Evaluating Risk
The HIRA Approach

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Risk-based Management

Overview
The identification and understanding of hazards and the assessment of risk is a fundamental requirement for all organizations dealing with the safety of people. Whether it is small businesses, not-for-profit organizations, camps, education institutions or manufacturing facilities of all sizes, mitigating the potential for loss begins by the identification and assessment of potential threats.

Requirements for identifying hazards and assessing risk in specific areas of safety are built into many regulations covering hazards of a specific nature, e.g. fire, substances hazardous to health, major accident hazards, noise, vehicle movements etc. Both North American and European Safety Legislation are similarly heavily oriented towards risk assessment and most recent safety legislation incorporates the principle of Risk-based Management in one form or another.

The Basic Approach
Whatever the industry or type of operation and whatever the nature of the hazards to be considered the basic approach is similar – although the techniques used and level of detail required may differ.

- Identify the types of hazards – these are generally broad categories covering a variety of situations.
- Identify the individual hazards – these are specific hazards that might arise in each given category and under what conditions they might occur.
- Evaluate the possible consequences and severity arising from the hazard – this may be consequences to people, the environment, organizational impact or any combination of these.
- Evaluate the likelihood of the consequences arising.
- Identify the prevention, control and mitigation measures in place to limit the consequences and / or reduce their likelihood. Eg. Risk Management Plan
- Assess if these measures are adequate and reduce the risk to as low as is practical.
- Review the assessment periodically to ensure it remains valid in the light of regulatory changes, new technology and changes in the risk levels considered "tolerable" by society.

Risk-based Management Applied to Outdoor Education
For the purpose of this discussion outdoor education will refer to education-based activities that primarily take place in the outdoors. One of the advantages to using a Risk-based approach is the ability to encompass the myriad of activities that often take place within an outdoor education program.

The following model has been adapted from the Emergency Management Ontario's Community Emergency Preparedness Program. The program was developed to aid municipalities in developing community emergency plans in order to comply with recent Provincial legislation.

At the organization or company level, concern for participant and staff safety is broad. A key challenge in the development of program risk management is the focusing of resources on the most significant risks. To obtain such focus, each institution must regularly identify and assess its credible hazards to determine the probability of occurrence, the potential consequence or impact and the school's vulnerability. This process is called an Hazard Identification and Risk Assessment (HIRA) and is conducted in four distinct, but related, assessment steps:

1. Hazard Identification – identify and research hazards;
2. Risk Assessment – conduct a risk assessment for each hazard;
3. Program Priorities – establish program priorities based on assessment;
4. Risk Profile – summarize program vulnerabilities and highlight preventative, control and mitigation measures.

The ultimate purpose of the HIRA process is to develop the Risk Profile. The Risk Profile identifies priority areas requiring attention during the development of the risk management strategy. The result of this process is a risk-based management program.

HIRA Step One – Hazard Identification
The first step toward the creation of a risk profile is the identification of hazards. This is not a complex process but can be time consuming. When beginning the identification process, it is a good idea to review and add to a general list of hazards before specific areas or scenarios are examined. Worksheet HIRA 1.1 *General Outdoor Education Hazards Checklist* (contained in Annex A) will assist in determining which hazards apply to specific educational programs.

Once a list of general hazards has been created, a more specific identification process can begin. Worksheet HIRA 1.2 *Hazard Information Sheet* (contained in Annex B) will assist with this process. Complete one worksheet for each general hazard identified as "Likely or "Possible" on Worksheet HIRA 1.1.

When examining specific hazards, past occurrence is a good indicator of future likelihood. The experience of a knowledgeable focus group is the best way to manage this step. This focus group should consist of individuals who have experience running similar programs, staff and outside "experts" with specific experience in the given activity areas. In addition to input from the focus group, accident statistics reports and other reference material can be used to determine the hazards that similar programs have faced in the past and may face in the future. It is strongly recommended that other programs operating similar activities be consulted during this process.

HIRA Step Two – Risk Assessment
Once a comprehensive list of specific hazards has been created, the **probability** and potential **consequence** of each hazard must be determined (in other words, the risk associated with each hazard must be assessed).

