AVALANCHE HAZARD EVALUATION IN PUBLIC EDUCATION PROGRAMS

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Introduction

One of the most difficult aspects of avalanche safety education is teaching the back country traveller how to apply theoretical concepts in the field. Commonly used approaches to the problem range from teaching skiers to avoid all steep slopes to highly technical multi-day courses more suitable for professionals.

The Student

It is important, when devising any course of instruction, to clearly understand the interest of the students. Where there is a wide range of interests, separate courses should be offered. Back country skiers can be divided into groups based on their likelihood of exposure to avalanche hazard:

<table>
<thead>
<tr>
<th>Group</th>
<th>Exposure</th>
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</thead>
<tbody>
<tr>
<td>Beginner skiers and cross-country skiers</td>
<td>Marked trails</td>
</tr>
<tr>
<td>Mountain tourers</td>
<td>Valleys and passes</td>
</tr>
<tr>
<td>Ski mountaineers</td>
<td>High elevation, steep slopes</td>
</tr>
<tr>
<td>Waterfall climbers</td>
<td>Gullies and slopes below cliffs</td>
</tr>
<tr>
<td>Cross-country downhillers</td>
<td>Prime avalanche prone zones</td>
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The needs of each group for training in on-site hazard evaluation are very different.

Skiers in the first group are rarely exposed to hazards; they ski marked trails in areas administered by National Parks or Forest Service personnel and are only exposed to danger in times of extreme avalanche hazard. Do not ignore this group. Stimulate their interest, not by scaring them as some instructors do, but by introducing them to the basic behaviour of snow, the rules for safe winter touring, and the fundamentals of back country avalanche rescue. Hazard evaluation can be limited to interpretation
of public warning programs and the recognition of safe routes. In a few years many of them will be back for more detailed instruction. The other groups are more difficult to deal with. They want you to teach them snowcraft.

**Snowcraft**

Traditionally, snowcraft was acquired after years of outdoor experience under competent leaders who stressed, by example, prudence and common sense. Constantly aware of the mountain environment, leaders showed their pupils how to recognize dangerous conditions. How can we emulate these traditional leadership methods within the short time frame we usually have available: a few hours of lecture time and one or two days in the field?

**Prudence and Common Sense**

We can only stress, not teach, prudence and common sense. The best way to do this is by the judicious use of carefully selected case histories, preferably drawn from personal knowledge and experience, or from publications such as The Snowy Torrents and Avalanche Accidents in Canada. There is a tendency towards overcaution as one learns about avalanche hazard which is later, at least temporarily replaced by over-confidence.

**Awareness**

The keys to safe back country travel are observation and constant alertness. Combined with a minimum of technical knowledge, they will ensure the safety of most touring parties. Show your students, preferably in the field, what to look for when they are out touring: signs of wind direction, changes in visual appearance of the snow cover, evidence of avalanche activity, surface hoar, and the many other factors which the experienced traveller notes and tucks away in this memory. Encourage the students to be constantly aware of changing conditions. Every time the snow cover changes they should ask themselves why and determine the significance of the change. Whenever they change direction or gradient they should consider whether snow conditions have changed. If enough different snow conditions can be located, point out what the students can learn by the feel of the snow under their skis and the appearance of their ski tracks.
Many of the items which are observed and noted may not be significant at the time, but may contribute to unstable conditions at a future date. Surface hoar is a good example, having a potential for forming a sliding layer if covered by further snowfall.

**Course Organization**

When teaching hazard evaluation, it is beneficial to extend the course over several weeks, even if there is only time for one day in the field. This gives the participants time to go out on intervening weekends and experience different snow conditions while they are still able to discuss them with their instructor.

**Hazard Prediction**

Start to develop hazard evaluation techniques on the first night. Discuss the conditions since the start of the season and, in particular, the conditions existing during the previous weekend. Encourage your class to try and predict what conditions will be like the next weekend. After the weekend, discuss what conditions actually were. This method is a great learning tool when developed over a few weeks. The technique can also be applied by developing a series of interrelated scenarios to be given out as a home study project as the course progresses.

**Tour Planning**

You may find it useful to develop a flow chart for students to use when planning and conducting a tour. Keep it simple; the flow chart is to assist the beginners, and the students will eventually develop their own thought processes. An example is shown in Figure 1. Make your students aware that conditions leading to avalanche hazard can be different in other parts of the country: the Coast Ranges, the Interior Ranges, and the Rocky Mountains all have their own peculiarities.

**Conclusion**

In practice, evaluating avalanche conditions on a back country ski tour is not easy, even for someone with a great deal of knowledge and experience. There are no hard and fast rules. All you can do is teach people to think and to keep thinking.
One of the early writers on snowcraft observed that "people are generally reluctant to retreat - they will only retreat if they are sure it is dangerous, not if they are unsure that it is safe".
HAZARD EVALUATION DURING TRIP

WEATHER

ARE CONDITIONS WHAT YOU EXPECTED

CHANGES IN WEATHER

EXISTING SNOW CONDITIONS

ROUTE AND TERRAIN

HAZARD RECEIVING OR DEVELOPING

WHAT WILL HAPPEN TO ME IF IT DOES AVALANCHE

GO OR NO GO

Figure 1
Discussion

Walton:

In addition to operational courses, the British Columbia Institute of Technology has developed a two-day information course for the winter recreationist. It is run through the night school program with about eight hours in the classroom and a one-day field trip. The courses were rewritten recently with support from the B.C. Ministry of Lands, Parks and Housing, and we are seeking instructors for various interest groups throughout the province.

Freer:

I am wondering how far one should go in teaching snow metamorphism in a weekend course?

Daffern:

It depends a lot on the group. I teach the principles of the changing snowpack in a reasonably simple manner, without getting too technical. Courses for ski patrollers can go into a little more depth than those for the general public, because the patrollers tend to be interested and fairly knowledgeable people and often have a professional and technical background.

Williams:

I agree with your philosophy of constructive teaching which leads to respect for avalanches, rather than destructive methods based on scare tactics. I have sometimes been criticized that my short avalanche lectures lead to a little bit of knowledge which is a dangerous thing. What do you think about this?

Daffern:

Short avalanche lectures should be used to create an awareness of avalanche hazard. The main items which should be stressed are avoidance, the heeding of public avalanche hazard warnings, and the basics of back country rescue. We do not try to teach avalanche hazard evaluation in these courses.