sound, lake, skyline for Seattle, ocean for Los Angeles	Dummy variable for mountain views and for Puget Sound, two dummies for Lake Washington (full and partial), dummy variable for partial skyline view, two dummies for two other lake views (Seattle), dummy variable for ocean view (Los Angeles)	The greatest impact is found for Lake Washington view, mountain views have the smallest impact (but significant), negative impact of a partial skyline view (Seattle), ocean view insignificant (Los Angeles)

Table 1. Previous studies of the impacts of views (continued)

Authors	Location, type of data, and number of observations	Type of view	Method	Results
Graves *et al*. (1988)	Orange County (California), sales transactions, 1,400 sales	Not specified	Dummy variable for view, distance to beach variable	View adds 13% to value, distance to beach is negatively related to value
Kask and Maani (1992)	Auckland (New Zealand), sales transactions, average of 85 transactions per year over 3 years	Sea	Dummy variable for sea view	Insignificant effect of view in 1983 and 1984, positive impact for 1986 (20%)
Kulshreshtha and Gillies (1993)	Saskatoon (Canada), sales transactions, 392 sales	River	Interacted view and house size variable, interacted view, house size and neighborhood variables	Views command $11 premium per square foot, premium varies across neighborhoods
Smith (1994)	Chicago CBD, sales transactions, 547 sales	Lake	Dummy variable for view, distance to Lake Michigan variable	View adds 11% to value, negative impact of distance from lake variable
Do and Sirmans (1994)	San Diego County, sales transactions, 645 sales	Not specified	Dummy variable	View adds 4%
Rodriguez and Sirmans (1994)	Fairfax County (Virginia), sales transactions, 194 sales	Not specified	Dummy variable	Positive impact of 7.8%
Lansford and Jones (1995)	Colorado River Basin (Texas), sales transactions, 609 sales	Lake	Dummy variable for waterfront property, dummy variable for view, distance variable from lake	Waterfront location adds $59,800 to value, view adds $15,000, distance from lake has a negative impact, 87% of positive recreational and aesthetic impact of lake stems from lakefront location, recreational and aesthetic impact of lake composes 20% of property value

Table 1. Previous studies of the impacts of views (continued)

Authors	Location, type of data, and number of observations	Type of view	Method	Results
Pompe and Rinehart (1995)	Surfside Beach and Garden City (South Carolina), sales transactions, 385 single family houses and 169 vacant land transactions	Ocean	Dummy variable for view, dummy variable for oceanfront properties, dummy variable for inlet location, distance to beach and beach width interacted variable, one separate regression for each property type	Distance to beach and beach width interacted variable has negative effect, view variable not significant for houses but significant at the 10% level for land, oceanfront location significant at the 5% level for houses and 10% level for land, inlet location insignificant for houses but significant for land
Doss and Taff (1996)	Ramsey County (Minnesota), assessed values, 32,417 observations	Lake	Dummy variable for lake view, distance from lake variable, also distance to other environmental features (forested areas, open water, etc.)	Positive impact of lake view (44%), negative impact of distance to lake variable
Benson *et al*. (1997)	Point Roberts (Washington), sales transactions, 397 sales over a 10 year time period	Ocean	Three dummies for scope (ocean front, unobstructed ocean view and partial ocean view)	Ocean frontage adds 147% to price, ocean view adds 32% and partial ocean view adds 10%
Benson *et al*. (1998)	Bellingham (Washington), sales transactions, average of 664 sales per year over 11 years	Ocean, lake, mountain	For ocean views: four dummy variables for scope of view plus those variables interacted with distance from the coast; for lake views: two dummies for lakefront and non-lakefront properties; for mountain views: one dummy	Ocean view has a positive impact that increases with the scope of the view and decreases with distance from the coast (impacts range from 4% for poor views two miles from the coast to 68% for full views adjacent to the coast), views from lakefront properties increase value by 127% and lake views from other properties by 18%, mountain views do not have a significant impact

Table 1. Previous studies of the impacts of views (continued)

