AVALANCHES IN BULGARIA – HUMAN AND NATURE PERSPECTIVE

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ABSTRACT: Avalanches were recognized as disturbance in the alpine and subalpine environment in Bulgaria. However, before the 1930s mostly forest workers were interested in the phenomena due to forest damages and accidental death of personnel. In few periods with high avalanche activity which caused damages in forests there was scientific attention and reports. However, newer development of remote sensing techniques provides affordable opportunities to better study the importance of avalanches as forest disturbance. After the development of the tourist movement in the 20th century encounters of people with avalanches frequented and lead to several tragic accidents. Attention in avalanches increased after a tragic event in 1965, when 11 mountaineers were killed in a single accident close to Malyovitsa peak in the Rila Mountains. For the whole period of records (1930s to present) a total of 99 avalanche accidents were recorded with above 230 people involved, of which 60 fatalities. In recent decades the raise in the number of freeride skiers and snowboarders lead to higher incident rate. In these groups were recorded 75% of all 58 accidents involving 108 people after 2000. Most of the successful rescues of completely buried people were due to quick and adequate reaction of people on the scene. Only few of the organized rescue operations resulted in digging out alive people, although several of those cases were remarkable. The data although limited and preliminary demonstrates high importance of proper reaction in avalanches and especially of adequate companion rescue.

KEYWORDS: avalanches, Bulgaria, forests, human accidents

1. INTRODUCTION

Avalanches were recognized as disturbance in the alpine and subalpine environment in Bulgaria. The lack of settlements in the high Bulgarian mountains lead to interest in their occurrence mostly among foresters. After the development of the tourist movement in the 20th century encounters of people with avalanches frequented and lead to several tragic accidents, which raised the attention to the phenomena. Our aim is to present the available data on avalanche occurrence in Bulgaria, discuss the problems in recording and analyzing data and the recent development in the field.

2. METHODS

We collected historical and modern data on avalanches from several sources: 1) A review of Bulgarian mountain literature published in the 20th century; 2) Interviews with mountain rescuers and mountaineers who shared their memories on accidents; 3) A review of forestry literature on avalanche occurrence in Bulgarian forests; 4) Reports and self-reports on social media after 2000; 5) Self-reports for avalanche accidents in the web-based platform avalreport.befsa.com; and 6) My own data on dating avalanche events by tree-ring analysis and actively working as avalanche trainer for the Bulgarian Extreme and FreeSkiing Association (BEFSA) and volunteer mountain rescuer at the Bulgarian Mountain Rescue organization.

3. RESULTS AND DISCUSSION

3.1. Avalanches as disturbance events in Bulgarian forests

Evidence of frequent and large avalanches were observed in the forest areas in several of the highest elevation regions of the Bulgarian Mountains – the Rila Mountains (especially the Rila Valley, Beli Iskar Valley, the highest parts of Bistritsa Valley), the Pirin Mountains (in most of the valleys), Central and Western Stara Planina Mountain Ranges, the Perelik region of the Rhodopes Mountains, the highest parts of Slavyanka, Belasitsa and Osogovo Mountains. However, despite the presence of numerous avalanche tracks, there is limited data on actual events. I found only 38 records of avalanches affecting forested terrain. The oldest written record described two avalanches that occurred in 1822: one was associated with the destruction of a building belonging to the Rila Monastery and the other for uprooted numerous large trees in the same region in 1822 (Petrov, 1988), but these reports could potentially be about the same event. Several publications by Hristo Peev refer to a number of avalanches that severely disturbed forests in the 1950s and 1960s (Peev, (1955); Peev and Klecharov, (1976). For exam-

ple, more than 30 ha of old-growth endemic *Pinus peuce* forests were strongly affected in the Pirin Mountains in the winter of 1954/1955. Another very impressive avalanche cycle from 1963-1974 included numerous avalanches in the old-growth *Pinus peuce* forests on the northwestern slope of Todorka Peak in Bunderitsa Valley and a very big avalanche which affected *Pinus heldreichii* forest on the Palashitsa slope in the same valley (12.02.1963, 1180 m^3 damaged wood). Between 2005-2015, several avalanches have affected forest areas and were described by Panayotov (2012). Furthermore, a tree-ring study of a famous avalanche couloir on the northwestern slope of Todorka peak (2712 m a.s.l.) in the Pirin Moutains by Panayotov (2007), dated at least 19 avalanche events that affected neighboring forests and demonstrated a high frequency of large avalanches. A GIS analysis of satellite data showed that more than 30% of the potential forest on the northwestern slope of Todorka Peak has been affected by avalanches (Panayotov, 2011). These data reveal the importance of avalanches for the *Pinus peuce* and *Pinus heldreichii* forests in the Pirin Mountains and demonstrate that they are one of the main disturbance agents in these forests. Numerous avalanche tracks in the other above-described mountains clearly show the need of further scientific studies on the topic, which will help reveal the real scope of the problem. Significant progress could be achieved by using the capabilities of remote-sensing methods which can be used to find avalanche tracks in remote and hardly accessible terrain. At a next step tree-rings can be used to date the major disturbance events and construct local avalanche histories.

3.1. *Avalanche accidents involving humans*

Attention in avalanches as important factor for tourism increased after a tragic event in 1965, when 11 mountaineers were killed in a single accident close to Malyovitsa peak in the Rila Mountains. In the recent decades the raise in the number of freeride skiers and snowboarders lead to higher incident rate. However, the mountain rescue service of Bulgaria keeps record only on accidents requiring organized rescue operations, which hinders the actual analysis of the importance of avalanches. Since 2000 the Bulgarian Extreme and FreeSkiing Association (BEFSA) is trying to organize a simple record system, which uses also reports in social media. In 2017 an application for volunteer reporting of accidents was launched at avalreport.befsa.com.

