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Critical Incidents *in* Adventurous Activities

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A Critical Exploration of *The 1999 Saxetenbach Disaster:*

Setting The Scene:

This blog will explore the systemic factors that contributed to the 1999 Saxetenbach Canyon Disaster (Brooks, 1999), examining how multiple failures aligned to create a tragic outcome. The discussion will be structured into key sections, beginning with an introduction to canyoning as an outdoor activity, followed by an overview of its history at Saxetenbach—highlighting the rise of commercial operations, the challenges faced, and the appeal of the location. A detailed examination of the canyon's site-specific characteristics will provide essential context before delving into the incident itself, including a timeline of events, prevailing weather conditions, the composition of the group, and an assessment of the provider's competency. To analyse the factors leading to the disaster, I will apply James Reason's Swiss Cheese Model (Wales, 2023), illustrating how multiple systemic failures across various levels contributed to the tragedy. Finally, I will share my personal reflections on the incident and propose a comprehensive risk assessment framework that could enhance safety measures for future commercial canyoning operations in Saxetenbach.



The History of Canyoning in Saxetenbach:

Setting the Scene:

Nestled within the Canton of Bern Switzerland, the Saxetenbach Canyon is a renowned destination for adventure seekers drawn to the exhilarating sport of canyoning. Considered one of the most picturesque canyons in the Interlaken region, Canyoning offers a dynamic blend of outdoor challenges, where participants navigate rugged terrain through a combination of rock climbing, hiking, abseiling, scrambling, and swimming (The Canyoning Company, 2017).

Canyoning, an adrenaline-fueled activity, involves descending fast-flowing mountain streams within deep gorges, requiring both skill and careful risk management. However, on July 27, 1999, the Saxetenbach Canyon became the site of a devastating tragedy (BELL and BALE, 1999). A group of 45 individuals, including tourists and guides, embarked on a canyoning excursion when a sudden and intense rainstorm triggered a violent flash flood. The rapid surge of water overwhelmed the narrow gorge, drastically increasing water levels within minutes. Struggling against the sheer force of the floodwaters, many participants found themselves trapped with little chance of escape. Tragically, 21 people lost their lives in the disaster.

The incident prompted intense scrutiny of the canyoning company responsible for the excursion, revealing critical lapses in safety protocols (Baierlein, 2023). Investigations found that the trip proceeded despite weather warnings, raising serious concerns about the lack of adequate risk assessment and communication with authorities. The Saxetenbach Canyon Disaster had a profound impact on adventure tourism in Switzerland, leading to increased regulation, stricter safety standards, and heightened awareness of the risks associated with extreme outdoor activities. This tragedy underscored the vital importance of adhering to weather advisories and implementing comprehensive safety measures to prevent similar catastrophes in the future.

The Incident:

Organised by the outdoor adventure company Adventure World, the 1999 Saxetenbach Canyon disaster claimed 21 lives and left several others injured. The victims came from diverse backgrounds, notably from Switzerland, Australia, New Zealand, South Africa, and the United Kingdom (Six guilty in Swiss canyoning trial, 2001).

What went wrong? The tragedy was the result of multiple contributing factors, which I will discuss within this blog, providing what I believe to be the most critical reasons for the incident taking place, Most notably Safety Concerns, inadequate Leadership, Poor Communication and Severe weather conditions playing a critical role.

Safety Concerns: A fundamental lack of safety measures contributed to the severity of the disaster. The canyoning guides were not properly equipped with essential safety gear, and participants were given little to no briefing on emergency procedures. This lack of preparation left the group vulnerable, particularly in the face of an unpredictable natural hazard.

Many participants had no prior experience with canyoning and were unaware of the risks involved. Outside Magazine interviewed one survivor, who admitted, “I didn’t have any idea what canyoning was, a lot of people have no idea what it was, it just sounded fun. We were just trusting our guides.” (Jenkins, 1999), This statement underscores a critical issue—the absence of informed consent and risk awareness among those taking part. Without an understanding of potential dangers, participants were unlikely to anticipate a flash flood or know how to react when disaster struck.

Another overlooked factor was the suitability of the clothing and equipment provided. Survivor Tiffany Johnson later described her struggle to escape, recalling that “She also had a branch stuck in her life-jacket restricting both of her arms, so wriggled back into the water to eventually remove it.” (SBS Language, n.d; Tiffany, 2019), This raises concerns about whether the safety gear issued to participants was beneficial or, in some cases, a hindrance to survival.

