

2015



# Panjshir Valley Avalanches 25 February

AVALANCHE SITE INVESTIGATION: 15 JUNE 2015  
DOUG CHABOT WITH HELP FROM **HAMEED HABIBI** OF THE AFGHANISTAN  
AVALANCHE CONTROL TEAM

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## Introduction

On 15 June 2015 I visited the Panjshir Valley in Afghanistan to investigate the area where avalanches killed an estimated 168 people in February. I was accompanied by Hameed Habibi, the Deputy/Second Command for the Afghanistan Avalanche Control Team at the Ministry of Public Works (MoPW), as well as Nasim Khan, Administrative Officer of the Panjshir MoPW, who was present during much of the road clearing.

I am an avalanche forecaster for the United States Forest Service in Bozeman, Montana and am currently the director of the Gallatin National Forest Avalanche Center. I am also an avalanche consultant for Aga Khan Development Network FOCUS group in Afghanistan, Tajikistan and Pakistan. I have over 25 years' avalanche experience and have taken numerous trips to Afghanistan including the Panjshir Valley. After February's large-scale avalanche cycle I wanted to visit the area in order to understand what happened and why so many died.

*The Panjshir avalanches killed 168 people, more than the combined total of all other avalanche fatalities in the world this winter. It rivaled the Salang Pass avalanches of 2010 (186 deaths), which was the largest loss of life from snow avalanches since World War 1.*

In the international avalanche community it is common practice to investigate avalanche deaths whenever possible, to learn from and understand the factors that contributed to the event. I have visited Afghanistan on many occasions and am keenly interested in avalanches. Afghanistan recently developed a professional Avalanche Control Team of MoPW, and I invited them to join me so we could investigate this natural disaster together. Conducting a field visit is the most effective way to learn what happened and why. We all had a basic understanding of the weather and snowpack that contributed to Afghanistan's widespread avalanche activity, but we lacked knowledge about the specific terrain and how local communities dealt with snow avalanche risk. The site visit helped us piece together the factors leading to the avalanche cycle and loss of human life.

I worked closely with Hameed Habibi to create this report. It was a collaborative effort and he conducted interviews during our visit and also created tables on weather and avalanche paths. This report is a reflection of his dedication and hard work to save lives in one of the deadliest avalanche areas of the world.

## Summary of Events

In the middle of the night on 25 February 2015, a large avalanche cycle struck Panjshir Valley in Afghanistan.

Heavy snow and strong winds fell on top of a weak snowpack creating widespread avalanches which hit



Doug Chabot and Hameed Habibi in Panjshir Valley.

many homes in multiple villages as the residents slept. It was estimated that at least 168 people were killed and 53 injured in 30 separate avalanches.



Hameed Habibi and Nasim Khan interviewing villagers where 23 people died. The slope above them avalanched at 0200 and destroyed many homes.

### **Analysis**

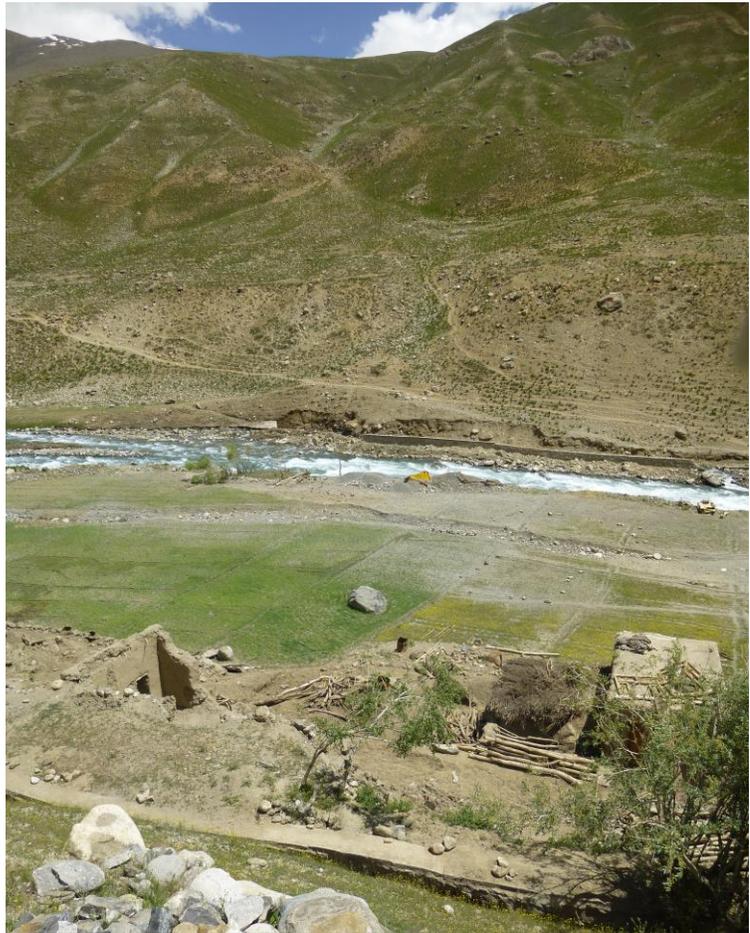
Early season snow fell in November and December that set the stage for dangerous avalanche conditions later in the winter. Cold temperatures changed the early snow into a layer of weak, unstable, sugary grains termed “depth hoar”. As subsequent storms piled up and added weight, the depth hoar became unstable and avalanched. This instability was seen throughout Central Asia in the Pamirs, Hindu Kush and Karakorum mountains of Afghanistan, Tajikistan and Pakistan. The Avalanche Control Team at the Salang