When assessing risk, speculation must be kept realistic, with due consideration given for credible program hazards. Focus on situations relevant to the program. It is also important to understand that it is impossible to anticipate every possible risk. Instead, it is important to develop a risk management strategy aimed at the most probable risks.

Such a program will ensure that systematic emergency response plans and operating procedures are in place should something unforeseen occur.

PROBABILITY

In this step the likelihood of occurrence for each identified hazard is examined. This is often best judged by past experience. For example, if at least one student has had frostbite for the past ten years during an annual skiing event it is reasonable to expect that another student will get frostbite in the near future. In this case, frostbite could be considered a high-probability risk for the program. When determining past occurrence, members of the focus group, as well as past staff and institution archives can serve as excellent sources of information. When considering past history also take into account near misses where the potential for injury was narrowly avoided or injury occurred to another party conducting the same activity in a similar fashion.

A second important means of determining probability is by obtaining expert opinion. This information can be found in a variety of sources such as articles, books, industry standards, professional organizations and academia. Such information may be most useful in determining the probability of events that may not have happened in recent memory, but may occur in the future.

Information gathered at this step can be added to the *Hazard Information Sheets* begun during the previous step.

CONSEQUENCE

Whereas the previous step determines how likely a specific hazard is to occur, this step determines how severe that hazard is/would be. This information is fundamental to the process of determining a program's vulnerable areas. When estimating the consequence of a given hazard consideration should be given to the following:

- The impact of other similar or previous incidents;
- The locations of other known hazards;
- The location of where the incident may occur;
- The potential for injuries;
- The potential for fatalities;
- The potential for multiple victims;
- Transportation systems and resources;
- Access to medical care;
- Time factors for response, evacuation and recovery;
- The history of prevailing meteorological conditions;

Information related to consequence can be recorded on each of the *Hazard Information Sheets* developed so far.

HIRA Step Three – Creating Program Priorities

At this step the program's identified hazards are ranked by priority based on their probability of occurrence, potential consequence and realistic concerns about the institution's risk tolerance. This can be accomplished by using a risk assessment grid.

This step translates the information gathered so far into a format that will be used to create a customized risk profile. The profile will then allow for the focusing of the program's risk management strategy – the primary goal of the HIRA process.

The use of the risk assessment grid facilitates the process of creating program priorities by allowing for the visualization of which hazards pose the greatest risk.

The first step in using the risk assessment grid is to assign numerical values/scores for probability and consequence to each program hazard. Assignment of scores should be based on discussion within the focus group. As scores are determined, they can be recorded on each *Hazard Information Worksheet*. Once all the scores are assigned they can be recorded on the risk assessment grid.

The following is a sample grid.

As can be seen on this grid hazard probability and consequence are scored using a scale of one through four. The following guidelines indicate how to score probability and consequence for each hazard.

The following scoring system is under development and likely to change. It is included for demonstration purposes.

SCORING PROBABILITY OF OCCURRENCE
1. No history of incidents in the last 15 years
2. Five to fifteen years since last incident
3. One incident in the last five years
4. Multiple or recurring incidents in the last five years.

SCORING CONSEQUENCE OR SEVERITY
1. Negligible impact – minor disruption in program
2. Limited injuries (minor or localized injuries such as scratches and bruises)
3. Substantial injuries (multiple injuries to one person or multiple victims with limited injuries – injuries include fractures, loss of consciousness, medical emergencies, etc. – these injuries typically do not have lasting consequences.
4. Catastrophic incident. (Life threatening injuries, possible fatalities, multiple victims with substantial injuries.) – Injuries likely to result in long-term disability.

High probability and high consequence are assigned numerical values of four. Therefore situations that are high in both categories would score as (4,4) and be recorded in the uppermost right square on the grid. Other situations might be scored as (3,4), 4,3), (2,3), etc. The adding together of the probability and consequence scores provides a general idea of overall risk severity for each hazard. Organizing all identified hazards according to their overall risk score will provide a preliminary ranking of program priorities.

Hazards receiving a score of four in consequence should receive appropriate program attention regardless of their probability score. Transportation is a classic example. A minibus accident may not have occurred within the past fifteen years and therefore would score one (1) for probability. However, the consequence of such an accident could be catastrophic and therefore would score a consequence of four (4). Transportation would then become one of the priority areas during the risk management planning process.

