Article

Effectiveness of School Site Decisions on Land Use Policy in the Planning Process

Volkan Baser [iD]

Department of Geomatics Engineering, Faculty of Engineering, Giresun University, 28200 Giresun, Turkey; volkan.baser@giresun.edu.tr

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Abstract: The school site is a key element of the educational process, as children spend a large amount of their time there. Schools that are well-located, designed within a systematic plan, safe, and operated in an efficient manner contribute to the development of society. Since land is a scarce resource, optimal land use is a spatial necessity. In developed societies, these usage preferences are planned and presented to decision-makers according to criteria, such as distance, slope, population, land use, etc., that are related to industry and agriculture. Suitable investment areas are often not mapped in development plans. This deficiency arising from planning also appears in the determination of school site locations. In this research, a real case study was conducted to solve the problem presented. The most used school sites' criteria were determined from the literature and those criteria were weighted with the analytical hierarchy process method. A cost–surface map of the study region was produced and associated with the implementary development plan. It was obtained from the cost surface map that suitable school sites are planned for urban, commercial, or different purposes. Additionally, possible locations for the school site in the region were determined and mapped for a future planning purpose, and the sizes of existing school campus sites in the region were analyzed. When existing campus areas were evaluated according to the number of school students, we found that only 40% of the schools were suitable. As one of the major findings, 210 possible school sites with a size of at least 2 ha were determined and mapped in Giresun, Turkey. For these reasons, clearly identifying the investment areas and transferring them to the plans is essential for sustainability.

Keywords: implementary development plan; land use; sustainability; school site selection; (AHP); Turkey

1. Introduction

As a reality faced by the entire world, land is considered a scarce resource in Turkey [1]. This scarce resource must be used carefully by humanity [2,3]. A rising global population has brought land management problems [4]. Human beings, who use the Earth as their home, have to use the land in the most suitable form for nature, considering all natural formations [5,6]. For this purpose, earthquake fault lines, areas with high tsunami risk, deserts, creek beds, sea and ocean coasts, forest areas, volcanic sites, erosion sites, avalanche potential slopes, etc., should be identified [7]. Otherwise, there may be a risk of encountering some of the numerous problems caused by land property [8]. Countries also plan how to use the land they own and provide appropriate uses for these plans. The current physical characteristics of soil and land need to be considered during planning. According to these data, land use plans are prepared [9]. Healthier living spaces can be created in accordance with those plans [5,10]. Education areas are also an important part of planning.

Education is the most important factor in the development process. In developing countries, people's educational success is directly related to individual gains and employment opportunities in the labor market. Education, therefore, affects not only the development of a country but also

individual development as well as the socioeconomic development of the society, such as the living conditions of the population. Education affects various aspects of development, such as cognitive competence, literacy, numerical competence, and problem-solving behaviors [11]. Therefore, it is an essential factor in the development of a country [12]. As a result, educational planning is important, and the selection of locations for school sites is an important component of this planning.

As one of the emerging countries, Turkey is trying to adapt to the technological, social, and economic changes brought about by the 21st century. While Turkey is adapting to these changes, its population is increasing. Turkey's population reached over 83 million people at the end of 2019 [13]. This population increase has revealed the necessity of establishing a good urban development planning process and of increasing the number of schools to provide education and training services for the younger generations [14].

School sites are a key factor in the educational process, and children spend most of their time at school when they are outside their homes. Schools that are well-located, designed within a systematic plan, safe, and operated in an efficient manner contribute to the development of society. Schools are expected to protect and sustain the existing culture of the society and to develop and change the society in which they are located. Therefore, schools need to be active and dynamic structures. This dynamism is facilitated by the establishment of adequate physical spaces in schools.

However, the choice of school sites is a complex problem that involves the evaluation of many different criteria (technical, political, social, environmental, and economic). Multi-criteria decision analysis (MCDA) integrated with geographic information systems (GISs) can be used to solve such complex problems [15]. MCDA and GIS can be combined into a tool that can manage large amounts of input data from different sources. This tool can operate effectively, rapidly, and at a low cost in the selection of sites. With the accessibility of remote sensing data and the development of GIS technologies, the use of MCDA for site selection has become increasingly common in recent years. Many studies have been conducted using MCDA integrated with GIS for the selection of locations for various purposes, such as school sites [16–26], landfill or solid waste sites [27–31], land use suitability assessments [32–36], urban development [15,37,38], sustainable urban center sites [39], fire station sites [40], aquaculture site selection, marine spatial planning [41,42], and energy plant sites [43,44].

The analytic hierarchy process (AHP) developed by Saaty [45] is a decision-making technique that uses binary comparisons to level the weights of the parameters [46]. This technique is one of the methods commonly used in MCDA with GIS. Today, it is used extensively in land suitability analysis (e.g., [18,25,27,30,44,47]).

Although there are studies in the literature focused on school sites, they are deficient in proposing building models for the selection of school site locations. In this study, the lack and inability of the current implementary development plan were revealed. Using the AHP process, suitable school site locations criteria were weighted. Integrated MCDA and GIS were used to determine and map suitable school area locations in the study region. Data from school site selection are provided to plan the other investment area in the implementary development plan. Sensitivity tests were performed by conducting sensitivity analyses related to the study, and the effectiveness of the methodology was verified. Moreover, suitability of existing school campus areas was determined by the population of school students in the study region.