The UK Canyoning Association, a recognised training and certification body for canyoning and gorge walking, show that life jackets are not typically worn for such activities within their website’s photographs (UK CANYONING ASSOCIATION, n.d.) and from personal experience when taking part in Canyoning and Gorge walking, I have personally encountered times when wearing a buoyancy aid was unsuitable especially when there is a current under the water which can drag you under and possibly create issues if there is any debris which can get caught on the equipment. This suggests that the equipment used in the Saxetenbach Canyon disaster may not have been appropriate for the conditions. Instead of aiding survival, it is possible that improper gear restricted movement and reduced participants’ ability to reach safety when faced with powerful floodwaters.



Inadequate Leadership:

A severe lack of leadership and proper training of the organisation guides played a crucial role in the disaster. Prosecutors later stated, "The guides failed to get the group out of the brook even when the water level rose, and the water turned muddy. The managers are accused of giving the guides insignificant training." (Lel, 1999), This lack of preparation left the guides unable to react effectively to the escalating danger, ultimately costing lives.

Concerns about the company's safety practices had been raised well before the incident. Two men from New Zealand who helped establish Adventure World's risk assessment resigned after predicting a catastrophe was inevitable. One of them, Erikson, recalled, "I could see something bad was going to happen, and I didn't want to be a part of it." He further explained, "There were just too many clients for the number of experienced guides. The company kept pushing less experienced guides." (Baierlein, 2023). However, these warnings went unrecognised.

Tragically, on the day of the incident, reports confirmed that "Seven of the eight guides in the Canyon were first-year guides." (Baierlein, 2023) With minimal experience, they were unprepared to recognise the warning signs of a flash flood or take immediate action to ensure the safety of the group. This failure in leadership and training became a critical factor in the devastating outcome.

Poor Communication:

A critical breakdown in communication between canyoning guides and emergency services played a significant role in the disaster. On the day of the flood, local fire services were already on high alert due to severe weather conditions. Recognising the potential danger, "The commander of the local Fire and Rescue Service sent an officer to warn guides not to head into the Canyon." (Baierlein, 2023). Despite this direct warning, senior staff at Adventure World proceeded with the excursion, ignoring the risk. In contrast, other outdoor companies operating in the area had already decided to cancel their trips (Baierlein, 2023), This, I believe, shows ignorance from Adventure World as they blatantly ignored the inherent risks posed on the day in favour of earning money for their organisation (Head, 1999).

The failure to act on clear warnings led to legal repercussions. A trial was held to determine the responsibility of the guides and the owners of Adventure World in the Saxetenbach disaster (Jenkins, 1999). The case became a turning point in evaluating the regulatory framework for outdoor adventure activities, prompting a reassessment of safety standards in Switzerland and beyond.

Severe Weather Conditions:

Despite a series of official local warnings and the well-documented risks of flash flooding (Jenkins, 1999), Adventure World proceeded with the canyoning excursion. At approximately 5:00 PM, in the midst of rain and thunder, the group entered the gorge. A powerful storm had been building in the mountains above, accumulating vast amounts of water before suddenly releasing it into the river. This led to a rapid and violent flash flood—a sudden surge of water that forcefully rushed through the canyon, overwhelming those caught in its path. The force of the torrent swept the group away, leaving little time for escape.

During legal proceedings, the president of Adventure World defended the company's actions, claiming the disaster was both unforeseeable and unavoidable. However, a police investigation into the incident reached a different conclusion. Regarding the expected risks of heavy rainfall in the area, the official report stated: "The wave occurs annually, sometimes multiple times a year, in the Saxetenbach Canyon and is a well-known phenomenon... The thunderstorm was the cause of the wave and the accident." (Jenkins, 1999) This finding reinforced concerns that the dangers had been both predictable and preventable, raising serious questions about the decisions made that day.



Key Achievements

Project Milestones: Successfully completed major projects, including:

The Green Tower: A 30-story residential building, completed ahead of schedule.

Riverside Apartments: A premium housing development, now fully occupied.