A blank copy of the risk assessment grid is contained as Worksheet Risk Assessment Grid HIRA 1.3 in Annex C.

HIRA Step Four – Risk Profile
Having identified and assessed specific program hazards the final step of the HIRA process is the creation of a customized program risk profile. This profile is intended to be a working blueprint for a risk-based emergency management program based on prevention, control and mitigation.

At this point begin completing the Risk Profile Worksheet. Your energies should be concentrated on those hazards that pose the greatest threat to the program. Use the combined probability and consequence scores in addition to all hazards that scored four for consequence. Rank the hazards in order of priority. This priority does not necessarily reflect the importance of addressing a particular hazard rather it prioritizes which hazards will be addressed first during the risk management development process.

For each hazard identify actions that can be taken based on the following three areas:
• **Prevention** – Identify actions that can be taken prior to the program or trip which will help reduce the likelihood of having given hazard become a problem. (E.g. Pretrip discussion about strainers/swimming practice.)
• **Control** – Identify reactive measures that can be taken to an immediate or developing situation. (E.g. Scout all rapids after identifying the water is very high and there is a great amount of debris that could cause strainers.)

- **Mitigation** – Identify actions that can be taken to reduce the severity or consequence of the situation. (E.g. If someone gets entrapped, initiate immediate rescue actions to access, stabilize and extricate victim.)

Using these categories, identify actions that could be taken or relevant information pertaining to the following risk management areas:

1. Staff Training – Identify areas where actions identified in a staff training program could prevent/control/mitigate consequence/severity of the hazard.
2. Participant Preparation – Identify areas where adequate participant preparation could prevent/control/mitigate the consequence/severity of the hazard.
3. Equipment – Identify issues related to equipment that could help in the prevent/control/mitigate the consequence/severity of the hazard.
4. Standards & Legislation – Identify existing industry standards and/or government legislation that could prevent/control/mitigate the consequence/severity of the hazard.
5. Policies & Guidelines – Identify policies or guidelines that could prevent/control/mitigate the consequence/severity of the hazard.

After working through the identified hazards you will have a comprehensive list of hazards and specific actions and measures that can be taken to reduce the risk of a particular program. The next step is to compile this list into a Risk Management Plan/Strategy.

Developing a risk management strategy is an on-going process. Priorities shift over time through the influence of current events, recent near-miss incidents, program goals, staffing and a multitude of other factors. The importance of undertaking a risk-based evaluation is to establish a baseline level assessment that can serve as a tool to help focus the application of resources in the most relevant areas of risk management development.

Annex A

GENERAL OUTDOOR EDUCATION HAZARDS CHECKLIST	HIRA 1.1

For each hazard mark the box that most closely reflects the potential for that hazard in your program.

Definitions:

Hazard: An event or physical condition that has the potential to cause fatalities, injuries, property damage, interruption in programming, or other types of harm.

Likely: The listed hazard has occurred in recent memory and is likely to occur again.

Possible: The listed hazard has not occurred in recent memory, but could occur based on prior incidence or "expert" assessment.

Unlikely: The hazard has never occurred and likely will not occur in the foreseeable future.

The hazards have been grouped by category or activity to facilitate discussion and processing.

Hazard	Likely	Possible	Unlikely
TRANSPORTATION			
Personal passenger vehicle accident			
School passenger vehicle accident			
Minibus accident (15 passenger)			
School bus accident			
Trailer accident			
HEALTH AND SAFETY			
Multiple health emergencies and epidemics			
Individual illness			
Medical emergency			
Allergic reaction			
ACTIVITY SPECIFIC – MOVING WATER PADDLING			
Entrapment			
Controlled Swim in moving water			
Uncontrolled swim in moving water			
Portaging/Scouting			
Improper paddling technique resulting in injury			
Attempted Rescue – shore-based			
Attempted Rescue – in-water			

Annex B

HAZARD INFORMATION SHEET	HIRA 1.2

Hazard Sheet #: _____

Updated: _____

Type of Hazard (E.g., climbing, transportation, environmental, etc.)

Specific Hazard (E.g. rock fall, van accident, lightning storm, etc.)