Pass noted the formation of this weak and unstable layer early in the winter. Other observers with FOCUS also found this layer in the surrounding mountain ranges of Central Asia.

Starting on 20 February and continuing into the early hours of the 25th, the weather station located at 3,222 meters on the south side of the Salang Pass and maintained by the Avalanche Control Team of MoPW, showed heavy snowfall for five days leading up to the Panjshir avalanches (see the attached Daily Weather Information table). Snowfall amounts in the starting zones near the ridge tops at elevations of 4-5,000 meters are hard to determine; however the weather station measured **2.59 meters** of snow during this short time, a very substantial amount. High winds likely deposited over double that depth in the starting zones. The depth hoar at the ground could not support the weight of all this snow. The Avalanche Control Team closed the road at 1600 on the 22 February and a “very large” avalanche released onto the road that night. Three medium avalanches were reported by the Team on the 23<sup>rd</sup>, and 19 “very large” avalanches occurred on the 24<sup>th</sup> with some crossing the road twice. The evening of the 24<sup>th</sup> saw large natural avalanches throughout Panjshir and most of Central Asia. The storm ended by 0800 on the 25<sup>th</sup> with the Salang Pass weather station showing clear skies.

*Recent avalanche activity is the number one sign that similar slopes are also unstable.*

Natural avalanches started two days prior at the Salang Pass and in hindsight were a prime warning sign that slopes in Panjshir were also unstable. The avalanches in the Panjshir Valley occurred 60-100 km away from the Pass, a distance that is not far in terms of weather systems and snowpack differences. Since the mountains on both sides of the Panjshir Valley road experienced similar snowfall and a similar snowpack, both sides had very large avalanches regardless of aspect (see the attached Panjshir Avalanches Survey). Villages are at an elevation of 2,100 to 3,000 meters with avalanche starting zones 2,000 meters above. Many homes were located in obvious avalanche paths. A few homes were located on the edges of avalanche paths or across the river, seemingly safe. However, some of the slides crossed the river and hit homes 40 meters or more up the opposite side of the valley.



17 people lost their lives when a large avalanche with a 20 degree alpha angle destroyed the buildings in the foreground.

An alpha angle is the measurement of the angle off horizontal from the debris to the starting zone and gives us a sense

of the size of the avalanche. The further an avalanche travels the lower the angle. In most areas the terrain is tightly confined with few safe zones and our lowest alpha angle measurement was 27 degrees. In the upper Panjshir Valley the landscape widens allowing the avalanches to travel far. Here we measured an alpha angle of 20 degrees on an avalanche path that killed 17 people, which denotes a near maximum runoff for that slide path, likely historic in size.

Locals said their great-grandfathers mentioned avalanches, but nothing this big. They estimate it has been at least 100 years since an avalanche cycle of this magnitude has hit the Panjshir Valley.



Clearing avalanche debris from the roads in the week following the slides.

