

# ALL THIRTEEN

THE INCREDIBLE CAVE RESCUE  
OF THE THAI BOYS'  
SOCCER TEAM

CHRISTINA SOONTORNVAT



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of the Thai Boys' Soccer Team**





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*In memory of Saman Gunan, who gave his life to help others*

*And for my father, Amnaj Soontornvat*



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*A soccer field at Mae Sai Prasitsart School, Mae Sai, Thailand*



# A Typical Saturday

June 23, 2018

ON THE SOCCER FIELDS of Mae Sai, Thailand, it sounds like a typical Saturday morning:

The *tap-tap* of soccer balls passing cleat to cleat across the grass.

The *twee!* of the coach's whistle and shouts of "Mark up!" and "Make some space!"

The hard *thump* of a well-placed foot, followed by the best sound of all: silence as the ball flies past the goalie's fingertips, then a soft *swish* as it lands at the back of the net.

It's only practice for the Wild Boars, a local boys' team for players ages eleven to seventeen, but if they can keep sinking shots like that in their next game, they can't lose.

In Thailand, as in most of the world, soccer is not just a sport; it's a total obsession. The scuffle and shouts of pickup matches can be heard at all hours of the day, whether in an urban metropolis like Bangkok or here, in the small town of Mae Sai.

Practice finishes, and the boys huddle together, drinking water and wiping the sweat off their faces. It's a hot day, but at least there are clouds to shield them from the brutal sun. Talk shifts from World Cup rivalries to what they're going to do next. Everyone's eyes turn to twenty-five-year-old assistant coach Ekkapol Chantawong, whom everyone calls Coach Ek. He's been promising to take the team on an excursion to a local cave, and all the boys want to know if their outing is still on.

Being a Wild Boar means more than just getting together to play soccer a couple of times a week. The team is tight-knit, even though they go to different schools. The kids on the team have a reputation for being adventurous and outdoorsy, never sitting still for long, always ready to hop on their bikes to go exploring together. Coach Ek encourages the boys to be athletes beyond the soccer field, and he organizes regular hiking and bicycling expeditions for them. They often go swimming after practice, either at the neighborhood activity center or at local swimming holes. On the team's last outing—a strenuous bike ride to the top of a nearby mountain, Doi Tung—they discussed what their next trip would be. This area of Thailand is well known for its caves, the most famous of which is Tham Luang Nang Non—the Cave of the Sleeping Lady—and they had agreed to go there together.

Some teammates have to back out of the fun. They have too much homework, or their parents have made them promise to come home for this reason or that. But twelve of the boys are still up for the adventure.

Night reminds the team that it's his birthday. His parents are having a party that evening, complete with food, a big cake, and lots of friends and family. The team is invited, too, but they can't show up late, and they definitely can't show up covered in cave mud.

Coach Ek tells them, "We have to be out by five o'clock."

Everyone agrees. They'll go for only an hour or so, and then they'll head back.

The boys buy snacks to top up their energy before the bike ride to the cave. They go for the good stuff: junk food, like chips, soda, and

## The Boys of the Wild Boars

In Thailand, everyone has a formal first name and last name that are usually reserved for official occasions. Friends and family tend to call one another by a short one- or two-syllable nickname. People also address each other with a word that describes how they are related. For example, brothers and sisters call each other Pi (for older siblings) or Nong (for younger siblings). But even people who are not related by blood will use these terms as a sign of respect and affection. The Wild Boars all call each other “Brother,” and they refer to their coach as “Coach Ek” or “Big Brother Ek.”



Members of the Wild Boars soccer team. Boys’ nicknames and ages at the time of entering the cave (left to right, back row): Note (14), Night (16), Thi (16), Tern (14), Manager Jose Mourinho of the Manchester United Football Team, Mix (13), Coach Ek (25), Nick (15). (Left to right, front row): Adul (14), Titan (11), Mark (13), Pong (13), Dom (13), Bew (14).

## This Is Mae Sai

---

The boys' home base of Mae Sai is a small but bustling town on Thailand's northern border. Market carts display all sorts of wares from Thailand, Myanmar, Laos, China, and beyond. Goods flow back and forth across the border. People too. Mae Sai is as diverse as you'd expect a border town to be. In the markets, you hear Thai spoken alongside Lao, Mandarin, Cantonese, Burmese (the official language of Myanmar), and local indigenous languages. Tourists come here from all over the world, but especially from China, Europe, and the United States. Most people in Mae Sai are Buddhist, but Muslims and Christians also call the town home. It's a vibrant, busy place, where women balance baskets of coffee beans on their shoulders as motorbikes zip in and out of the lanes of traffic, waiting their turn to cross the border.