Authors	Location, type of data, and number of observations	Type of view	Method	Results
Lake *et al*. (1998)	Glasgow (Scotland), sales transactions, 4,000 sales	Road	GIS used to calculate view scores based on first identifying what can be seen from the property, then weighting cells by their distance from the observer	Negative impact of road visibility of 2.5%
Lake *et al*. (2000a)	Glasgow (Scotland), sales transactions, 3,456 sales	Roads, railways, water features, parks, industrial estates, vegetated areas, buildings	Viewsheds are used calculated at eye level at a 45° angle, only land visible up to 500 meters of each property is considered	Only railway visible from the back of the property is significant with the expected sign
Lake *et al*. (2000b)	Glasgow (Scotland), sales transactions, 3,544 sales	Parkland, industry, road, obstructed	Viewsheds are used	Obstructed, industry and road views have a negative impact, parkland has no impact
Tyrväinen and Miettinen (2000)	District of Salo (Finland), sales transactions, 590 sales	Forest	Dummy variable for view =1 if more than 50% of the direct view from the window is of forest, a distance to the nearest forested area variable is also included	Positive impact of view of 4.9%, an increase of one kilometer in the distance to the nearest forested area decreases value by 5.9%, with distance dummies, the effect on price is strongest up to a distance of 300 meters
Beron *et al*. (2001)	Los Angeles Metropolitan Area, sales transactions, average of 52,378 sales per year over 16 years	Not specified	Dummy variable for view, dummy variables for location bordering golf fairway, location bordering water and location bordering wooded area, dummy variable for location within 5 miles of nearest beach and distance to nearest beach variable, main focus is on air quality (visibility) variables	The impact of view is in the 1.4%-7.0% range, the impact of a location bordering water is positive (maximum impact of 34.5%), the impact of location bordering fairway is mostly insignificant, the impact of location bordering wooded area is never significant, visibility is positive and contributes between 3% and 8% to the value

Table 1. Previous studies of the impacts of views (continued)

Authors	Location, type of data, and number of observations	Type of view	Method	Results
Seiler *et al*. (2001)	Lake Erie, tax assessment values, 1,172 observations	Lake	Dummy variable	View increases value by 56%
Bond *et al*. (2002)	Lake Erie, sales transactions, 190 sales	Lake	Dummy variable	View increases value by 89.9%
Des Rosiers *et al*. (2002)	Quebec City (Canada), sales transactions, 760 sales	Landscaping	Dummy variable for landscaped curbs, density of visible vegetation variable, interacted variables of tree cover and age and sex of neighborhood inhabitants	Landscaped curbs increase value by 4.4%, each rank unit of vegetation density reduces value by 2.2% (excessive tree cover), older people and women appear to place more value on landscaping
Paterson and Boyle (2002)	Simsbury and Avon (Connecticut), sales transactions, 504 sales	Developments, agriculture, forested areas, water	Percentage of area in each of the categories and visible within one kilometer	Visibility of developments and of forested areas has a negative impact, while visibility of agriculture and water is insignificant
Tse (2002)	Hong Kong, sales transactions, 1,000 sales	Sea	Dummy variable	View increases value by 6% to 10% depending on model specification
Bourassa *et al*. (2003)	Auckland (New Zealand), sales transactions, 4,880 sales	Water	Dummy variable	View increases value by 8%

Table 2. Sample statistics

Variable	Mean	Standard deviation
Net sale price (NZ$)	337,164	204,886
Land characteristics		
Land area (square meters)	552	42
Cross-leased or strata-titled	0.24	—
Location		
Distance from Central Business District (meters)	6,583	2,345
Distance from coast (meters)	1,607	1,120
Topography		
Elevated	0.49	—
Level	0.44	—
Sunken	0.07	—
Improvements		
Floor area (square meters)	143	57
Age of dwelling	47	29
Quality of the principal structure		
Poor	0.05	—
Average	0.75	—
Superior	0.20	—
Modernized	0.27	—
Deck	0.64	—
Driveway	0.85	—
Landscaping		
Poor	0.05	—
Average	0.79	—
Superior	0.16	—
Date of sale		
1st quarter	0.32	—
2nd quarter	0.21	—
3rd quarter	0.22	—
4th quarter	0.25	—
Aesthetic externalities		
Water views		
Narrow	0.04	—
Medium	0.04	—
Wide	0.02	—
None	0.90	—
Other views		
Narrow	0.13	—
Medium	0.08	—
Wide	0.01	—
None	0.78	—
Appearance of landscaping in the neighborhood		
Poor	0.05	—
Average	0.79	—
Superior	0.16	—
Appearance of structures in the neighborhood		
Poor	0.05	—
Average	0.75	—
Superior	0.20	—