Probability:	Score:

Consequence:	Score:

HAZARD INFORMATION SHEET	HIRA 1.2

Hazard Sheet #:   *(Assign File #)*
Updated: *(Date of last update)*

Type of Hazard (E.g., climbing, transportation, environmental, etc.)

(Name the general hazard type – derived from the General Outdoor Education Hazards Checklist*)*

Specific Hazard (E.g. rock fall, van accident, lightning storm, etc.)

(Describe the nature of the hazard without discussing its consequences.)

Probability: *(Record notes/bullet points listing factors affecting the probability of the hazard's occurrence. Include notes about history as well as any available research information.)*	Score: *(Based on grid)*
Consequence: *(Record notes/bullet points listing possible consequences if this hazard where to occur. Include information on vulnerable groups and, if relevant, how remoteness of the location may impact on the outcome.)*	Score: *(Based on grid)*

Annex C

RISK ASSESSMENT GRID	HIRA 1.3

PROBABILITY

4			
3			
2			
1			
	1	2	3	4

CONSEQUENCE

SCORING PROBABILITY OF OCCURRENCE
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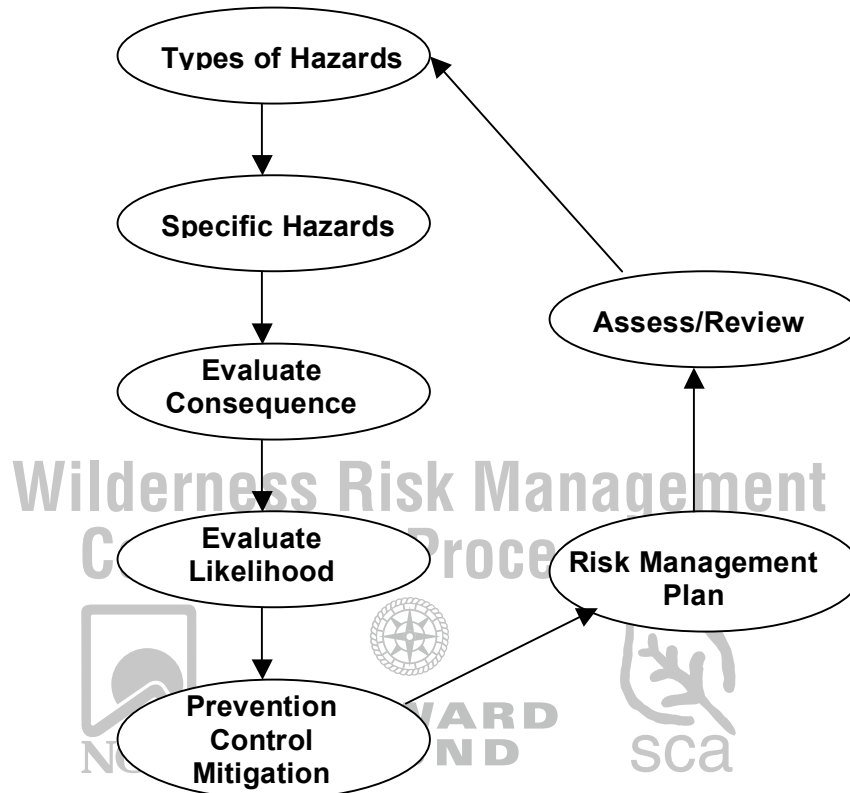
Risk Profile Worksheet
Prevention, control and mitigation measures

Hazard	Staff Training	Participant Preparation	Equipment	Standards & Legislation	Policies & Guidelines

The Basic Approach
A Risk-based Framework

- Identify the types of hazards – these are generally broad categories covering a variety of situations.
- Identify the individual hazards – these are specific hazards that might arise in each given category and under what conditions they might occur.
- Evaluate the possible consequences and severity arising from the hazard – this may be consequences to people, the environment, organizational impact or any combination of these.
- Evaluate the likelihood of the consequences arising.
- Identify the prevention, control and mitigation measures in place to limit the consequences and / or reduce their likelihood.
- Create or revise the Risk Management Plan
- Assess if these measures are adequate and reduce the risk to as low as is practical.
- Review the assessment periodically to ensure it remains valid in the light of regulatory changes, new technology and changes in the risk levels considered "tolerable" by society.