How the Swiss Cheese Model can be applied to the Saxetenbach Canyoning incident:

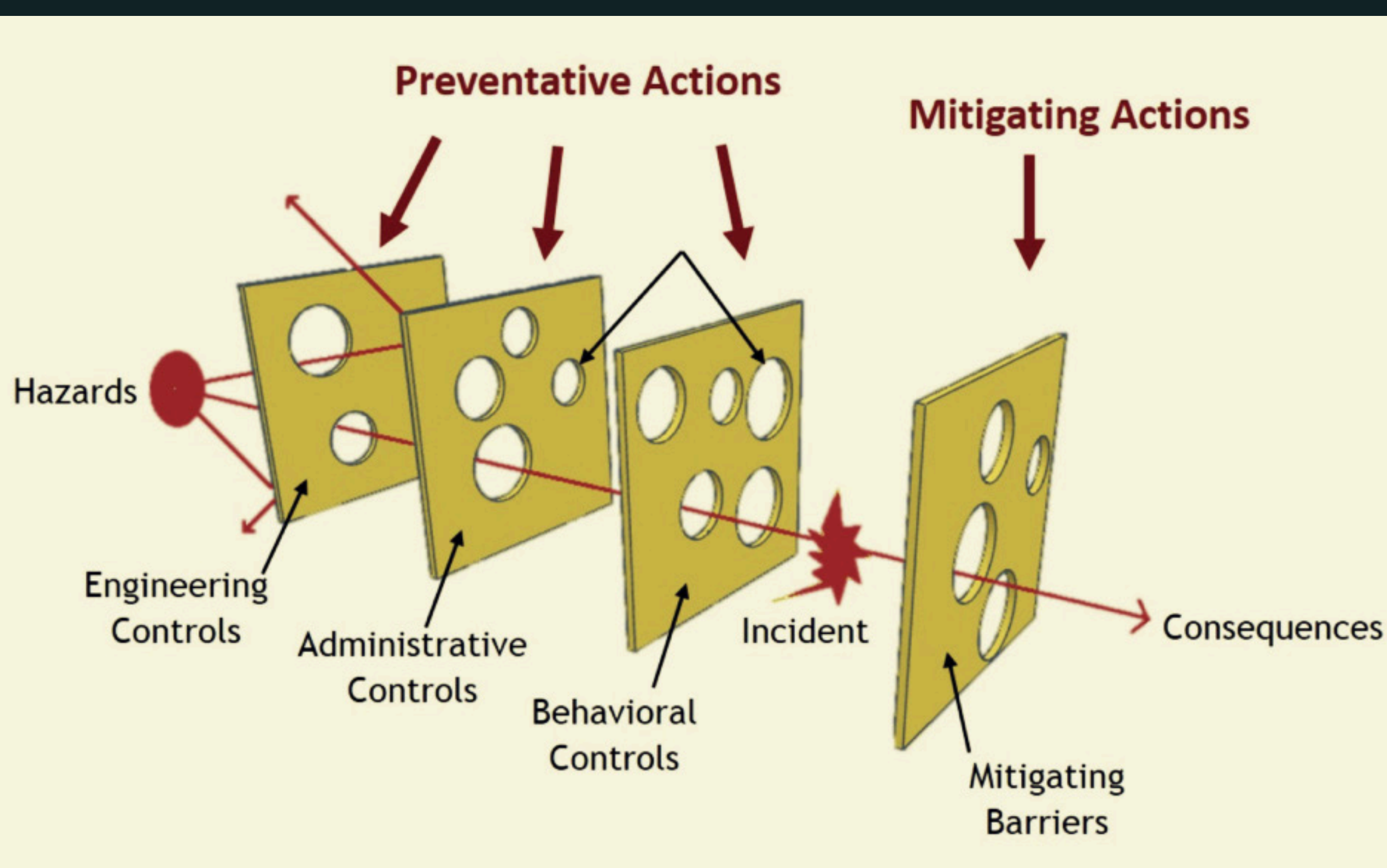
What is the Swiss Cheese Model?

Developed by psychologist James Reason (Reason, 1991), the Swiss Cheese Model (SCM) is a framework used to illustrate how system failures occur due to multiple weaknesses aligning across different layers of defence. The model visually represents these layers as slices of Swiss cheese, where each slice symbolizes a protective barrier against risks. However, like real Swiss cheese, these layers contain holes—representing errors, vulnerabilities, or weaknesses. When the holes in multiple layers align, they create a pathway for an incident to occur.