Table 2. Sample statistics (continued)

Variable	Mean	Standard deviation
Appearance of immediately surrounding improvements		
Poor	0.01	—
Average	0.75	—
Good	0.22	—
Very good	0.02	—
n = 4,814		

Table 3. Hedonic regression results

Variable	Model 1	Model 2	Model 3
Adjusted R-squared	*0.63*	*0.64*	*0.65*
Constant term	12.835***	12.945***	13.396***
Land characteristics			
Ln of land area (square meters)	0.293***	0.276***	0.273***
Cross-leased or strata-titled	1.803***	1.699***	1.692***
Location			
Ln of distance from Central Business District (meters)	-0.399***	-0.396***	-0.443***
Ln of distance from coast (meters)	0.024***	0.034***	0.035***
Topography			
Elevated	0.020	0.027	0.023
Level	0.044**	0.068***	0.063***
Improvements			
Ln of floor area (square meters)	0.239***	0.214***	0.183***
Age of dwelling			
Age	-0.021***	-0.022***	-0.022***
Squared	5.0×10^{-4}***	5.1×10^{-4}***	5.2×10^{-4}***
Cubed	-4.0×10^{-6}***	-4.1×10^{-6}***	-4.2×10^{-6}***
Quartic	1.1×10^{-8}*	1.2×10^{-8}*	1.2×10^{-8}*
Quality of the principal structure			
Poor	-0.057***	-0.048**	-0.040*
Superior	0.143***	0.128***	0.092***
Modernized	0.053***	0.050***	0.056***
Deck	0.044***	0.041***	0.039***
Driveway	0.032**	0.028**	0.020
Landscaping			
Poor	-0.028	-0.026	-0.017
Superior	0.062***	0.056***	0.045***
Date of sale			
2nd quarter	-0.005	-0.007	-0.006
3rd quarter	-0.046***	-0.044***	-0.042***
4th quarter	5.6×10^{-4}	0.002	0.007
Aesthetic externalities			
Water views			
Narrow	—	0.077	0.035
Medium	—	0.333***	0.284***
Wide	—	0.499***	0.465***
Water views interacted with distance from the coast			
Narrow	—	0.005	0.008
Medium	—	-0.028***	-0.023**
Wide	—	-0.043***	-0.044***
Other views			
Narrow	—	0.055***	0.043***
Medium	—	0.067***	0.048***
Wide	—	0.074**	0.063*
Appearance of landscaping in the neighborhood			
Poor	—	—	-0.508***
Superior	—	—	0.099

Table 3. Hedonic regression results (continued)

Variable	Model 1	Model 2	Model 3
Appearance of structures in the neighborhood			
Poor	—	—	-0.283**
Superior	—	—	0.366***
Appearance of immediately surrounding improvements			
Poor	—	—	-0.410**
Good	—	—	0.075***
Very good	—	—	0.235***

Notes: Dependent variable is the natural log of the sale price net of chattels. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Estimated coefficients for the census area unit dummy variables are omitted from the table.

Table 4. Mean percentage impacts of views and immediately surrounding improvements on house prices

Type of externality			
Views (relative to houses with no views)	Narrow view	Medium view	Wide view
Water views			
At coast	0	33	59
1,000 meters from coast	0	13	18
2,000 meters from coast	0	11	14
Other views	4	5	6
Immediately surrounding improvements	Poor	Good	Very good
Impact of appearance relative to average quality	-33	8	27

Table 5. Percentage impacts of appearance of landscaping and residential structures in the neighborhood

