Is Scuba Diving Dangerous?

Editors' note: this article is addressed to divers and non-divers alike. We hope that it will help non-divers to navigate the at times confusing coverage of diving-related events in the media and would like to encourage our subscribers to share it with their non-diving friends.

On May 14th, a group of five Italian scuba divers entered a deep sea cave in the Maldives known as Dhevana Kandu. None returned. Local authorities and Divers Alert Network Europe (DAN EU), scrambled to put together a recovery mission under the leadership of Finnish deep cave explorer Sami Paakkarinen. The team arrived in the Maldives on May 18th and had successfully recovered all of the bodies from the cave three days later.

Tragically, the Finnish team could not obtain the necessary permissions and arrive in time to prevent the loss of Sgt. Major Mohamed Madhudhee, a military diver in the Maldivian armed forces. Madhudhee died from severe decompression sickness incurred during a recovery attempt on May 16th.

Similar to the Thai cave rescue incident in 2018, the story made global headlines and was reported by a number of leading media worldwide, including the *New York Times*.

Diving and the attention economy

Most of the time, scuba diving does not attract a lot of public attention. Divers talk about diving all the time; non-divers rarely even think about it. This temporarily changes when something goes wrong in spectacular fashion, until the news cycle moves on and the diving stories are consigned to the archives.

Unlike the stock market or show business, there is no beat journalism on the subject of diving. General-assignment reporters who are suddenly called upon to cover a dive accident almost invariably lack access to expert sources who could shine a light on the technical aspects of a case.

This isn't anyone's fault, least of all the journalists': We all work for a living, and as a writer who specializes in diving, I can assure you that my choice isn't conducive to having a stellar career in media.

As a result of this situation, however, the non-diving public is exposed to a distorted image of scuba diving. The focus is on unusual accidents, and the hazards that receive all the attention (caves, sharks) are not representative of the actual risks the average diver needs to prepare for and manage.

Recreational diving

The objective of recreational diving is to have fun: enjoy the sensation of weightless immersion, explore marine environments, maybe take pictures and videos of fish, sea turtles, or the myriad species of small creatures found in oceanic habitats.

The overwhelming majority of recreational diver training is carried out under the rules of the *World Recreational Scuba Training Council (WRSTC)*. The WRSTC sets a hard depth limit of 40 meters. For a breathing gas supply, recreational divers carry a single tank (usually) of compressed air or *nitrox*, which is air with a slightly elevated oxygen content.

Bottom times must be limited so that even a relatively fast ascent would be unlikely to cause decompression sickness. Entering overhead environments (shipwrecks or caverns) is permitted only to a

very limited extent: Divers must stay within the daylight zone, and the total swimming distance to the surface (i.e. depth plus penetration distance) must not exceed 40 meters.

These are the rules under which the vast majority of dives are conducted. The intent behind these rules is to limit the scope of recreational dives so that an emergency ascent to the surface remains possible at any time without undue risk. And they work.

Photo by The Jetlagged

Safety and difficulty

Like other outdoor activities, diving isn't very regulated in most places, and official safety statistics are scarce. However, there are organizations that make the safety of diving their daily business: specialist accident insurance underwriters like *Divers' Alert Network (DAN)*.

Dive accident insurance (without travel insurance) can be had for as little as $100 annually and covers medical expenses. The low cost is a clear indication that, in the opinion of those who deal with the matter in a professional capacity, diving has an excellent safety track record.

With regard to difficulty, recreational diving is about as hard as driving a passenger car: While it takes a bit of training and practice, just about anyone can learn to do it with a high degree of safety, as long as they follow the rules of the road and stay within the speed limit.

Once divers venture outside of the WRSTC boundaries, things quickly become complicated in ways that are not always immediately obvious. In the following paragraphs, I will address some of the arising considerations in a simplified and (hopefully) accessible manner.

Overhead environments

After exploring the inside of a shipwreck or cave system, divers need to exit the overhead environment and reach open water before they're physically able to go up. Dive planning for overhead environments needs to account for a horizontal distance to be covered at depth, in addition to the vertical component of the ascent. Covering distance takes time, and when diving, time means gas.

