The economic effect of environmentally sensitive area policy on housing and land prices in King County, WA

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Overarching Question: Has the 1990 SAO affected the residential housing and land prices in, outside and adjacent to ESAs?

Hypotheses:

- Developed residential property values adjacent to ESAs experienced increase following the restrictions of 1990 SAO, comparing with those in an outlying control group.
- Vacant residential land values adjacent to ESAs experienced decrease following the restrictions of 1990 SAO, comparing with those in an outlying control group.

Background

The Environmentally Sensitive Area (ESA) policy was first implemented when King County adopted Sensitive Area Ordinance (SAO) in 1990. Prior to the passage of 1990 SAO, King County had enacted a series of laws to restrict the development on lands abutting environmental resources (such as streams, wetlands, wildlife habitats) and regulate the development on lands susceptible to flooding, erosion, sliding, earthquake and other geological events in unincorporated portion of King County (Fig. 1). But no development standards and clearing limits were required in those laws. The County replaced 1990 SAO with more rigorous Critical Area Ordinance (CAO) in 2004 based on the Best Available Sciences. The SAO/CAO distinguishes itself from other existing laws protecting specific ESAs by limiting clearing of natural vegetation on ecological important but privately owned lands. Thus, It was very controversial from the start and it stirred up continued oppositions from many land owners and developers (Katsaros, 1992). The legal debates on SAO/CAO mainly focus on the adverse impact on property value. Despite the general expectation that the effect is adverse, empirical evidences have suggested the opposite effect. For example, in the Bear Creek area near Redmond, where clearing allowances have been in place for a decade, property value increase have kept pace with or even exceeded other areas of King County (Seattle Times, 2004). Therefore, it is uncertain with regard to the effect of SAO on housing and land prices. The answer to such question can only be addressed through an empirical analysis of the market transactions both before and after the SAO is implemented.

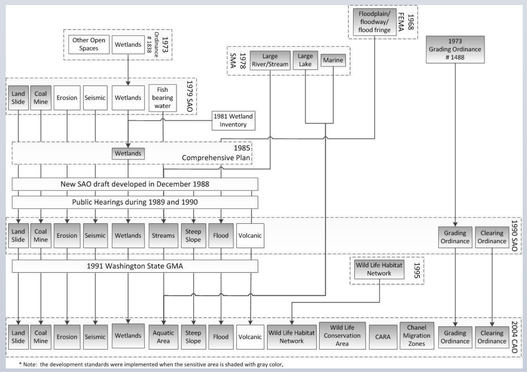
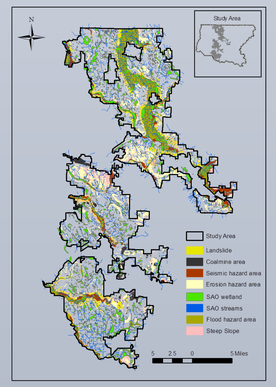


Fig. 1 The time line of developing and implementing ESA policy in King County, WA

Study Sites



This study focuses on the rural area that's outside the Urban Growth Boundary (UGB) in unincorporated King county area, which is exclusively administered by King County government. The majority of the lands in the study area are used for single family residential (SFR) housings with a density of 1 dwelling unit per 5 or 10 acres ESAs and buffers have a total area of 110737 acre and cover 49% of the study area.

Fig. 2: The sensitive areas designated in the 1990 SAO in the study area

Methods

Data: The transactions made between *January 1st, 1986* and *December 31st,1995* are extracted from the King County Department of Assessments (KCDA) real estate transactions database, i.e., 5 years before 1990 SAO and 5 years after 1990 SAO. ESA GIS data are provided by King County Department of Development and Environmental Services (KCDDES).

Table 1: Summary statistics for land transactions in ESAs

Sensitive Area(SA)	Sold Before 1990 SAO	Sold After 1990SAO
Outside SA (Control)	705	998
Stream	30	70
Wetland	63	69
Landslide	24	30
Seismic	30	52
Erosion	157	209
Total Samples	**1049**	**1454**
Flood*	2	2
Coal Mine*	18	10
Slope*	5	12
More than one SA**	438	512

* Excluded from analysis due to no enough samples

** Samples with more than one type of SA are excluded

Table 2: Summary Statistics for residential housing transactions in ESAs

Sensitive Area(SA)	Sold Before SAO		Sold After SAO	
	In	Adjacent	In	Adjacent
Outside SA (Control)	2948	NA	10072	NA
Class 2S Stream	44	8	127	31
Class 1 wetland	37	8	85	21
Class 2 wetland	41	9	128	22
Erosion	144	14	372	59
Land Slide	17	5	73	0
Seismic	49	2	265	0
Steep Slope	342	114	1115	435
Total Samples	**3622**	**160**	**12237**	**568**
Class 1 Stream*	1	0	2	0
Class 2P Stream*	1	1	9	0
Class 3 Stream*	6	0	17	1
Class 3 wetland*	2	1	3	1
Flood*	6	1	4	14
Coal Mine*	19	0	34	0
More than 1 SA**	530	NA	1599	NA

Economic Rationale: Similar to other land use regulations, SAO has two effects on land and housing prices, the restrictive effect and amenity effect. The economic rationale in this research is similar to Spalatro & Provencher (2001).