The core principle of the model is that no single layer of defence is flawless. To effectively minimise risk, organisations must implement multiple overlapping layers, ensuring that even if one barrier fails, others remain intact to prevent a disaster. As Reason explains, “Organisations can use the Swiss Cheese Model to analyse their systems, identify weak points, and implement appropriate measures to strengthen their defences.” (Shabani, Jerie and Shabani, 2023).

HAZZARD *vs* *RISK:*

Example of the Swiss Cheese Model Illustration::



Hazard vs. Risk:

A key distinction in risk management is understanding the difference between a hazard and a risk. As defined, “A hazard is something that can harm us, whereas risk refers to the likelihood and severity of being harmed by the hazard.” (Beames et al., 2019, p.47).

In the context of the Saxetenbach disaster, the primary hazard was the flash flood—a naturally occurring event with the potential to cause harm. The risk, however, was the probability of that hazard impacting the canyoners, which was significantly increased by multiple failures in safety protocols. In terms of the Swiss Cheese Model, each weakness or failure—whether poor communication, inadequate training, or ignored weather warnings—represented a hole in a slice of cheese. As these vulnerabilities aligned, they created a direct path for disaster, ultimately leading to tragic consequences.

Defensive Layers:

Defensive layers in the Swiss Cheese Model represent the control measures implemented to reduce risk. These barriers can be both physical and behavioural, each playing a crucial role in enhancing safety.

A physical barrier refers to protective measures, such as wearing appropriate clothing or using specialised safety equipment. In contrast, a behavioural barrier is influenced by individual actions and decisions, such as a guide's level of experience or a participant's physical readiness could impact their ability to make quick, rational decisions in an emergency. Since behavioural barriers vary from person to person, they introduce an additional layer of complexity in risk management.

By strengthening both physical and behavioural defences, organisations can create a more robust safety system, reducing the chances of multiple failures aligning to allow an incident to occur.

Summary of the Swiss Cheese Model and its Importance:

The Swiss Cheese Model highlights the necessity of multiple layers of defence to effectively mitigate risks. By understanding how failures align, organisations can strengthen their safety measures and prevent catastrophic incidents. As the model emphasises, 'to improve performance of the protection layer, reduce the area of the holes and ensure the holes in adjacent slices do not align' Achieving this requires continuous monitoring, evaluation, and reinforcement of each protective layer. Regular risk assessments, improved training, and stronger communication channels all contribute to minimising vulnerabilities. By proactively identifying and addressing weaknesses, organisations can build a more resilient system, reducing the likelihood of a single failure escalating into a disaster.

What Was the Hazard?

In the context of the Saxetenbach disaster, the primary hazard was the flash flood wave (Robinson, 2025), a natural phenomenon that occurs annually or even multiple times a year in the Saxetenbach Canyon. This hazard was well-documented and known to Adventure World prior to the incident, meaning the risk was not unforeseeable. Given this knowledge, the company should have implemented stronger defensive layers or additional "slices of cheese" to mitigate the risk. However, the failure to reinforce these layers allowed the weaknesses to align, ultimately resulting in one of the deadliest canyoning disasters in history.

Shortcomings Within the Defensive Layers:

Several critical failures within the defensive layers contributed to the severity of the Saxetenbach disaster. One major issue was the life jackets provided to participants, which, rather than aiding survival, restricted mobility and became entangled in debris within the canyon, making it harder for individuals to escape the rushing floodwaters.

Another significant weakness was the lack of experience among the guides. The majority had only one year of experience leading canyoning trips, leaving them unprepared for such an emergency. Compounding this issue, both guides and senior staff ignored weather warnings, despite knowing that the canyon had experienced flash floods in the past. The decision to proceed with the excursion, despite clear storm warnings, proved to be a fatal mistake.

Additionally, many participants had little to no understanding of canyoning, meaning they were unaware of the risks involved. Given that the group included people from multiple countries.

While there were undoubtedly more weaknesses in the defensive layers, I believe that these stand out as the most critical failures that, when aligned, allowed the disaster to unfold. Had these layers been strengthened, the tragic outcome might have been avoided.

