Ski Resort Expansion Modeling
A Descriptive and Suitability Model of Expanding Ski Resorts Based on Vail Resorts

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Abstract

The purpose of this project is to answer the question of how GIS can be used in creating a descriptive and suitable model that shows the exact areas in which to build or expand a ski resort. By creating these models, we will be able to help certain resort companies, such as Vail Resorts, build or expand new areas for skiing and snowboarding. The new resorts can create many jobs and the local economies of the surrounding towns will benefit from the revenue. All of the data being used, such as ski runs, weather, and suitability factors, will be downloaded from reliable sources and the data will be run through a data flow model. The results that come from the model will be used in finding the best sites where a new resort can be constructed.

Introduction

GIS can be applied to many spectrums of geography. One of those extents is figuring out new areas in which a ski resort can be built or expanded upon. Skiing and Snowboarding have become a pastime throughout the mountainous regions of the United States, especially in the Rocky Mountains. It is a getaway vacation for families and a passion for others. With an industry that provides numerous employment opportunities and has a substantial influence on the many local economies, it would be profitable to see where another ski resort could be beneficial. In recent years, Vail Resorts has expanded to own 13 different mountain resorts spanning 5 states in the US, and a resort in Australia. The company is striving to provide world-class skiing conditions, and each mountain provides more differentiation to the collection. They have provided the task of identifying the specific characteristics that make the existing resorts fantastic places to ski, and using those characteristics to identify locations for potential expansion projects. The areas that are being focused on are Beaver Creek, Breckenridge, Vail, Heavenly, Keystone, Kirkwood, Lake Tahoe, Northstar, and Park City. The areas around these ski resorts will be the space that is the study area. The concluding results will help resort companies, such as Vail Resorts, pinpoint possible areas in which they would be able to add onto other existing resorts, or even decide to create a whole new resort. Companies will see an increase in revenue and new jobs would be created which would support the local economy of surrounding communities. The question is how can GIS be used in creating a descriptive and suitable model that shows the exact areas in which to build or expand a ski resort?

Location Results

The location that would be the best potential new area is found in the Northwestern part of Idaho near the towns of Naples and Bonners Ferry. The main mountain that the resort would center around is called Roman Nose which is west of the towns. There are already many trails and roads that channel through the hillsides so access for the potential resort would capable. Much of the hillside is appropriate for mostly green and blue ski runs. There are a fair amount of spots on the mountain that would allow more experienced skiers to engage in black diamond and double black diamond ski runs. On Figure 3 seven chairlifts were put in place along with ski routes that could possibly be routed on the hillsides. The highest elevation of the potential area is 2299.7m while the lowest elevation is 620.592m.

Area of Interest for Ski Resort Location

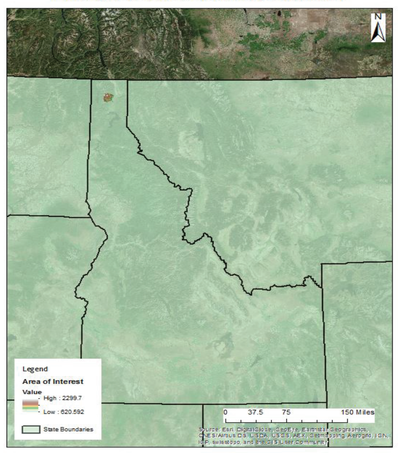

Figure 1: Northwest Idaho proved to be the best Area of Interest.

Transportation Distances

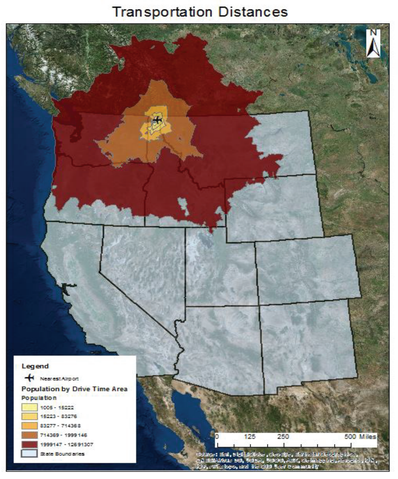

Figure 2: Shows the distance of 720, 360, 180, 120, 90, 60, and 30 minute drives along with population in the corresponding area. The closest airport is also 20 miles away from the potential resort.