2. Materials and Methods

The spatial data of the study area consisted of 1/25,000-scale standard topographic maps, geological maps, digital soil maps, land cover maps, and other maps produced by public and government institutions. Available data from administrative units, population statistics, etc., local authorities, and the Turkey Statistical Institute were complemented by integrating data obtained from the National Address Database. The thematic maps generated from these data indicated the spatial distribution of the values of the parameters in the study area being analyzed.

2.1. City Planning

In Turkey, the regional plans, spatial strategy plans, environmental plans, master zoning plans, and implementary development plan are the procedures by which important judgments are carried out for modern urbanism and the sustainable use of agricultural sites in the public interest by the classification of land and real estate [3,48–50]. The decision-makers determine whether the land will be converted into a natural resource, public sphere, or investment area.

The systematic and gradual unification of plans, which is a critical urbanism mechanism, was a rule of Turkish Zoning Law, as shown in Figure 1. Zoning plans can be classified as upper- and sub-scale plans. The main principles related to the field of planning are determined in the upper-scale plans. The sub-scale plans, such as those of the implementary development plan, involve scaling down to the parcel as the base. Public authorities build public services, such as roads, schools, and parks based on the sub-scale plan, whereas private property owners design their real estate following the function in the zoning plan. With the 1/1000-scaled implementary development plan (implementary zoning plan), the immovable property in private ownership is directly associated with the plan [3].

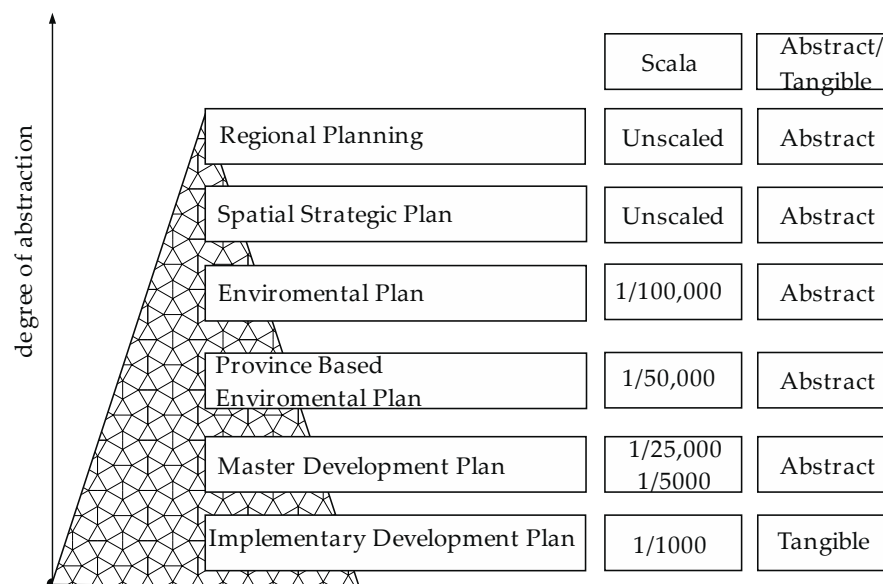|	Scala	Abstract/ Tangible
Regional Planning	Unscaled	Abstract
Spatial Strategic Plan	Unscaled	Abstract
Enviromental Plan	1/100,000	Abstract
Province Based Enviromental Plan	1/50,000	Abstract
Master Development Plan	1/25,000 1/5000	Abstract
Implementary Development Plan	1/1000	Tangible

Figure 1. Relationship between planning hierarchy and legal confiscation [3].

Physical planning represents a process that sets out to solve a certain set of problems. The emphasis of this study was taking precautions before future problems arise by determining the location and size of the existing or planned school sites in the implementary development plan before the plan is made. In this context, the deficiencies in the current situation were revealed, the school area locations were determined in the light of the specified criteria and the problems were minimized by those criteria.

2.2. Study Area

The Giresun province, located at 40°54′54.7″ N, 38°22′58.8″ E and comprising a 6934 km^2 area in northeastern Turkey, was chosen to explore the methodology. Although the population density along the coastline is above the provincial average, moving from the coastline to the interior, this ratio decreases significantly below the provincial average. Researchers showed that 54.95% of the general population lives in 30% of the general geographic area, including 28 coastal provinces in Turkey [51]. Examination of the landforms shows that the province has rough terrain conditions with the uppermost surface forming the Giresun mountains, which cover the strip between the narrow, low plains along the Black Sea coast and the Kelkit Stream Valley to the south. The mountains appear as a wall parallel to the coast and have an average height of 2000 m, but they reach over 3000 m in some places. The extension of the Giresun mountains parallel to the coast causes the division into two different climatic zones found

in the province. The land in the province consists of 25% agricultural land, 34% forest and hazelnut plantations, 18% meadow and pastureland, and 25% non-agricultural land [52].

