

Summary Description

Municipality of Anchorage



Anchorage Coastal Resource Atlas Project

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Introduction

Local governments often struggle to balance competing demands for residential, commercial, and industrial development with imperatives to minimize environmental degradation. In order to effectively manage this development process on a sustainable basis, local planners and government agencies are increasingly seeking environmental information. The subject area for the project spans a diverse ecological community along the western slopes of the Chugach Range, is located in a major urban community, and is in some areas subject to intense development pressures. The original Anchorage Coastal Resource Atlas (1983-1985), and plan policies needed to be updated to assist planners and local government in determining impacts of development in the Anchorage area.

It is essential that the Anchorage District Coastal Zone Management program update these data and the policies vital to their protection. This project also coincides with the implementation of Anchorage's recent 20-20 Comprehensive Plan, which calls for extensive protection of coastal resources, and includes a land use code revision. Results of this GIS-based project and the modeling exercise will allow the Anchorage Coastal District to evaluate the efficiency and success of its Coastal Zone Management (CZM) policies and form the basis of a plan update according to State statutes and guidelines. The new data sets will provide a much-needed new baseline for monitoring, restoration and enhancement of coastal resources, consistency review methods for permits in coastal resources, and for watershed management plans also being developed. This two-part Anchorage project primarily addresses the following legislatively authorized CIAP uses, from Section VIII. D:¹

¹ The project was developed using grant funding from the State of Alaska Coastal Zone Management Program (see "MOA_Coastal_Atlas_Grt_Application.pdf" to view the original grant application).



The modeling component of the project resulted in The Municipality of Anchorage Anchorage Sensitivity-Index Decision Support System (ASIDSS). The ASIDSS is a GIS-based screening tool to identify and prioritize significant local areas using multiple environmental criteria and a sensitivity index. The ASIDSS is the first model of its kind developed using GIS in the MOA, and will be refined with time. The ASIDSS will help update Anchorage's coastal resource identification and analyses, which are required elements of the Anchorage Coastal Management Plan. The results of this sensitivity assessment will provide the Municipality with an updated delineation of its coastal resource areas. These new data will serve as baseline information for Municipal departments to use in planning and policy determinations, and design, construction and permitting actions related to areas within the Anchorage coastal resource boundary. The results of this mapping program will provide a new baseline foundation for Anchorage's Coastal Management Program.

The tool is intended to enable repeatable, updated model outputs using source datasets that are updated on a regular basis. GIS was chosen as a data delivery mechanism to allow for periodic updating of the model outputs using current datasets, public access and participation in the analysis.

Goal

The goal of the project is to delineate specific areas of sensitivity to disturbances and new development within Anchorage's coastal boundary. This analysis is based on geographic information systems data and tools, in this case an ESRI ArcGIS Version 9.0 software modeling program, which was designed specifically for use as a component of Anchorage's Coastal Atlas revision process. This model generates map products that represent the result of GIS layer assimilations of all the new coastal resources data.

Methodology

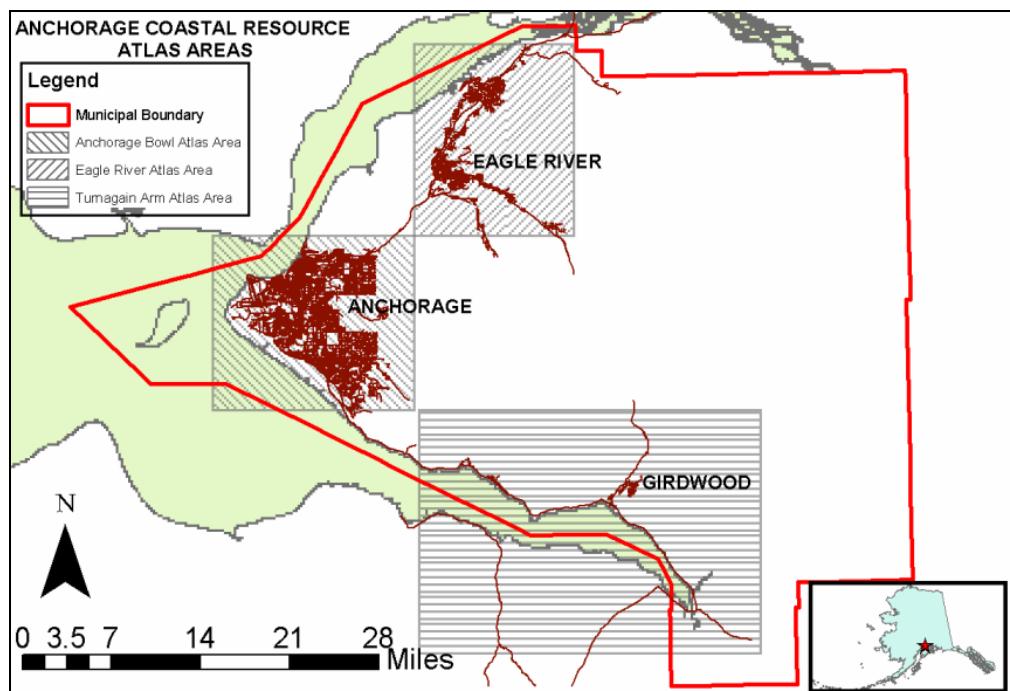
In order to delineate area-specific sensitive zones within Anchorage's coastal boundary, each GIS layer outlined above was assigned a series of weights based on the intrinsic habitat values, known sensitivities to disturbance, and importance to each species' life cycle needs in the Anchorage area. In addition, as important data modifiers and for refinements to the individual significance of sensitive areas, additional GIS layers were added to the model. These include road rights-of-way, and land use. These coverages were assigned negative weights in order to correlate these "human" factors as impacts and modifiers of natural areas. So, for instance, the Municipality's land use categories were given various negative values based on their "typical" development patterns, as these would impact sensitive environments. These negative land use values were used since they further modify the relative significance, rarity, and sensitivity of the habitat coverages.



