DESIGN AND IMPLEMENTATION OF A FOREST VEGETATION MAP IN ZONGULDAK REGION, TURKEY

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ABSTRACT

The aim of the project is to design on computer, The Forest Vegetation Map of Citdere District within the Zonguldak Forest Directorate. Aerial photography and conventional methods were used in data acquisition. The site properties are essential for tending, natural / artificial regeneration and plantation. Any work, not taken into considerations of these properties in the future might be potentially dangerous to the forestry. Due to this risk, it is very important to create the site map. Producing the vegetation and soil maps is the fist step in the creating the site map. The vegetation maps are not only fundamental for the site maps, but may also have many work spaces such as, ecosystem, ecology, agriculture and forestry. Much information about natural preservation, impacts caused by antropogen and vegetation dynamics can be obtained from vegetation maps. That's why they have many advantages to be inspected.

1. INTRODUCTION

The purpose of producing a vegetation map is to determine the specifications and extend, zone, of the plant species in that region. However, producing a vegetation map does not mean anything unless it serves an objective in the practice. One can understand the natural capacity and the characteristics of a particular region in which the plant diversity is studied. At the same time, with the help of producing similar map at certain intervals, vegetation characteristics and zones, depending on the time and utilisation purposes, can be determined. But, to determine the definite variations among different vegetation groups, soil studies must accompany with the vegetation ones. In forestry, vegetation maps helps considerably in the establishments of silvicultural application units as well as in planning.

GIS is a system in which data manipulations, analyse and confirmations can be performed, so maps, tables, reports and graphics that decision makers, analysts and planners base on their decisions. Thus, in order for a GIS analyse to be used properly, location accuracy must be of utmost priority at the very beginning.

The determination of all the species and sub-species in the region was completed to be able to produce a vegetation map. First, vegetation samples are acquired so that every tree and brush species in the region was included. All the samples were then tabulated, and required forest units and the detailed explanations of the species in these units were determined out of the tables. After it was determined that the samples could be classified in the field or not, the range of the confirmed species were then delineated on the map. In the delineation stage of the task aerial photography was used as well.

2. STUDY AREA

The study area, " Citdere District ", is within the Yenice Forest Directorate, Zonguldak, Black Sea region, Turkey Figure 1. The elevation ranges between 640 m at Sekermese and 1704 m at Kuyrukkaya Tepesi, where the slopes are relatively steep and the terrain is treacherous. The region is included in the West Black Sea region macro climatic zone. According to the data obtained by the nearby regional meteorological station, the region can be classified among the zones where moisturise vegetation types grow, depending on the location and dominant plant species. There is not or is a little, if any, water shortage. In the study area, the soil depth is fairly high where the bedrock varies (sandstone, marn, limestone etc.).

Citdere district is 6070 ha. (60.7 km^2), 5431 ha of which is productive, 412.5 ha. Of which is not in terms of forest management applications. 234.5 ha. Are bare, open spaces. Citdere is very abundant in terms of tree, brush and grass species. Available forests can be classified as naturally well preserved, including both coniferous and deciduous species.

3. DETERMINATION OF MAP UNITS

To determine the forest vegetation types, 134 sample points were taken using Braun-Blanquet method (Figure 2). The approximate area of these sample points is 400 to 500 m^2. All the plant species and the areas they cover within the sample point were measured and recorded. After the tabulation of these records, 14 tree and brush units were established. These are as follows:

1. Fir - Beech forest mixed with Scotch pine.
2. Monosses uniflora variant.
3. Fir - Beech forest mixed with Ilex Colchica and Rhododendron ponticum var.
4. Fir - Beech forest mixed with Ilex Colchica typical var.
5. Yew - Beech forest.
6. Hophornbeam – Basswood forest var.
7. Oak forest (Quercus macrantera var.).
8. Melamphyrum arvense (Rhododendron ponticum var. of Quercus petraea).
9. Melamphyrum arvense (typical var. of Quercus petraea).
10. Scotch pine - Black pine forest.
11. Beech forest.
12. Oak (Quercus hartwissiana) – beech forest sub-sub var.
13. Circea lutetiana sub-sub var.
14. Fir (Abies Bormulleriana var.) forest with Circea lutetiana sub-sub var.