2.2.1. Educational Facility Area Size

The decisions regarding educational facility areas in the province and their spatial qualities have important consequences in terms of child development as well as the quality of education [53,54]. The field sizes of the educational facilities, the class customs, and the number of students are related to each other. In addition, when planning a location for a school building in a particular area, the corresponding improvement in solar gains is important. Those in the indoor environment of the school building should be able to benefit directly from optimum daylight and operating costs should be reduced. The daylight should also ideally come from between the east and the south to take advantage of solar gains. This maximizes solar gains in the early hours of the morning and reduces the likelihood of overheating in the afternoon. International studies recommend that 0.77 ha be designated as school locations for single-story schools with 4–8 classrooms, 1.14 ha for schools with 8–16 classrooms, 1.6 ha for schools with 16–24 classrooms, and 2.2 ha for schools with 24–32 classrooms [55]. Additionally, the General Directorate of Spatial Planning of the Ministry of Environment and Urbanization in Turkey determined the standards and minimum area sizes for minimum social and technical infrastructure areas in different population groups [56].

2.2.2. School Site Selection Index

In this study, an integrated methodology was established. Accordingly, a GIS index model was developed to identify suitable regions for school site selection. The advanced model performed a multi-criteria decision analysis that included a school site selection index (SSSI). The SSSI was designed to help identify appropriate school sites.

The proposed methodology is shown in Figure 2. Initially, the information from the various data sources (geological and topographic maps, statistical information) was fed into the GIS. This information was processed and, by determining the weights of the parameters, the results were finalized with the SSSI.

2.2.3. Parameters in SSSI

The SSSI consists of nine parameters: Distance from rivers (m), proximity to electrical transmission lines (m), geology, distance from schools (m), proximity to main roads (m), land use/land cover, soil, population aged under 19 years (per pixel), and slope (°) (Table A1). Thematic maps for each parameter were generated.

2.2.4. Analytical Hierarchy Process

The importance of effective decision-making criteria and the ranking of decision alternatives was realized through the use of pairwise comparisons [57]. The method creates and applies a hierarchy of criteria to explain the problem.

The choice of a hierarchical structure for solving problems in AHP means that the problem is divided into various levels. The method allows decision-makers to effectively compare criteria and sub-criteria. The objective is clearly expressed at the top of the hierarchy [58]. The criteria that will directly affect the objective are below the objective, and the alternatives to be selected are at the bottom [59].

Extensive criteria are separated into sub-criteria and placed in the hierarchy. The relative significance of the criteria at each level of the hierarchy is obtained by pairwise comparison according to the criterion located at an upper level [38]. The factors determined for the selection of the safe school sites for our study area and each factor were weighted by AHP in Table A2.
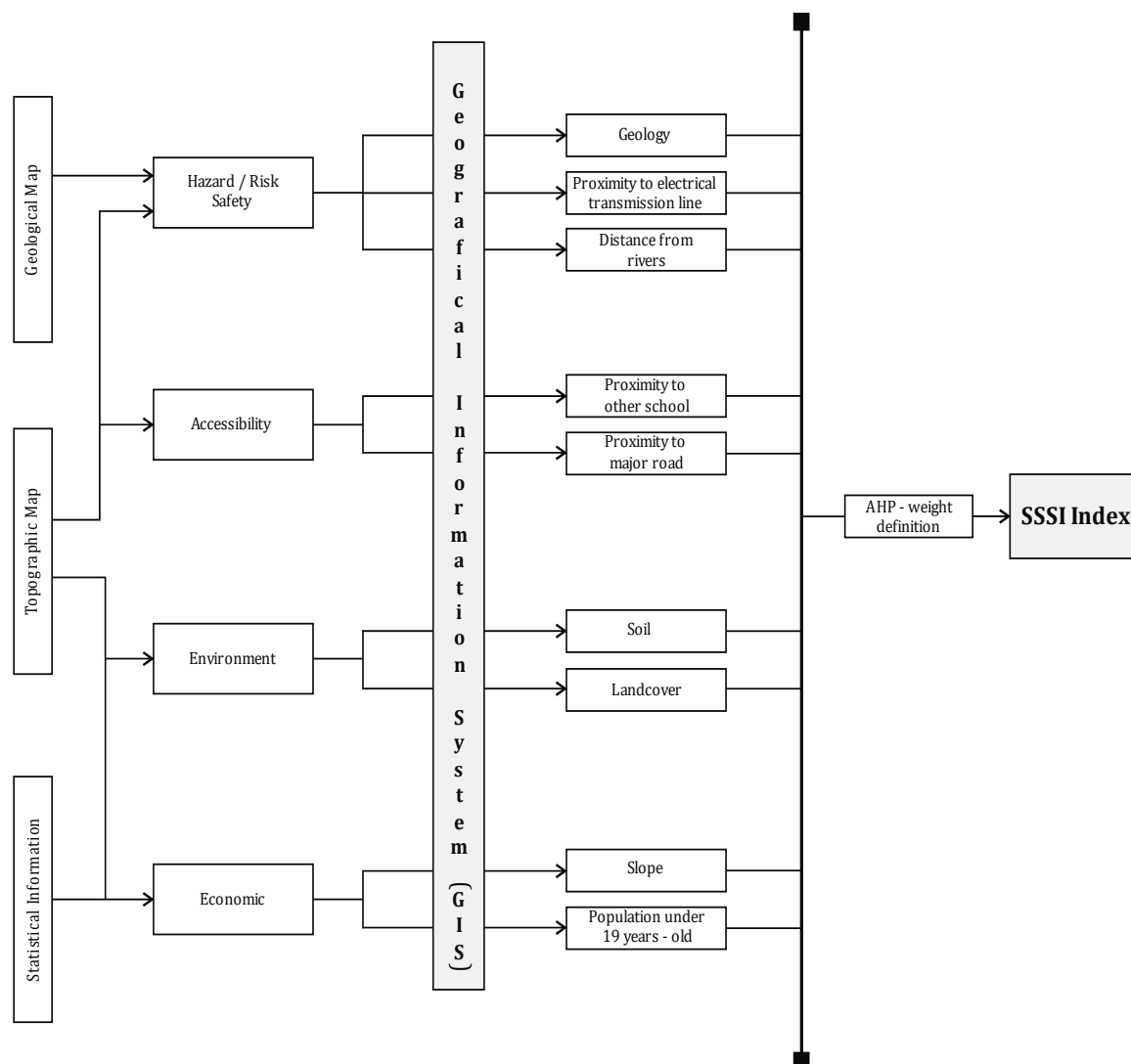
Figure 2. Flow diagram for safe school site selection. GIS, geographic information system; SSSI, school site selection index.