Reflective Account and Risk Assessment:

Closing Remarks:

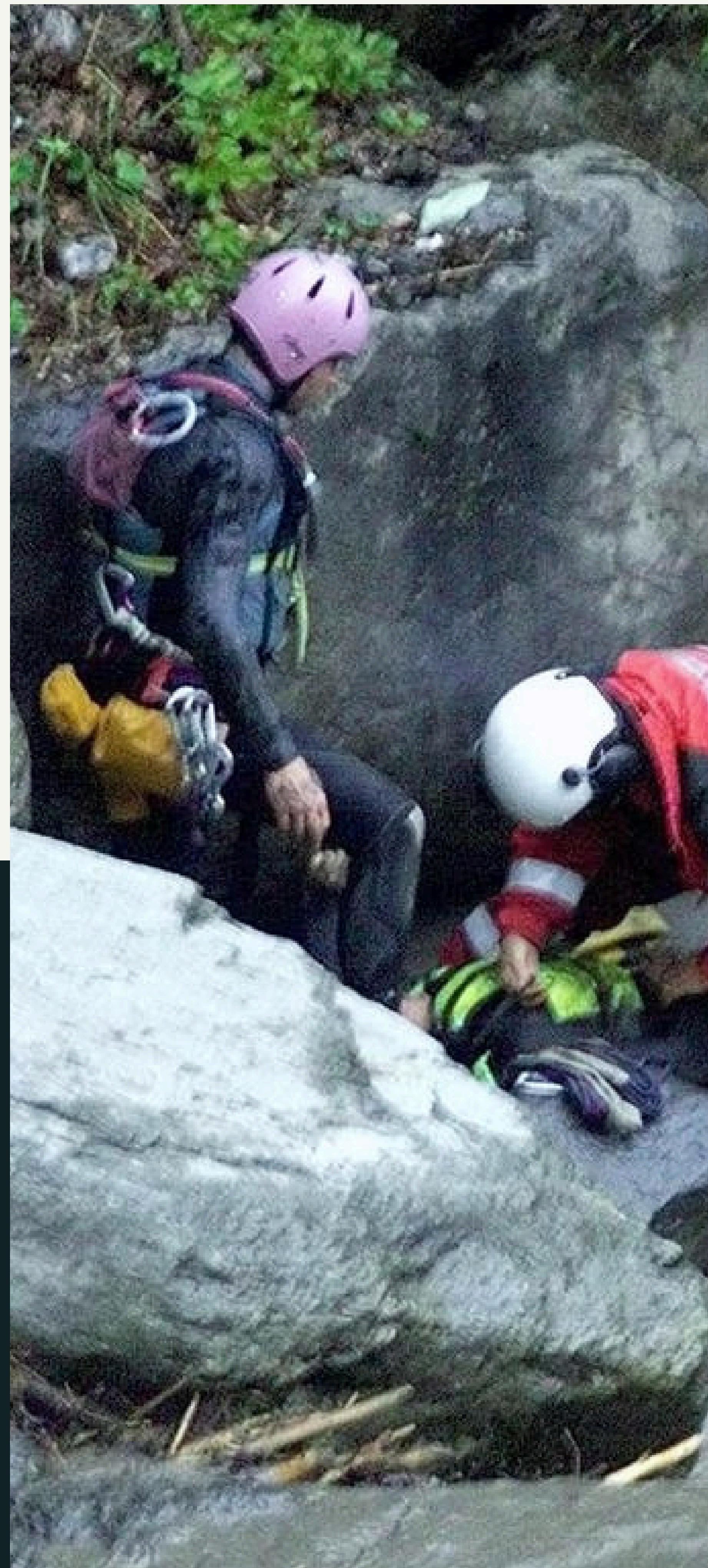
Analysing the Saxetenbach canyoning disaster has been an eye-opening experience, revealing the harsh reality of systemic weaknesses within adventure tourism organisations and their critical role in participant safety. This tragedy highlights how, as customers, we often place blind trust in activity providers without fully understanding the risks involved. Before engaging in an adventure experience, participants typically have no insight into the company's risk assessments, the competency of their guides, or the adequacy of their safety protocols factors that could mean the difference between life and death.

Moving forward, I believe it is essential for both myself and readers of this blog to adopt a more proactive approach to risk awareness in adventure tourism. While we cannot control an organisation's safety assessment, we can make more informed decisions by conducting personal risk assessments and considering factors such as weather conditions, terrain hazards, and emergency preparedness. Additionally, researching an organisation's safety track record and policies before participating in high-risk activities can provide valuable insight into whether our safety is truly their priority.