## RESCUE

Rescue efforts were hampered by avalanche debris on the roads. Hundreds of avalanches buried tens of km of roads in between villages. Although cell phones spread the news quickly, there was very little that could be done to help. The snowstorm had crippled rescue efforts. It took plows over a week to reach the upper part of the valley with debris reaching four meters in height. Rescuers and plows were exposed to many avalanche paths as they moved up the valley. Luckily, the delayed response likely saved rescuers' lives since the time delay allowed the slopes to stabilize.

## AFTERMATH

During our visit to the sites we could see many people reconstructing their destroyed homes in their original locations. *Avalanches will occur again on these slopes.* Although the solution to not build in the exact same spot seems obvious and would save lives, it is not that easy to convey or implement such a

straightforward solution. Much of the land is ancestral and holds deep meaning to those who live there. Adjacent land is not for sale, and nor are underserved villagers in positions to move. Furthermore, religious beliefs dictate that the power of life and death lies with Allah's will and is beyond their control.

## AFGHANISTAN AVALANCHE CONTROL TEAM

The Avalanche Control Team is comprised of four individuals who are Afghanistan's only avalanche experts. The team was formed by the MoPW in 2012 in response to the deadly avalanches at the Salang Pass in 2010 and is trained to determine snow stability, close the road and direct artillery avalanche control. Their job is very important to keeping the public safe at the Salang Pass. The fact that there were

no deaths during this widespread avalanche cycle is a testament to their valuable work. The Panjshir Valley avalanches also illustrate the value of these experts' and how forecasting to adjacent communities could save even more lives. They work closely with the Ministry of Defense to control the avalanche paths that threaten the Pass. Their expertise prevents avalanche fatalities from reaching record numbers. The Afghanistan government's support of this program is commendable and necessary.

## **RECOMMENDATIONS AND CONCLUSION**

Very large avalanches traveled historic distances and destroyed homes that were located in obvious avalanche paths in the middle of the night. This was not an isolated incident. Large, fatal avalanches will occur again in the Panjshir Valley just as they will at the Salang Pass and throughout Central Asia where avalanche terrain is plentiful. Steep, open slopes reaching thousands of meters high coupled with heavy snowfall will create avalanches in the future. The Avalanche Control Team of MoPW at the Salang Pass has saved lives through their control work. In the adjacent valleys, most notably Panjshir, the snowpack and avalanche potential will mirror that found at Salang. Although avalanche control work is not practical or possible in Panjshir Valley, it certainly would be possible for the public to be warned of high avalanche danger when the Avalanche Control Team is finding dangerous conditions at the Pass. Between cell phones and word of mouth there is a good likelihood that many villages could be warned when conditions are dangerous and expected to worsen. A simple solution would be to warn folks whenever the pass is closed for avalanches.

Since the Avalanche Control Team are the local experts it is recommended that they further their avalanche training by seeking external avalanche education, continue annual training with their Italian peers and partner with other professionals from other countries.