2.3. School Site Selection Index Parameters

2.3.1. Population Aged under 19 Years (per Pixel)

The total population of Giresun province is 448,400. There are 10 elementary schools, 13 secondary schools, and 17 high schools in 16 neighborhoods that comprise the city center in Giresun province (Table A3). The number of students and campus area sizes of the designated schools were investigated. We found that 3 out of 10 primary schools, 4 out of 13 secondary schools, and 8 out of 17 high schools met international and national criteria for campus area size.

2.3.2. Distance from Existing Schools

The distance to another school, based on how far a student would have to walk, was one of the important factors used in the analysis. In the literature, a walking distance of 1–2 km from the school is recommended, while the recommended walking distance is 2.4 km in the United States. When determining the optimal buffer distances from schools, the School Rules-Based Guidelines [60] were used. From this point, the distances between the schools should be determined and given in Table A2.

2.3.3. Proximity to Main Roads

Schools must be easily accessible for transportation, however, because of noise, air pollution, and other reasons, they should not be located near main roads [61]. In addition, vehicle transport produces toxic substances that have an adverse effect on human health. Several research reports have been published on the health risk of students in schools close to large road networks. In these reports, students were shown to be at high risk for heart and lung problems, whereas after a distance of 150 m, the risk was found to be significantly reduced. Considering these reports and the condition of the study area, the limitation of the proximity to the main road limitation was determined, and 300 m was chosen as the distance suitable for the study, while all the possible school site locations were analyzed via the weighted approach [62].

2.3.4. Distance (m) from Rivers

Considering the topographic structure of the study area, buffer zones in the range of 0-600 m were determined for this criterion. According to Kazakis et al. [63], the risk of flooding is high at a distance of less than 100 m from a river, while the risk at distances of more than 2000 m has no risk. Schools should be placed outside a flood zone due to risk of personal injury, loss of life, and substantial property damage. Since no effective flood registration information was available for the region, the study was conducted based on the literature and the buffer limits were determined.

2.3.5. Land Use

Land use plans are important in the development of zoning plans. Selection of school sites should also be based on zoning plans. Sub-criteria were determined and rated based on general land use in the form of dense forest, seasonal agriculture, agricultural areas, wetlands, rocky areas, open areas, and other areas.

2.3.6. Slope (°)

According to paragraph (g) of Article 1 of Communiqué No. 2010/2630 of the Turkish Ministry of National Education on the "Principles for Opening and Closing of an Institution", selection of a location is one of the important criteria. When a school is located on a deep slope, it creates many problems. For example, natural disasters, such as landslides, avalanches, and rock falls frequently occur on steep slopes. Additionally, the construction of schools on steep slopes creates many difficulties, especially from the economic aspect.

In this context, the digital elevation model (DEM) was transformed into a slope raster data set using ArcGIS (version 10.2) software positional analysis, and the slope values are expressed as percentages. These values were classified for use in the analysis.

2.3.7. Soil

According to the Turkish Land Use Capability (AKK) system, the soil is grouped into eight classes ranging from Class I, which is the best, easiest, and most economical to cultivate without erosion, to Class VIII, which is unsuitable for any type of agriculture. The land classes in a planning area are divided into three groups in terms of settlement eligibility [64].

- Absolute protected areas: Class I, Class II, and Class III farmland;
- Priority protected areas: Class IV, Class V, and Class VI farmland;
- Areas that can be settled: Class VII and Class VIII farmland.

2.3.8. Proximity (m) to Electrical Transmission Lines

Schools should be far away from power transmission lines to ensure that pupils and school staff are protected from high voltage electricity. Accordingly, buffer zones of 150 m were determined [62].

2.3.9. Geology

An examination of the general geological structure of the region showed Upper Cretaceous volcanic face terrain covering a very large area, especially in the northern part. The core of the Giresun mountains forms a granodiorite base. Glacial forms are found in the northern Karagöl mass in the western part of the mountains. The Upper Cretaceous in southern Alucra and Lower Cretaceous folds with flysch layers in the Sarıçicek Mountain constitute the main structure, and gypsiferous clays belonging to the Oligocene–Miocene age are found in the Şebinkarahisar District to the west [52].

The most suitable areas, suitable areas, non-suitable areas, and restricted areas were determined as sub-criteria, and buffer zones were formed for the selection of suitable school sites in the study area.