In the context of the Swiss Cheese Model, I was able to identify critical weaknesses in Adventure World's safety system failures that ultimately led to this devastating incident.

To prevent similar disasters, I would encourage adventure tourism providers like Adventure World to integrate the Swiss Cheese Model into their risk management strategies. By identifying the root hazard and implementing multiple layers of protection, organisations can significantly reduce the probability of an incident occurring. The more preventative measures (or barriers) in place, the less likely it is that failures will align and allow a disaster to unfold. In conjunction with the SCM, providers should take considerations of implementing similar guidelines featured in other rock/water activities as a reference for good practice, most notably outlined by the AALA and adventure activity safety guidance (www.hse.gov.uk, n.d.; UK CANYONING ASSOCIATION, n.d.).

However, it is important to acknowledge that no activity is entirely risk-free. Attempting to eliminate all risks would fundamentally alter the nature of adventure tourism; after all, the thrill of a challenge is what makes these experiences so rewarding. The key is not to remove all risks but rather to ensure they are well-managed and understood,



Final Remarks:

In my view, the Saxetenbach canyoning disaster was entirely avoidable. The tragedy occurred due to a clear lack of safety measures and the disregard for critical warnings issued by local authorities. The owners of Adventure World failed to take proper accountability for their role in the incident, despite overwhelming evidence pointing to their negligence. To conclude, based on the available evidence, it is evident that the owners of Adventure World bear significant responsibility for the tragedy that unfolded in the Saxetenbach Gorge.

Risk Assessment:

In light of understanding the risks and hazards of the Saxetenbach incident, I have developed a risk assessment of Canyoning in the Saxetenbach Gorge for any activity organisers to implement into their safety protocols.

Saxetenbach Gorge Risk Assessment for Canyoning: By Quinn Harris					
Location: Saxetenbach Gorge, Switzerland					
Hazard:	Risk:	People Endangered:	Danger Value:	Risk Mitigation:	Danger Value Update:
The Weather	Annual Flash Flooding	Everyone	Medium	Stay Informed on Weather Conditions and Prepare Accordingly Regularly monitor weather forecasts leading up to and on the day of the trip, paying close attention to any advisories or warnings issued by authorities. Ensure that all participants are equipped for varying conditions by bringing appropriate gear	Low
River- water level and water flow	Drowning	Everyone	Medium	Before embarking on a canyoning adventure, ensure that every participant has basic swimming skills. For those who are less confident in the water, provide a life jacket to enhance safety. Additionally, continuously monitor water levels, as sudden changes can indicate potential hazards. A qualified instructor should assess the conditions before and during the activity to determine whether it remains safe to proceed.	Medium
Natural Hazards e.g. Landslides	Falling, Getting Hit by Rocks	Everyone	Medium	Ensure Proper Gear and Safety Training All participants should wear a helmet and sturdy, gripped footwear. In case of a strong current, individuals should float on their backs and await rescue. Ensure everyone receives training on handling such situations before the trip.	Medium
Instructor to Participant Ratio	Lack of Instructors for a safe Activity	Everyone	Medium	Optimise Group Size and Supervision Adjust group size based on the canyon's difficulty and participants' experience levels. Ensure experienced guides familiar with the Saxetenbach River provide adequate supervision.	Low
Safety Equipment	Entrapment or Malfunctions	Everyone	Medium	Inspect and Maintain Equipment Regularly check all canyoning gear, including helmets, harnesses, ropes, and wetsuits. Ensure everything is in good condition, replacing any damaged or worn-out equipment.	Low
Participant Skill Level	Endangers other Participants	Participants	Medium	Conduct a Pre-Trip Briefing and Assess Readiness Hold a pre-trip briefing to ensure all participants understand the requirements of canyoning. Check their physical well-being and readiness for the activity. If someone struggles with the pace, adjust the route to keep them included without compromising their safety.	Medium

In response to the tragedy, the Swiss government eventually introduced stricter safety measures and improved oversight of commercial outdoor excursions (Swissoutdoorassociation.ch, 2025; Baierlein, 2023). However, these reforms were not implemented immediately. It took several years before meaningful changes were made—far too late for those who lost their lives in the disaster.

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