Wrecks and caves can have confusing layouts and are often completely devoid of natural light. Cave divers therefore rely on guidelines – think Ariadne's Thread – to mark their way to the exit, and they carry multiple lamps for redundancy. Because delays can happen, time means gas, and no piece of equipment is immune to failure, redundant breathing gas supplies (at least two tanks per diver, often more) are an absolute must.

Photo by DAN Ambassador Janez Kranjc

Effects of depth

Depth creates a separate set of complications. The ambient pressure increases by one atmosphere for every ten meters or thirty feet of water column. This pressure, in turn, increases the density of the breathing gas, with a number of consequences.

At 50 m/160 ft, a diver draws six times the amount of gas into their lungs with each breath as they would on the surface. Gas supplies are depleted much faster at depth than in the shallows.

Secondly, pressure at depth forces gas into the bloodstream and the tissues of a diver's body. When the ambient pressure drops during ascent, the dissolved gas comes out of solution and needs to go somewhere.

Unsuccessful decompression – an ascent that is too rapid – causes the gas to form bubbles inside the divers' body. This leads to a spectrum of conditions collectively referred to as decompression sickness. Mild cases result in an itchy skin rash; severe ones can involve paralysis and stroke-like symptoms up to and including death.

Successful decompression requires the diver to ascend at a slow enough rate to allow for the gas to be eliminated in a controlled manner via the bloodstream and lungs. The ascent from a deep dive can take several times as long as the bottom phase, and divers must be equipped with the requisite amounts of breathing gas.

Finally, both of the main constituent gases of air, nitrogen and oxygen, cause problems at high pressure: They become narcotic, inducing physical and cognitive impairment. The sheer physical density makes breathing harder, and high-pressure oxygen develops a toxic effect on the central nervous system.

To counteract these effects, technical divers use gas blends that include helium, which has a very low density and is non-narcotic. The downside is that while helium blends with low oxygen are great at depth, they are anything but ideal during decompression. This, in turn, necessitates the use of additional gas cylinders with high-oxygen blends optimized for shallow water.

A different ballgame

By this point, I'm sure you'll have noticed that "additional gas cylinders" has become a recurring theme. Scuba cylinders are bulky and must be attached to a diver's body in a way that doesn't interfere with the mission of the dive. They have breathing hoses that should be accessible when needed and neatly stowed away when not. Crucially, procedures must be in place to ensure that no diver breathes the wrong gas at the wrong depth.

More advanced divers increasingly make use of closed-circuit rebreathers (CCR), a type of device that recirculates exhaled gas, chemically scrubs out carbon dioxide, and replenishes the metabolized oxygen. The use of CCRs adds significant complexity to a dive and requires another, separate skillset. On the upside, it drastically reduces gas consumption and extends the amount of time divers are able to spend underwater.

The above complications do not make technical and cave diving inherently dangerous. They do however, require specialized equipment and extensive training in its use. Most divers, even instructors and other professionals, will never need this training. It is therefore not part of the standard recreational diving curriculum.

Experience as a recreational diver can help, but is by no means sufficient. To return to the analogy of driving, working as a taxi driver for 30 years has little influence on one's ability to reverse park a tractor trailer. Undertaking the task anyway would entail a high risk of ending in calamity.

Photo by Julian Mühlenhaus for DAN Ambassador Alexandra Pischyna

Safety

When performed by appropriately trained, equipped, and prepared divers, technical and cave diving is not a particularly dangerous activity. This is reflected in the fact that dive accident insurers do not charge tech divers higher premiums.

Good divers at any level are explorers, but not thrill seekers. Quite the contrary; we go to great lengths to keep our dives as uneventful as we can possibly manage. Adrenalin and the fight-flight response it triggers serve no useful function underwater. We train and practice to replace our instinctive responses with learned skills and procedures. Unexpected events are discussed in the post-dive debrief, and a narrow escape is cause for serious introspection.

From decompression procedures to laying guidelines, gas reserve calculations, and bailing out from a rebreather: Almost everything we know today about diving safety was learned the hard way. Studying the lessons of the past, diligence in applying safety standards, and updating these standards to incorporate new insights gained over time, is a form of respect to those who paid the price of knowledge.