Avalanche Disasters in Türkiye

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ABSTRACT

Because of the increment in human loss at last decades, all related units begin to solve avalanche problem with the General Directorate of Disaster Affairs as a coordinator. Snow avalanche disaster experienced at the mountainous parts of north, east and southeastern Anatolia. The statistics indicate that among 1960 and 1996, every year on average 26 people lost their lives in avalanche. Especially, in 1991-92 winter season, 328 people died and this created a sudden publicity.

At the beginning of 1992, General Directorate of Disaster Affairs made a collaboration with two big institutes in France-Grenoble (CEMAGREF) and Switzerland-Davos (SFISAR) which have world wide experience in snow avalanche studies. This collaboration is realised as a project which is named as "Avalanche Forecasting, Mapping, Zoning and Paravalanche Construction Technologies". Trabzon, Rize and Bayburt region (Soğanlı Mountain) are a pilot region of the project.

In 1994 and 1995, five snow observation stations were established in the pilot area, a series of education programs in the field and in the bureau was realized and the avalanche danger areas were determined. In addition, the data from observation stations are being analyzed, mapping studies continue. In 1996, snow avalanche forecasting models will be tried the applicability of the avalanche prevention techniques in Türkiye will studied, and legal rearrangement will be done.

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1.INTRODUCTION

At last decades, increment seen in human loss because of snow avalanches in Anatolia. 328 persons were died during 1991-1992 winters season, 135 persons were died during 1992-1993 winter season, 27, 7, 8 persons were died during 1993-1994, 1994-1995 and 1995-1996 winter seasons respectfully (AFET, 1996). According to records of snow avalanche events from 1950 to present, eastern, south-eastern and northern Anatolian regions are more avalanche dangerous regions in Türkiye. In eastern part of Black Sea Region, avalanche events occur at land part of mountains which extent parallel to the sea-shore, and caused big damages in the area. Destroy of forests is getting more and more. Avalanche event did not occur before in this region. So, it is very strange. Some of them were effected on settlements so, bigger damages and losses could not be developed (Gürer, et al., 1994). Areal distribution of avalanches shows southern and south-eastern part of Anatolia is under the effect heavy avalanches. Avalanche events which caused big damages and numbers of human losses created a sudden publicity.

General Directorate of Disaster Affairs was started to work together with Snow and Avalanche Institutes in France (CEMAGREF) and in Switzerland (SFISAR) in 1993 on the subject of "Snow Avalanche Mapping, Zoning and Paravalanche Structures". This collaboration continues (or starts) as a project in 1994 in pilot area which cover Trabzon, Rize and Bayburt provinces, because of transportation conditions, etc.

2.PROJECT STUDIES

The project is realized under "International Decade For Natural Disaster Reduction" studies. In first year of the project, four field studies realized in the pilot area. In Soğanlı Mountain region, five snows and avalanche observation station was set-up. In these stations, to determine the behaviours and strengths of snow layers, snow depth, snow density, snow water equivalent, wind, cloudiness measurement snow profiles have been made. These stations are in; 1)Trabzon-Çaykara-Uzungöl, 2)Trabzon-Çaykara-Karaçam, 3-Rize-İkizdere, 4-Bayburt-Merkez-Göloba and 5-Bayburt-Merkez-Helvaköy regions.

According to project protocol, two course programmes realised in September 1994. One of them is about Mapping of Avalanche Zones with ARC/INFO and the other is "Project of Paravalanche Structures". First course has been given 6 AFET engineers along 20 days. Air-photo

interpretations of avalanche areas, field observation studies, using ARC/INFO in avalanche mapping are the main topics of the course. Second course gave 15 AFET engineers along a week. Definition and types of avalanches, avalanche mechanism, prevention techniques, reliability of these techniques in Türkiye, type of structures are the main topics of this course programme.

Conferences on "Creation of Interest To Avalanches In Local Decision Makers" were realised in Erzurum, Bayburt, Trabzon and Rize provinces at December 1994. Governors, governor assistants, governor of districts, mayors, mukhtars, General Directorates of Highways, State Hydraulic Works, Village Affairs, Head Offices of Public Works and Forest, Civil Defence, Health and soldiers are joined these conferences as a listener.