3. Results

3.1. Interpolation of Maps

The proposed methodology combined the selected parameters linearly, considering the relative weights. As a result, cost–surface maps were created using the criteria and sub-criteria defined for the study (Figures 3 and 4).
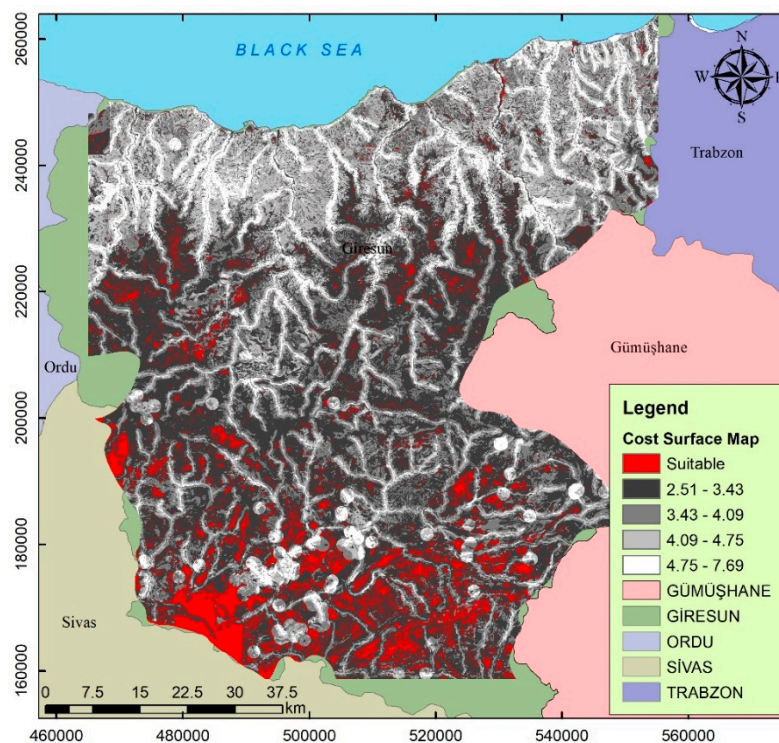
Figure 3. Elementary school selection site cost surface map.

Suitable school site locations are predominantly located in the southern part of the study area, as seen on the cost–surface maps. In these regions, there are few settlements and the areas are unplanned. For this reason, this study may serve as a basis for choosing suitable sites when developing future plans.

As a final stage, the cost–surface map of existing school areas was evaluated. The cost–surface map is shown in Figure 5. From the cost surface map, places with a score of six or above that are suitable for a school site were determined. In addition, sites with a minimum of 20,000 m^2 (2 ha) were selected from the available areas. Suitable school sites were evaluated given these criteria and the best 210 school site locations are indicated on the map in Figure 5. Evaluations and analyses showed that some potential school sites were used for different purposes and buildings.
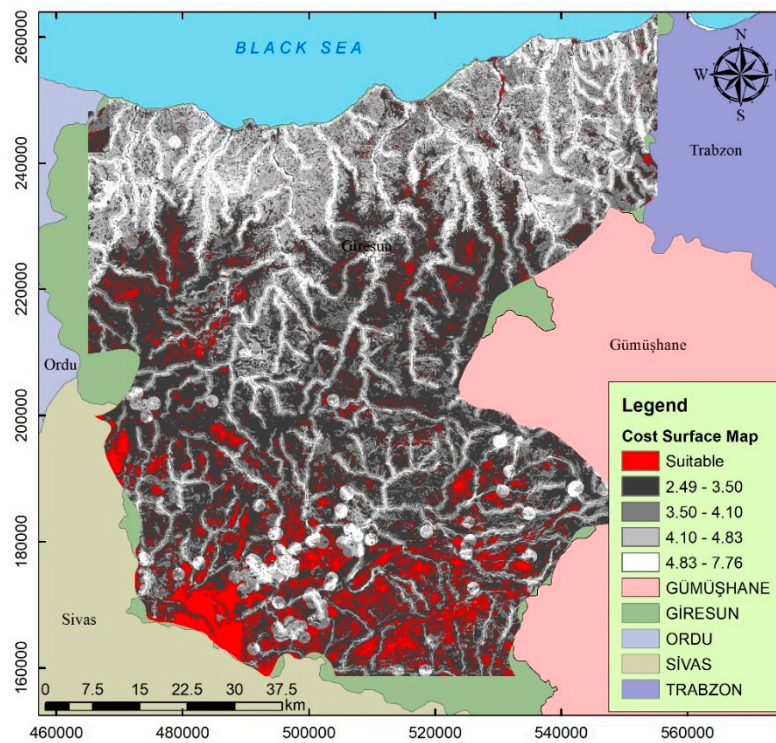
Figure 4. Secondary school selection site cost surface map.
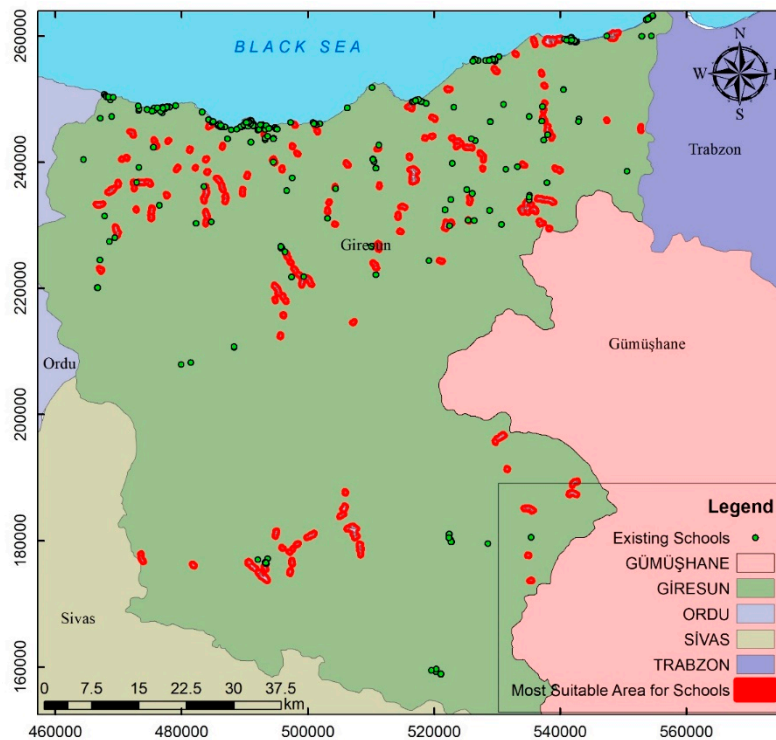
Figure 5. Available school areas and the most suitable school areas.