### **PHOTO CREDITS:**

Nasim Khan: Cover, page 4

Hameed Habibi: pages 1 and 2

Doug Chabot: page 3

**Daily Weather information**

Date	Time	Station	Air Temp C	Wind Speed m/s	Wind Direction N	Humidity(%)	Pressure(hpa)	New Snow CM	Total Snow	Snow Type	Sky Condition	Events/Remarks
20.02.2015	800	South	-4	4	124	99	692	10	80	Wet	Cloudy-Snowing	
20.02.2015	1200	South	-3	3	102	99	694	2	79	Wet	Cloudy-Snowing	
20.02.2015	1600	South	-3	3	107	100	687	4	83	Wet	Cloudy-Snowing	
21.02.2015	800	South	-2	0	357	100	688	14	95	Wet	Cloudy-Snowing	
21.02.2015	1200	South	0	0	66	100	691	2	95	Wet	Cloudy-Snowing	
21.02.2015	1600	South	0	1	51	99	696	0	94	Wet	Cloudy	
22.02.2015	800	South	-1	2	116	99	697	10	103	Wet	Cloudy-Snowing	
22.02.2015	1200	South	0	0	111	100	698	1	101	Wet	Cloudy-Snowing	
22.02.2015	1600	South	0	5	83	100	689	1	100	Wet	Mostly Cloudy	
22.02.2015	1600	North	-2	18	97	69	692	0	21	Wet	Cloudy	Avalanche Control Team recommended closing the pass because of avalanche occurrence, wind storms and less visibility.
23.02.2015	800	South	-1	4	111	100	688	20	118	Wet	Cloudy-Snowing	Very large avalanche happened during the night at 2nd door of AWCC
23.02.2015	800	North	-2	25	103	100	698	23	42	Wet	Cloudy-Snowing	
23.02.2015	1200	South	-2	6	51	100	686	22	140	Wet	Cloudy-Snowing	3 Medium Avalanches happened around 0935 first gallery to tunnel from the south side.
23.02.2015	1600	South	-2	10	93	100	684	17	187	Wet	Cloudy-Snowing	
24.02.2015	800	South	-5	3	80	100	689	50	219	Wet	Cloudy-Snowing	
24.02.2015	1200	South	-5	4	113	100	687	18	237	Wet	Cloudy-Snowing	18 large and very large Avalanches are happened on both sides of Salang pass
24.02.2015	1600	South	-4	2	93	100	686	11	248	Wet	Cloudy-Snowing	Very large Avalanche happened behind No.8 EMG-R up to Hafta Noor Office.
25.02.2015	800	South	-7	4	244	100	689	55	301	Wet	Cloudy-Snowing	
25.02.2015	1200	South	-8	4	197	98	692	0	300	Wet	Cloudy-Snowing	Very large Avalanche happened in end of Pul Khaaki EMG-R No.7
25.02.2015	1600	South	-9	5	118	90	690	0	300	Wet	Mostly cloudy	Panjshir Avalanches incident that killed more than 200
26.02.2015	800	South	-5	2	239	57	691	0	300	Wet	Clear	
26.02.2015	1200	South	-6	0	311	50	687	0	299	Wet	Clear	
26.02.2015	1600	South	-6	2	178	56	688	0	299	Wet	Clear	
27.02.2015	800	South	-9	3	213	42	690	0	297	Wet	Mostly Clear	
27.02.2015	1200	South	2	1	193	99	685	0	294	Wet	Partly cloudy	
27.02.2015	1600	South	-4	2	270	100	685	3	297	Wet	Mostly cloudy	
28.02.2015	800	South	-7	1	79	100	684	0	296	Wet	Partly cloudy	
28.02.2015	1200	South	-4	7	95	73	686	0	294	Wet	Partly cloudy	
28.02.2015	1600	South	-7	5	119	90	686	0	294	Wet	Cloudy	