At the same time in the field, training programme is realised. Ram profile, snow profile, temperature profile studies and evaluation of all meteorological datas with these profiles were main subjects of this programme.

2 AFET engineers studied on "Avalanche Forecast, Modelling and Computer Application" in Davos-Switzerland on April 1995. An other training programme on "Avalanche Mapping, Modelling, Meteorological Evaluation" is realised in Grenoble-France and only one engineer from AFET joined the programme in October.

Besides these activities, an avalanche data bank based on the records in archives and a possible avalanche risk map was prepared by marking all the recorded avalanche locations on a 1:1.000.000 scale topographic map. Mapping studies in pilot project area have been continued. In total, 46 maps finished and entered computer media. 31 of them are belong to Trabzon province, 12 of them are belong to Rize province, and the others are belong to Bayburt province. These studies take to much time and required to care.

3.Requirement of Avalanche Mapping

In the world, people settle in the valley instead of mountain and rough area. Touristic places in mountain, development of cities through the mountains, new highways and roads, energy lines, avalanche mapping studies, snow and meteorological measurement in stations are caused to come face to face with avalanche danger. Avalanche events could not prevent these developments or

activities. So, to prevent new buildings, limited the utilities in dangerous areas at danger period are best methods to prevent or to decrease the losses (Hotchkiss, 1972).

Changing the avalanche mechanism is not possible. So, avalanche effects should be decrease by two ways: paravalanche structures and avalanche mapping. The second way gives best and more reliable results in long-term period. Realisation of settlement programmes by using avalanche maps, decrease losses and damages. These maps help to fix the place, size and type of the paravalanche structures (Yavaş & Erenbilge, 1996).

4.Avalanche Mapping

As determine at the previous pages, General Directorate of Disaster Affairs uses modern technologies to solve the avalanche problem in Türkiye since 1994. Other experienced countries as France uses these technologies.

Avalanche mapping studies are realized first in the bureau, then in the field and then in the bureau again. During these studies, 1/25.000 scale areal photos and topographical maps are used (Gürer, et al., 1995;Yavaş & Erenbilge, 1996).

These mapping studies are continuing in Trabzon, Rize, Bayburt and Artvin provinces. The field study finished in Trabzon province and digitisation of maps (40%) is still continue. The field study of Rize is in 40% level, of Bayburt is in 30% level, of Artvin 35% level. In bureau, these maps are entered the computer media using ARC/INFO which is one of the best programme of GIS.

During field surveys, additionally avalanche questionnaire forms have been filled by local people by face to face (Yavaş & Erenbilge, 1996).

All these studies try to be realized with 4 engineer from General Directorate of Disaster Affairs. Really, studies continue rapidly with this small avalanche group.

In mapping studies, approximately 1240 km² area mapped and printed from Trabzon province. And approximately 3900 km² area will be finished at the end of this year in the same province. Totally, 2000 km² area mapped and printed in pilot project area.

One example which is from Toprak Plateau between Trabzon and Rize provinces, can be seen Figure-1.

5.Results

Decreasing avalanche disaster studies have been continue since 1950 in Türkiye. These studies are accelerated after the avalanche events at last decades. Results during these studies are as follows:

I. For decreasing the losses and damages because of snow avalanches, using of avalanche risk map which creates from avalanche maps, is best method.

II. Avalanche questionnaire form will give more help to preparation of risk maps. So, it should be done with care.

III. Avalanche maps have been starting to use by other public utilities as General Directorate of Highways, Bank of Provinces, village Affairs, etc. They are planned their works such as road directions, water structures, etc.

IV. Avalanche maps are shown reforestation areas in the field. This will provide a natural prevention against avalanche.

V. Paravalanche structures will project according to these maps. This will provide financial benefit.

VI. Maps are used in selection of resettlement areas because of natural disasters. This will provide safe settlement against avalanche.

VII. General Directorate of Disaster Affairs has been given detailed lectures to gendarmes. They are started to use avalanche maps.

VIII. These results are the benefits of GIS with ARC/INFO in avalanche studies.

6.References

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