In the designed default settings mode, this Anchorage sensitivity model outputs a discrete new GIS layer, the **sensitivity index**, which represents the intersections of all the GIS layers. These data are conveyed with numeric attributes, which are then further broken down into an ordinal scale. Along with the modeling technicians, Municipal staff created logical breaks within the progression of intersection points generated by running the model, based on the number of overlap locations of each layer. The product results of running the model with the default weights and values assigned to the data layers was ranked with intervals determined by Municipal staff. The range of overlap points varied, and the breakdown we created represented the logic of our best professional judgment on points for distinguishing high overlap = high sensitivity, mid-overlap = moderate sensitivity, and lower overlap = lowest sensitivity. It is essential to reiterate that all these GIS layers are based on data that represent important coastal resources, and overlaps of these contribute progressively with an area's increasing levels of significance as important coastal resources. The results of this model thus are portrayed in a way that represent the scientific basis for calling out critical coastal habitats, as outlined in the state's new coastal regulations.

Metadata for the ASIDSS are available for reference as to how the model relies on a weighting scheme to generate the sensitivity locations. The sensitivity locations produced with the software and are meant to be scientific/objective delineations of sensitive and important coastal resources for the Municipality. However, the modeling program allows for different assignments of weighting, and different scenarios can be generated by adjusting the weighting. Enforceable policies are therefore warranted for management of these areas, as directed by State statutes. .

Figure 1. Study Area Reference Map



Modeling Criteria

For this project, a number of criteria were used in the modeling program.² These criteria were identified by the Steering Group, a local advisory committee, which includes representatives from various Anchorage area resource agencies (see “atlas Stakeholder Group.doc”). An example of modeling criteria is shown below in Table 1.

TABLE 1. Example of criteria used in GIS-based modeling.

Example of Criteria used in Modeling	Weight
1. Number of acres of each habitat type within MOA parks.	6.25
2. Portion of watershed area with slope between 7% and 15%.	1.75
3. Natural Open space.	3.00
4. Travel corridors for significant species.	9.25
5. Vacant parcels within 100 feet of major roads.	8.50
6. Portion of stream length running thru or within 50 meters of park land.	6.25
7. Vacant parcels within 100 feet of major roads and major trails	14.50
8. Portion of watershed area within a FEMA designated 100 year floodplain.	1.75
9. Portion of 50 meter buffer around streams that is wooded.	6.25
10. Streams classed as anadramous.	7.50
11. Forested areas.	18.25
12. Portion of 30 meter buffer around streams that are wooded.	9.00
13. Wetlands.	7.75

Source Datasets

Relevant, existing GIS layers were used to support the analysis of environmental sensitivity in terms of these criteria. It was important to determine which data should form the basis for the model. We developed a Stakeholder Group composed of subject matter experts (“SME”) in the various data areas, for example geology, landcover, wetlands, watersheds, habitat. The SME’s helped decide which data should be used, and made recommendations for appropriateness of data usage. These datasets were compiled from a variety of sources including remotely sensed imagery, various habitat data sources, digital soils surveys, the MOA Elevation Datasets, and other sources.³

TABLE 2. Data sets used in the project.

	Source Datasets	Scale / Resolution	Updated
1.	USGS 30 Meter Digital Elevation Model (DEM)	30 Meter Raster	1996
2.	MOA Digital Elevation Model (DEM) from LIDAR (see metadata for specs)	1 meter raster	2003
3.	MOA Hydrography Dataset	1:300	2003

² See documents named “Sensitivity analysis criteria_final_3a-f.pdf.”

³ See also “aisdss_data_sets_sum1—6.pdf”



4.	MOA Parks Dataset	1:100	2003
5.	MOA Trails Dataset		
6.	MOA Land Use Dataset	1:100	1998
7.	MOA Parcel Dataset – selected parcels of recreational land	1:100	2003
8.	MOA HLB Dataset as represented by the MOA coverage.	1:100	2003
9.	MOA Federal Emergency Management Agency (FEMA) Q3 Flood Dataset as represented in the MOA coverage.	1:500	2003
10.	MOA & U.S. Fish & Wildlife Service (USFWS) National Wetlands Inventory in the form of the MOA wetlands coverage.	1:500	2003
11.	Natural Resources Conservation Service (NRCS) Digital Soils Survey provided to MOA as A/I coverage.	1:1,000	2002
12.	USGS 2000 30 Meter Remotely Sensed Landcover Dataset from Landsat ETM	30 Meter Raster	2002
13.	Habitats: various MOA datasets in coverage format.	1:500	Original 1980, and 2001

ASIDSS: An Environmental Sensitivity--Decision Support System

The ASIDSS is a simple desktop-based ArcGIS user interface that allows the user to execute the analysis by assigning relative weights to each criterion; the weights determined by MOA planning staff, or other appropriate groups. The program is a wizard-driven, logically sequenced modeling program to generate areas of sensitivity.⁴ .

Example Output: For the Bowl resource area, polygon areas were created in three colors (green, yellow, red) corresponding to different levels of sensitivity of the land to development. The general process used as a guideline in the ASIDSS is as follows. See the ASIDSS and documentation for more detail on ASIDSS. :

1. List criteria
2. Evaluate data available
3. Determine data requirements
4. Translate data requirements into spatial operations that will meet the stated criteria.

⁴ See “ASIDESS_UserGuide.pdf” for detail on how the ASIDESS works