3.2. Validation—Sensitivity Analysis

To evaluate the sensitivity of the study, the "distance from rivers" layer was removed from the analysis (Sensitivity 1). Then, the "distance from rivers" and "slope" layers were removed (Sensitivity 2). Finally, the "distance from rivers", "slope", and "land use" layers were removed from the analysis

(Sensitivity 3). The accumulated cost surface values that were driven from normalized factor/criteria score result are shown in Table 1.

Table 1. Sensitivity report.

Layer	Minimum	Maximum	Mean	SD
Cost Surface	0.84740817	7.68693113	3.62420290	0.83396815
Sensitivity 1	1.0565918	6.68393135	3.40203058	0.72953943
Sensitivity 2	2.2271065	6.59693145	3.12012967	0.59817467
Sensitivity 3	2.4906170	6.20693159	2.75260654	0.52469339

4. Discussion and Conclusions

To determine the suitability of the sites where schools will be established and to determine the land class, an application was sent to the agricultural organization in the relevant region. Because the current cadaster data do not have enough information about the nature of the land, similarly, farmland was classified within the scope of cadaster studies (absolute farmland, marginal agricultural land, etc.) and was associated with cadaster data. It is clear that this study will contribute to the selection of investment environment locations [7].

The combination of GIS with different MCDA methods can be used in the selection of suitable sites. The GIS-based AHP offers valuable feedback for decision-makers. By applying a comprehensive and easy-to-use procedure that can be easily understood by non-specialists, it presents a straightforward output. However, there is no standardization in the studies in the literature. Whereas the criteria and their weight in this study are in good agreement with the research studies in the literature, the SSSI criteria were additionally associated with the implementation of a zoning plan in this study.

The AHP method was used to extract the relative importance of the evaluation criteria, and GIS was used to create spatial identification and maps of the evaluation criteria. In this study, a methodology that defines safe school site zones and can be applied to different regions was developed. This is important for decision-making because it can create an important road map for the selection of appropriate school sites when required. For safe school site estimation, the recommended SSSI processed the information of nine parameters and created independent thematic maps for each parameter. Thus, the most appropriate locations for safe school sites were identified and presented. In the unplanned areas on the map, the abundance of appropriate school sites stands out. In this situation, this study can serve as an effective source for the selection of school site locations when developing new plans.

When cost surface maps are examined, suitable school site locations appear predominantly in the southern part of the study area. In these regions, settlements are few and areas are unplanned. Therefore, our findings can form the basis for choosing appropriate areas when making plans. The cost–surface map was also obtained using the simple additive weighting (SAW) method. The SAW cost–surface map was compared with the AHP and showed good agreement. Whereas the focus of good agreement was the SSSI, the AHP and SAW methods were not compared in detail.

In measuring the spatial competence of primary education facility areas, the principally accepted criterion is the minimum area size per individual. In the research, as a result of the analyses conducted within the scope of spatial competence, we determined, with accessibility indicators and the inspections of the produced analytical maps, that 30% of primary school areas, 32% of secondary school areas, and 48% of high school areas could meet the minimum education field criteria in Giresun province.

We evaluated 210 possible school sites, which are indicated in the map. This overlap showed that the most suitable areas correspond to different functions, while only a few of them are school sites. Qualitative criteria must be considered in the selection of the location of education. We think that qualitative criteria will be useful in the planning stage if the locations of education areas throughout the country are determined using the criteria in this study. Analysis studies should be performed using future population projections with the aim to determine the quantity of new school sites.

In this context, investment plans should be shown on 1/100,000-scaled environmental plans. Thus, since the legal objections regarding the practices are specified on a higher scale, the concept of public benefit will not be overturned by the courts. Otherwise, most of the applications can be stopped legally.

The SSSI was constructed as a basis for future studies. Appropriate school site locations can be selected in the desired regions using the index. However, the outputs of the SSSI should be evaluated for the development of zoning plans. School sites to be placed in zoning plans can be optimally determined using the index. The outcomes of these kinds of scientific decision-making tools can be effective in resolving conflicts of interest and finding solutions to political problems.

Conflicts of Interest: The author declares no conflict of interest with regard to the publication of this paper.