Among these units number 3 and 12 with all their sup-species occupy more area than the rest of the determined units. The delineation of forest units and their apparent distinctions was both done on the field and from the aerial photography. During the field study, a 1:10,000 scaled map, which had been enlarged from a 1:25,000 scaled map, was used.

Some units were evaluated as combined, and open spaces were included in some of these combined units. Finally, the following map units were established:

1. Open Spaces
2. Fir – Beech forest mixed with Scotch pine
3. Rhododendron ponticum variant of Fir – Beech Forest with Ilex colchica
4. Fir – Beech forest mixed with Ilex colchica
5. Typical variant of Fir – Beech Forest with Ilex colchica
6. Yew – Beech Forest
7. Hophornbeem – Basswood Forest
8. Melamphyrum arvense – Oak (Quercus petraea) Forest
9. Scotch pime – Black pine Forest
10. Beech Forest
11. Typical variant of Oak (Qu. hartwissana) – Beech Forest
12. Abies bormulleriana var. of Oak (Qu. hartwissiana) – Beech Forest
13. Degraded Scotch pine – Black pine Forest
14. Black pine afforestation area

4. METHODS

After the manually drawn and coloured vegetation map was completed on a 1:10,000 scale, this map was decreased in scale to 1:25,000 to coincide with the original 1:25,000 regional map. Both maps were then scanned in 200 dpi with "jpeg" format to enable the authors to load them to a computer and do manipulations. Arcview GIS Version 3.1 was used. Though an appropriate size of a digitising table was available for the project, because of the steep terrain conditions and since user must have relied upon the limited magnification capacity of the table's mouse, this option was omitted. If the digitising was done using the mentioned digitising table, due to the fact that there would have not been a reliable base map readily viewable through the screen, the unavoidable mistakes to be done during the digitising would have directly transmitted to the pertaining layers. Hence the digitising was done through the screen on the "jpg" images. The unlimited magnification capacity and flexibility of the software enabled the authors to zoom in as much as needed and to do corrections as much as necessary during the digitising. Positional accuracy in this way was the same as what was on the original map and the manually done vegetation map. 7 different layers were created. They were as follows:

1. Circumference of the region, the outer extend of the whole study area – boundary map.
2. Contour lines spaced at 10 m intervals – contour map.
3. Stream, with its all year running and dry in the summer tributaries – creek map.
4. Sample points taken at – points map.
5. Sample points taken + soil profile – points+profile map.
6. Plant societies, each of the established 15 land cover types – vegetation map.
7. Transportation network, unpaved but year round useable roads – road map.

After these maps were created, a user, forester, will be able to see and decide what kind of vegetation live in the district what can be done in the future, what kind of forest management practices can be performed and so on. Changes in terms of the vegetation types and extends can always be updated as long as a reliable data sources is available (Figure 3).

5. CONCLUSION

In forestry, there have been many areas where vegetation maps serve as base maps toward producing regional forest management maps. In addition, they play an important role in differentiating vegetation types and in identifying the silvicultural operational units. The map created for Citdere District including very unique tree species and their varied stand classes is very important for preservation and determination of negative human interference.

6. REFERENCE

Akyuz, F., 1996, Studies on Forest Fire-Damaged Area in Turkey for GIS Application, ISPRS XVIII. Congress, Vienna, Austria, Volume XXXI, Part B4, pp.45-49.

Band, L., Peterson, D., 1991, Forest Ecosystem processes at the Watershed Scale: Basis for Distributed Simulation. Ecological Modelling, Vol. 56, pp. 171-196.

Tomlin, D., Geographic Information Systems and Cartographic Modelling, Prentice Hall. 1990.

Toz, G., 1992, Forest Management Information Systems (FORIS) on Application of GIS in the Forestry, ISPRS XVII. Congress, Washington D.C., USA, Volume XXIX, Part B4, pp. 713-720.

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