The collected up to now data, although preliminary, provides initial insight into the trends.

For the whole period of records (1930s to present) a total of 99 avalanche accidents were recorded with above 230 people involved (Fig. 1), of which 60 fatalities (Fig. 2). Most important for the rescue of partially or completely buried people was companion rescue and self-rescue to which were due the majority of survivals. I found records on 13 alive people found after complete burial. The cases with organized rescue which found alive fully berried people were few, of which most notable was the case with Dimo Dimov, who was dug out alive after spending more than 5 hours in wet snow avalanche in the very steep and long Blue couloir in the Rila Mountains (1974). Another notable case was with D-r Krasen Demirev, who was found alive after being buried for more than 4 hours under the snow.

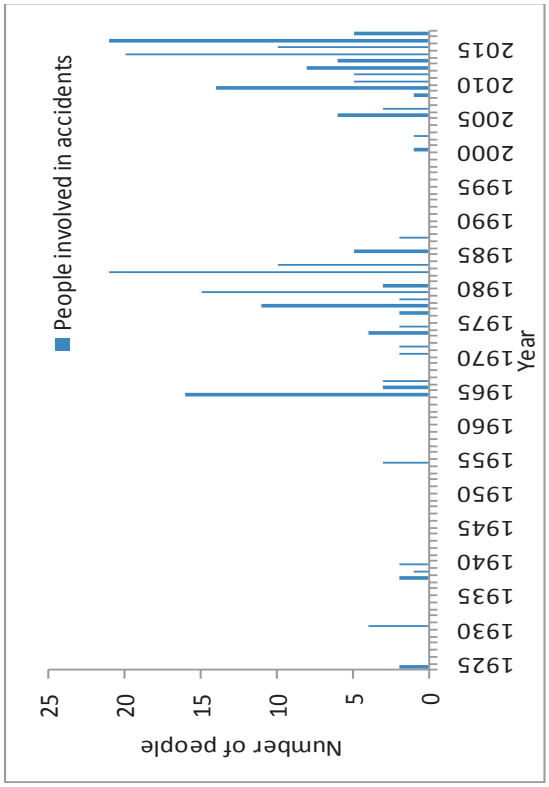

Figure 1. Number of involved people in avalanche accidents in Bulgaria

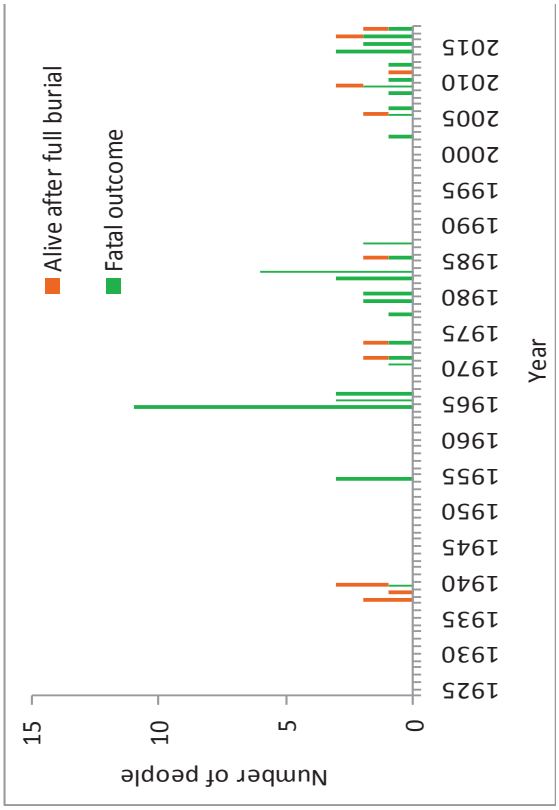

Figure 2. Number of people who died in avalanche accidents and number of rescued alive after complete burial in Bulgaria

For the period since 2000, when reports on social media and self-reports on avalreport.befsa.com have been included in the data, the total number of recorded accidents was 59 with 108 people involved. The majority (75%) were involving skiers and snowboarders. This is rather different from the period before the 1990s, when most incidents involved hiking or climbing mountaineers. About 15% of all involved people after year 2000 died in the accidents. This is lower percentage compared to the whole period (26%). It could be due to better accounting of accidents with records of cases of partially buried people, which did not need rescue, but also to improved awareness and rescue capabilities due to accessible avalanche training and modern equipment such avalanche beacons. The number of rescued alive people after complete burial was 5, while heavily injured were 8. The rest were partially buried and dug out by companions or by themselves or were not actually buried. In few cases people reported assistance by avalanche airbags.

This data, although limited and preliminary, confirms the importance of proper reaction in avalanches and especially of adequate companion rescue. Therefore BEFSA is working actively on public awareness, training and education events. There is constantly increasing interest in this type of education. However, the best represented group in such courses is the one of people above 25 years while incidents involve also younger people. It is therefore necessary to search for additional methods for raising awareness. To do that BEFSA produced and launched a series of short avalanche awareness and training movies in 2017 and 2018 called “The Avalanche series of BEFSA” available on web-site safety.befsa.com and is currently trying to organize a number of awareness lectures in high schools.

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