Appendix A

A detailed literature review was conducted and all relevant criteria for the selection of the most suitable and safe school sites were determined and categorized. In addition, the frequency of use of sub-criteria is given in Table A1. The most used criteria, sub-criteria, and determined weights with the AHP method are given in Table A2. Table A3 shows the sizes and locations of the school campus areas.

Table A1. Literature review of criteria for determining school site selection.

Category	Criteria	Literature Review													Frequency
		[65]	[16]	[66]	[18]	[67]	[68]	[69]	[12]	[20]	[21]	[70]	[24]	[26]	Total
Hazard/Risk/Safety	Avalanche (snow/ice)														3
	Bank erosion														5
	Flood areas														12
	Landslide														5
	Rockfall														3
	Underground flooding														3
	Earthquake zones														-
	Geology														3
	Proximity to high voltage power lines														1
	Hazardous waste														3
Enviromental/Geographic	Distance from streams														11
	Elevation and slope														11
	Land cover														7
	Natural heritage areas														4
	Noise level														3
	Air Pollution														5
	Vegetation type														-
	Visibility														-
	Presence of sensitive ecosystem														-
	Land use type														6
	Rainfall Intensity														-
Economic	Medical facility														4
	Emergency communication														3
	Safe haven														3
	Transformers														6
	Proximity to residential areas														7
	Proximity to tourist areas														4
	Proximity to agricultural areas														1
	Population density														10
Social/Accessibility/ Infrastructure	Distance from existing schools														11
	Distance from roads														13
	Existing fire stations														1
	Existing police stations														1
	Existing libraries														2
	Industrial areas														3
	Commercial areas														2

Table A2. Datasets used in the analysis.

Category	Criteria	Sub-Criteria	Rating Score	Weight (%)
Hazard/Risk/Safety	Distance from rivers (m) (D)	<150 150–300 301–450 451–600 >600	10 8 6 4 2	0.119
	Proximity to electrical transmission lines (m) (H)	<150 150–300 301–450 451–600 >600	10 8 6 4 2	0.028
	Geology (I)	The most suitable Suitable Unsuitable Restricted	0 2 4 6	0.019
Accessibility	Distance from schools (m) (A)	<800 801–1300 1301–1800 1801–2400 >2400	10 8 6 4 2	0.240
	Proximity to main roads (C)	<150 150–300 301–450 451–600 >600	10 6 2 4 8	0.157
Environmental	Land use (E)	Forest Seasonal agriculture Agricultural areas Wetlands Rocky areas Open areas Other	9 2 1 10 5 6 0	0.078
	Soil (G)	Class I Soil (Good agricultural land) Class II Soil Class III Soil Class IV Soil Class V Soil Class VI Soil Class VII Soil Class VIII Soil	10 7 6 5 4 3 2 1	0.043
Economic	Population aged under 19 years (per pixel) (B)	0 0.01–0.03 0.04–0.07 0.08–0.17 >0.17	10 8 6 4 2	0.237
	Slope (°) (F)	<10 10–15 16–20 21–25 >25	2 4 6 8 10	0.078

Table A3. Giresun/Center (primary, middle, high school) areas.

Giresun/Center (Primary, Middle, High School)						
School Name	Building Area (m^2)	Annex (m^2)	Garden Area (m^2)	Total Area (m^2)	Location (m)	
					Y (m)	X (m)
AKSU District						
ABACIBÜKÜ PRIMARY SCHOOL	780.0	-	4525.55	5305.55	452,652.78	4,530,933.59
ZÜBEYDE HANIM VOCATIONAL AND TECHNICAL ANATOLIAN HIGH SCHOOL	1720.0	630	3812.02	6162.02	452,866.79	4,531,008.40
ANATOLIAN IMAM HATIP HIGH SCHOOL	1540.0	-	3780.00	5320.00	452,924.74	4,530,900.71
15 TEMMUZ ŞEHİTLER AKSU ANATOLIAN HIGH SCHOOL	1000.0	-	2243.00	3243.00	452,771.27	4,530,620.74
15 TEMMUZ ŞEHİTLER SCHOOL	550.0	-	835.79	1385.79	453,011.18	4,530,627.28
ŞEHİT HAKAN GEMİCİ SECONDARY SCHOOL	830.0	1345	5448.90	7623.90	452,672.33	4,530,159.97
SCIENCE HIGH SCHOOL	1233.0	1660	41,176.09	49,085.09	452,440.96	4,529,198.62
SOCIAL SCIENCE HIGH SCHOOL	880.0	2529			452,443.08	4,529,005.94
FINE ARTS AND SPORTS HIGH SCHOOL	1607.0	-			452,475.21	4,528,921.38
ÇINARLAR District						
GİRESUN HIGH SCHOOL	800.0	300	4040.00	5140.00	448,846.85	4,532,061.79
MEHMET AKİF ERSOY SECONDARY SCHOOL	565.0	170	2365.00	3100.00	448,909.43	4,532,026.09
HURŞİT BOZBAĞ GIRL ANADOLU IMAM HATIP HIGH SCHOOL	1165.0	-	2160.00	3325.00	448,797.83	4,531,808.07
ÇITLAKKALE District						
ÇITLAKKALE İMAM HATİP SECONDARY SCHOOL	880.0	-	2514.00	3394.00	445,733.51	4,530,541.47
NAMIK KEMAL PRIMARY SCHOOL	1100.0	-	1700.00	2800.00	446,207.77	4,530,679.50
ÇITLAKKALE PRESCHOOL	1165.0	-	3015.00	4180.00	446,750.53	4,530,457.27
ERİKLİMAN District						
YEŞİL GİRESUN VOCATIONAL AND TECHNICAL ANATOLIAN HIGH SCHOOL	1385.0	625	4064.51	6074.51	442,328.64	4,532,567.19
FEVZİ ÇAKMAK District						
23 NİSAN PRIMARY SCHOOL	900.0	-	2440.00	3340.00	448,014.17	4,531,187.98
GAZİLER District						
GÜRE İMAM HATİP SECONDARY SCHOOL	850.0	-	2950.00	3800.00	442,703.00	4,531,768.82
ATATÜRK VOCATIONAL AND TECHNICAL ANATOLIAN HIGH SCHOOL	500.0	-	650.00	1150.00	442,741.06	4,531,798.23
HAMDİ BOZBAĞ ANATOLIAN HIGH SCHOOL	3100.0	-	3500.00	6600.00	442,776.90	4,531,840.00
MİMAR SİNAN ANATOLIAN HIGH SCHOOL	630.0	-	2570.00	3200.00	442,832.51	4,531,791.06
EDUCABLE DISABLED SCHOOL	1400.0	-	1765.00	3165.00	442,916.19	4,531,984.68
GEDİKKAYA District						
GEDİKKAYA SECONDARY SCHOOL	1140.0	-	4985.59	6125.59	450,756.75	4,531,350.29