Type of externality		Percentage impacts				
Appearance of landscaping		Percentage of properties with superior quality landscaping in a neighborhood				
		0	25	50	75	100
Percentage of properties in neighborhood with poor quality landscaping in a neighborhood	0	**0**	**3**	**5**	—	—
	25	**-13**	**-10**	**-8**	—	—
	50	**-25**	**-23**	**-21**	—	—
	75	**-38**	**-36**	—	—	—
	100	**-51**	—	—	—	—
Appearance of structures		Percentage of properties with superior quality structures in a neighborhood				
		0	25	50	75	100
Percentage of properties in neighborhood with poor quality structures in a neighborhood	0	**0**	**9**	**18**	**28**	**37**
	25	**-7**	**2**	**11**	**20**	—
	50	**-14**	**-5**	**4**	—	—
	75	—	—	—	—	—
	100	—	—	—	—	—

Note: The percentage of properties with average quality landscaping or structures for each cell is the difference between 100 and the sum of the percentages for superior quality and poor quality landscaping or structures. Percentage impacts are shown only for the range of quality distributions evident in the data; for example, there are no neighborhoods with more than 50% superior quality landscaping.

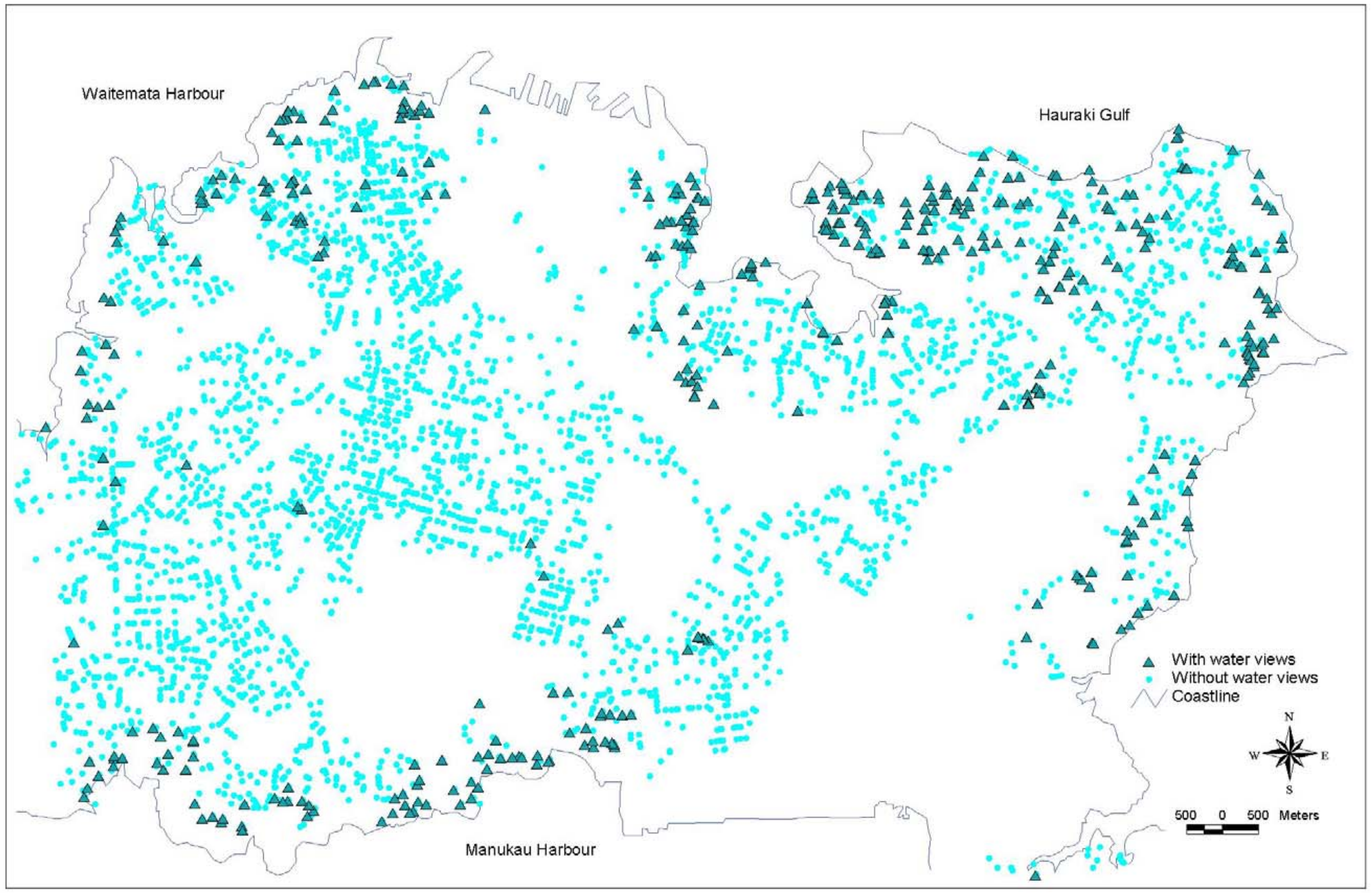

Figure 1. Location of residential properties sold in Auckland City in 1996, with and without water views

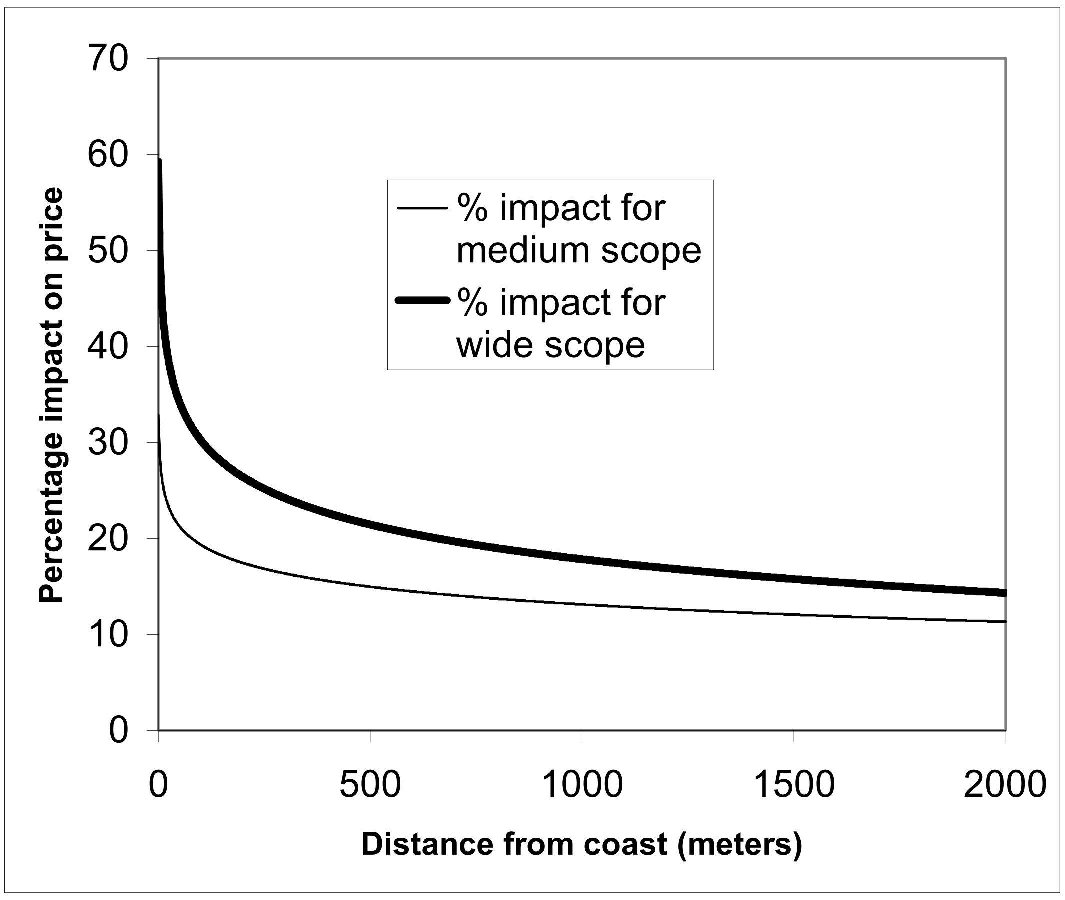

Figure 2. Impacts of medium and wide views on residential property prices