Empirical Model:

$$Log\ \boldsymbol{P} = \beta_0 + \beta_S S + \beta_E E + \beta_L L + \beta_N N + \delta_T Y + \gamma_1 SoldAfterSAO + + (\gamma_2 + \gamma_3 SoldAfterSAO) ESA_{Percent} + (\gamma_4 + \gamma_5 SoldAfterSAO) ESA_{Type} + \varepsilon$$

Where,

$LogP$	the natural logarithm of the parcel's sale price
B	a vector consisting of housing structural characteristics
E	a vector consisting of parcel's environmental amenities
L	a vector consisting of the parcel's location characteristics
N	a vector consisting of the parcel's neighborhood characteristics
Y	the year of the parcel sale that captures the overall appreciation over the study period
$SoldAfterSAO$	an indicator variable to controls for any benefits that accrue to property owners in any portion of the study area after the 1990 SAO was enacted
ESA_{type}	a vector consisting of the types of ECA present on the parcel
$ESA_{percent}$	the percentage of the parcel being covered by ESAs
$\beta's, \delta's\ and\ \gamma's$	parameters to be estimated
ε	error term that captures the random effect

Results

Table 3: Parameter estimates for amenity effect (in blue shade) and restrictive effect (in pink shade) in Land Price Model

Variable	Coefficient	P-value	Significance
InErosion	0.095	0.152	
InSeismic	0.071	0.564	
InLand Slide	0.145	0.196	
InStream	-0.024	0.710	
InWetland	0.210	0.005	**
InErosionPostSAO	-0.092	0.277	
InSeismicPostSAO	0.128	0.386	
InLandSlidePostSAO	-0.026	0.861	
InStreamPostSAO	0.030	0.713	
InWetLandPostSAO	-0.225	0.020	*

Signifiance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05

Table 4: Parameter estimates for amenity effect (in blue shade) and restrictive effect (in pink shade) in Housing Price Model (Note: only statistical significant variables are listed)

Variable	Coefficient	P-value	Significance
In_Erosion	0.033	0.028	*
In_class2S_Stream	0.070	0.005	**
In_Class1_Wetland	0.208	< 2e-16	***
In_Class2_Wetland	0.129	8.04E-08	***
AdjacentTo_Class1_Wetland	0.122	0.040	*
In_Erosion_PostSAO	0.090	0.0049	**
In_Seismic_PostSAO	0.168	2.42E-06	***
In_Slope_PostSAO	0.102	0.0004	***
In_Class1_Wetland_PostSAO	0.118	0.004	**
AdjacentTo_Slope_PostSAO	0.084	0.009	**
AdjacentTo_Class2S_Stream_PostSAO	0.172	0.025	*
AdjacentTo_Class2_Wetland_PostSAO	0.194	0.014	*

Conclusions

- Among all type of sensitive areas, wetlands had greater amenity effect on both vacant land and single family properties.
- SAO had negatively affected the vacant land prices encumbered by wetlands, but had slightly increased the sale prices of single family properties adjacent to and encumbered by wetlands.
- Properties adjacent to sensitive areas had gained values from the implementation of SAO.

Discussions

While the results at this stage are preliminary, they conform to the hypothesis that the ESA policy has varied impacts on land and housing prices. The 1990 SAO did not change the supply of land because it didn't remove significant amount of land from the market, nor did it change the zoning code. This implication is different from other regional land use regulations such as Urban Growth Boundary (UGB). Further, the SAO did not impose restrictions on the land encumbered by ESAs. The development effect of SAO is that part of the site, or even the entire site, is excluded from further development due to one or more ESAs located on the site or in close proximity to the site. In another words, the land cannot be developed to the highest and best use because of the SAO. As such, the 1990 SAO are very likely to affect the developer's willingness to pay for a site and thus create a negative price effect on that site.

On the other hand, while the 1990 SAO did not change the supply of developed properties, but rather, potentially the demand for development properties in ESAs. The clearing limits of the 1990 SAO prevents clearing vegetation in or near to the ESAs that obstructs views. However, the properties that were developed before the 1990 SAO are grandfathered. As a result, the already-built properties with direct and excellent views actually became more attractive to buyers with a taste on stream and wetland views.

References

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Spalatro, F., and Provencher, B., 2001. An analysis of minimum frontage zoning to preserve lakefront amenities. Land Economics, 77, p.469-81.