Table A3. *Cont.*

School Name	Building Area (m^2)	Annex (m^2)	Garden Area (m^2)	Total Area (m^2)	Location (m)	
Giresun/Center (Primary, Middle, High School)						
GEDİKKAYA PRESCHOOL	365.0	-	-	-	451206.35	4,531,139.70
ŞEHİT İSA YÜKSEL PRIMARY SCHOOL	730.0	-	4206.15	4936.15	451,259.30	4,531,177.41
125. YIL VOCATIONAL AND TECHNICAL ANATOLIAN HIGH SCHOOL	1450.0	2630	27,081.43	31,161.43	451,148.83	4,530,603.35
GEMİLERÇEKEĞİ District						
MİTHAT PAŞA SECONDARY SCHOOL	690.0	-	2068.00	2758.00	449,324.38	4,531,478.12
HACI HÜSEYİN District						
YEŞİLGİRESUN PRIMARY SCHOOL	920.0	-	1715.00	2635.00	448,997.94	4,531,719.48
HACI MİKTAT District						
VOCATIONAL AND TECHNICAL ANATOLIAN HIGH SCHOOL	5100.0	-	3300.00	8400.00	448,089.49	4,531,461.26
HACISİYAM District						
ATATÜRK ANATOLIAN HIGH SCHOOL	1605.0	-	7285.00	8890.00	447,246.62	4,531,054.71
KANUNİ SECONDARY SCHOOL	535.0	-	1995.00	2530.00	447,279.29	4,530,960.40
HURŞİT BOZBAĞ GIRL ANATOLIAN IMAM HATIP HIGH SCHOOL	645.0	-	965.00	1610.00	447,553.55	4,531,044.30
ABDULLAH BOZBAĞ PRIMARY SCHOOL	515.0	-	635.00	1150.00	447,602.38	4,531,084.13
KAPU District						
CUMHURİYET SECONDARY SCHOOL	1100.0	-	2485.00	3585.00	448,496.05	4,531,807.12
KAVAKLAR District						
FATİH VOCATIONAL AND TECHNICAL ANATOLIAN HIGH SCHOOL	680.0	-	3170.00	3850.00	448,908.06	4,531,262.83
ŞEHİT İSMAİL BAY SPECIAL EDUCATION AND APPLICATION SCHOOL	215.0	-	5155.00	5370.00	449,922.93	4,529,938.07
15 TEMMUZ ŞEHİTLER İMAM HATİP SECONDARY SCHOOL	1120.0	-	11,740.00	12,860.00	450,023.73	4,530,501.40
ÇOTANAK PRIMARY SCHOOL	860.0	-	2458.00	3318.00	449,212.98	4,531,245.92
75. YIL PRESCHOOL	1000.0	-	1420.00	2420.00	449,198.23	4,531,195.85
KAYADİBİ District						
KAYADİBİ PRIMARY SCHOOL	500.0	-	2085.00	2585.00	448,844.65	4,528,630.05
NİZAMİYE District						
GAZİPAŞA PRIMARY SCHOOL	860.0	-	2720.00	3580.00	448,513.52	4,531,542.91
MUSTAFA KEMAL SECONDARY SCHOOL	1145.0	-	6705.00	7850.00	448,463.79	4,531,282.79
FINDIK YURDU PRESCHOOL	700.0	-	300.00	-	448,476.81	4,531,228.86
TEYYAREDÜZÜ District						
19 EYLÜL PRIMARY SCHOOL	2200.0	580	5620.00	8400.00	443,912.28	4,531,545.42
24 KASIM PRESCHOOL	250.0	-	650.00	900.00	444,666.29	4,530,995.51
TEYYAREDÜZÜ SECONDARY SCHOOL	740.0	-	2610.00	3350.00	444,719.95	4,531,000.21

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