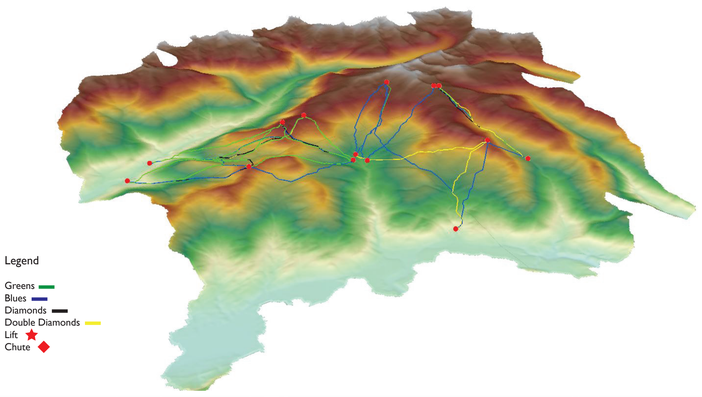

Figure 3: A 3D scope image of the mountain and the possible ski runs that could be built on the hillsides.

Conclusion

After running through the methods and using our suitability factors the best potential site in the Rocky Mountains for a new ski resort is at Roman Nose in Idaho. The site worked the best with our descriptive and suitability models. It is close to a hospital, grocery store, and lodging which is necessary if people are going to be vacationing to the resort. There is a terrific amount of precipitation that happens within the skiing season here as well. This potential site can be reviewed by ski resort companies, such as Vail Resorts, and be certified as a project that will profit the company. New jobs can be created and the economy of the local towns will see a positive effect. The new resort will also benefit skiers and snowboarders as well because it gives more space for riders to explore. Many times resorts can feel a bit overcrowded when there are too many people on the hill. With GIS, the question of finding an area that is suitable based on certain criteria to build a new ski resort can be answered. Finding the best answer takes time though. There is a considerable amount of data processing that is needed and being able to display the results of this new data is crucial in getting the idea to be seen as product people can trust. The tools in ArcMap allowed for generating the maps and flow models that were needed for this project to work. GIS serves many applications in the field of geography. This application is a way to provide skiers and snowboarders with a place they can leave their problems behind and unearth the beautiful landscapes ski resorts have to offer. If other ski resort companies gathered data and broke it down through a GIS based software they would be able to figure out undeveloped places that would enhance their business.

References

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Methods

In order to figure out the best possible areas, models and python scripts were generated using Model Builder in ArcMap and Python Scripter. Many tools were ran through the model builder which helped in different processes such as ski run extraction, clipping data, and run path generation which are shown in these three figures. Gathering the precipitation, ski run, and land cover data was the first step in the project. Along with the rest of the data collected it was then calculated through Model Builder to find statistics which would give characteristics about the hills that resemble Vail's Resorts. Once the statistics were determined and reclassed, certain layers were masked and the possible areas were shown. Once the best location was figured out, potential lifts and ski runs were put in place so that there would be an idea of where a company could place its run on the hill.

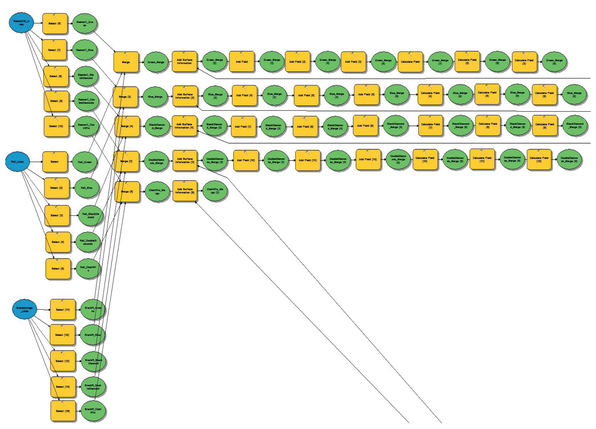

Figure 4: Ski Run Extraction being used to classify the runs of Breckinridge, Vail, and Beaver Creek.

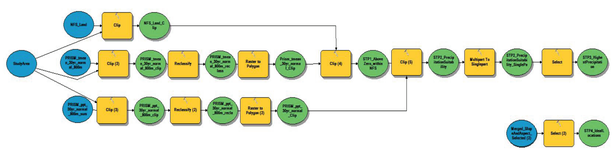

Figure 5: Weather data being clipped to National Forest Land.

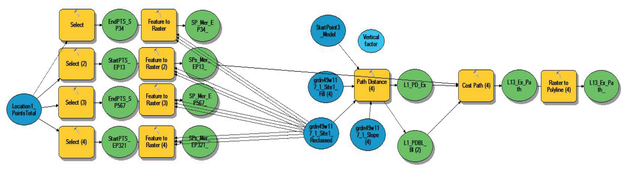

Figure 6: Using Start and End points to find Green, Blue, Diamond, and Double Diamond runs. This shows the process for finding Double Diamond runs.

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