Panjshir Avalanches survey 06152015

No.	Name of Location	Coordinates		Avalanches Size	Effected Area	Alpha Angle	Slope Aspect	History	Time	Elevation (m)	Killed	Injured	Structures Damaged	Remarks
		Latitude	Longitude											
1	Baharak	35°21'42.66"N	69°36'8.99"E	Mediume	Road	20°	338N	NA	NA	2165	0	0	Road	
2	Zer Kotal Bambar Daar	35°30'33.91"N	69°51'13.74"E	Large	Road	NA	NA	NA	NA	2348	0	0	Road	
3	Salim Khail - Dahan Dargak -1	35°33'43.49"N	69°51'53.53"E	Very Large	Houses	28°	110N	Maybe more than 110 Years before happened	200	2610	23	12	Houses	Snowing and wind storm
4	Salim Khail - Dahan Dargak -2	35°33'47.85"N	69°51'51.32"E	Very Large	Houses	28°	110N	Maybe more than 110 Years before happened	200	2626	0	0	Houses	Snowing and wind storm
5	Chagahs Khana - Deh Khawak -1	35°33'36.94"N	69°53'01.17"E	Very Large	Houses	27°	290W	20 Year Before happened	230	2388	0	0	Houses	Snowing
6	Chagahs Khana - Deh khawak -2	35°33'37.07"N	69°52'58.67"E	Very Large	Houses	27°	290W	20 Year Before happened	230	2396	0	0	Houses	Snowing
7	Chagahs Khana - Deh khawak -3	35°33'34.72"N	69°52'58.72"E	Very Large	Houses	27°	290W	20 Year Before happened	230	2393	0	0	Houses	Snowing
8	Deh Khawak -1	35°33'53.58"N	69°53'32.50"E	Very Large	Road	NA	290E	NA	NA	2423	0	0	Road	
9	Deh Khawak -2	35°33'55.47"N	69°53'34.73"E	Very Large	Road	NA	290E	NA	NA	2423	0	0	Road	
10	Deh Khawak -3	35°33'55.68"N	69°53'36.53"E	Very Large	Road	NA	290E	NA	NA	2435	0	0	Road	
11	Deh Khawak -4	35°34'24.20"N	69°54'34.36"E	Large	Road and River	34°	290W	NA	NA	2426	0	0	Road	Snowing
12	Deh Khawak -5	35°34'23.38"N	69°54'41.20"E	Large	Road and River	34°	290W	NA	NA	2495	0	0	Road	Snowing
13	Kur E Mirza Beg -1	35°34'59.40"N	69°54'50.20"E	Very Large	Road and Houses	34°	130E	More than 80 Years Before	0000	2455	6	2	Road and Houses	Snowing
14	Kur E Mirza Beg -2	35°35'17.94"N	69°55'32.06"E	Very Large	Road	NA	160SE	NA	NA	2475	0	0	Road	80m highest of Avalanche
15	Tang e Paryaan -1	35°35'36.03"N	69°56'56.71"E	Large	Road	36°	300NW	NA	NA	2512	0	0	Road	
16	Tang e Paryaan -2	35°35'35.03"N	69°56'54.25"E	Large	Road	36°	300NW	NA	NA	2524	0	0	Road	
17	Tang e Paryaan -3	35°35'34.16"N	69°56'53.40"E	Large	Road	36°	300NW	NA	NA	2525	0	0	Road	
18	Shahr E Beland - Paryaan -1	35°39'52.69"N	70°04'00.03"E	Very Large	Road	NA	100E	NA	NA	2756	0	0	Road	
19	Shahr E Beland - Paryaan -2	35°39'51.25"N	70° 3'57.22"E	Very Large	Road	NA	100E	NA	NA	2771	0	0	Road	
20	Shahr E Beland - Paryaan -3	35°39'48.27"N	70° 3'53.51"E	Very Large	Road	NA	100E	NA	NA	2774	0	0	Road	
21	Shahr E Beland - Paryaan -4	35°39'45.36"N	70° 3'50.06"E	Very Large	Road	NA	100E	NA	NA	2777	0	0	Road	
22	Kul Kawa - Paryaan -1	35°41'03.40"N	70°04'54.16"E	Very Large	Road and Houses	25°	110E	NA	1500	2866	2	3	Road and Houses	Snowing
23	Kul Kawa - Paryaan -2	35°41'0.44"N	70° 4'51.16"E	Very Large	Road and Houses	25°	110E	NA	1500	2863	0	0	Road and Houses	Snowing
24	Kur Petaab - Paryaan -1	35°41'55.72"N	70°05'58.75"E	Very Large	Road and Houses	26°	180E	More than 100 Years Before	0000	2914	8	0	Road and Houses	Snowing
25	Kur Petaab - Paryaan -2	35°41'57.31"N	70° 6'1.75"E	Very Large	Road and Houses	26°	180E	More than 100 Years Before	0000	2919	0	0	Road and Houses	Snowing
26	Kur Petaab - Paryaan -3	35°41'55.46"N	70° 5'55.03"E	Very Large	Road and Houses	26°	180E	More than 100 Years Before	0000	2916	0	0	Road and Houses	Snowing
27	Pas Mazar	35°42'21.89"N	70°06'59.99"E	Very Large	Road and Houses	20°	330NW	More than 100 Years Before	2300	2987	17	2	Road and Houses	Snowing and wind storm
28	DARA -Abdullah Khel -1	35°14'23.19"N	69°36'7.40"E	Very Large	Houses	NA	NA	More than 100 Years Before	2300		73	11	Houses	Snowing - CONCEPTUAL
29	DARA -Abdullah Khel -2	35°15'16.48"N	69°36'55.35"E	Very Large	Houses	NA	NA	More than 100 Years Before	2300		18	7	Houses	Snowing - CONCEPTUAL
30	DARA -Abdullah Khel -3	35°13'35.03"N	69°35'24.24"E	Very Large	Houses	NA	NA	More than 100 Years Before	2300		21	16	Houses	Snowing - CONCEPTUAL