In this region, most families are farmers or members of the working class. The Wild Boars know that getting a good education is vital. They hope that if they study hard and get a good job someday, they can earn enough money to help support their families. Maybe then they can give something back to their parents, who work tirelessly so their children can focus on school and soccer.

their favorite candy bar, called Beng-Beng. And they scarf it down before setting out.

They laugh and call out to each other as they cycle along. The oldest boys—Thi, Night, and Night's cousin Nick—are good friends with the coach. Fourteen-year-old Adul is quite close to Coach Ek, too. Adul is the only non-Buddhist in the group, and he is devoted to the Christian church he attends in Mae Sai, where he sings and plays guitar. The other parishioners raised money to send him to a good local school, where he is at the top of all his classes.



Pedaling with him are fellow eighth-graders Note and Tern. Bew weaves among his friends, driving his moped. Next come the inseparable thirteen-year-olds, who go to school together: Dom, who is the team captain; Mix; and Pong, a jokester who isn't as serious about class as the other boys. The "little" boys work to keep up: thirteen-year-old Mark, who is the smallest member on the team, and eleven-year-old, chubby-cheeked Titan, the youngest player, who begged his parents to let him join the Wild Boars. Despite the differences in their ages, these twelve boys are very good friends. They hardly ever get into arguments, though



*The entrance to Tham Luang–Khun Nam Nang Non Forest Park*

they do love to tease little Titan, who usually takes it all in stride with his big smile.

As the boys cycle on, paved roads give way to dirt, and neighborhood dogs trot out to greet them. The Nang Non mountain range rises up behind them, a blurry dark green, as they ride past homes and apartments, repair shops, and open-front stores selling furniture, restaurant equipment, and plastic toys.

After a few minutes on their bikes, the boys are on the one-lane roads that wind through farms and into the mountains. The Wild Boars love these trips, when they can leave behind their stacks of homework and get up into the fresh green hills that hover over their neighborhoods.

The boys' parents are happy that their children are adventurous. It's much better for them to be out in nature, exercising their bodies and minds, than stuck at home watching a screen or wandering under the artificial lights of a shopping mall. Besides, they're with Coach Ek, who is much more than just a coach.

Ek believes that his duties don't end on the field. He feels that in order to be a good leader, he needs to understand the boys as individuals. In turn, they sometimes listen to their coach more than they do their own parents. But rather than being annoyed, the parents are grateful that their sons have such a good influence. They trust Ek deeply, and he even babysits for them sometimes. He is young enough to feel like another son or nephew to the boys' families, but he carries the wisdom and maturity of someone who has been through too many of life's hardships. They hope their sons can learn to be like him. Luckily, the boys want the same thing.

Tham Luang is only a few miles from the soccer field, and the team turns off the main road after about half an hour. As they pump up the gravelly track to the entrance, birds swoop through groves of banana and lychee trees. Yellow-and-brown-spotted butterflies flit past as pineapple fields give way to thick jungle that shades the road. The last bit of the bike ride is all uphill: muggy and sweaty. Soon the team is gratefully walking their bikes toward the cool, dark mouth of the cave. They set their bikes on the ground outside and swap their cleats for flip-flops. Coach Ek leads the boys up to the entrance, bringing along the supplies he's packed: a coil of thin rope and flashlights. They walk past a faded sign warning visitors not to enter during the rainy season, as the cave floods at that time.

But they don't pay the sign much attention. It's only June 23, and the heavy rains are still weeks away.



*Clouds hover over the Nang Non mountain range.*



# 2.

## A Sky Full of Water

June 23, 2018

THE PARK RANGERS who work at Tham Luang Nang Non Forest Park have a light day on June 23. During busy times, they lead tours into the cave, guiding people into the impressive entrance chambers and giving talks about how the structures have formed. But now that the high season for tourists has passed, Tham Luang will see only a handful of visitors, taking selfies or paying their respects to the shrine at the cave entrance.

Pretty soon, visitors to Tham Luang will stop completely. Monsoon season officially started in May, but the steady, heavy rains come in July.

Thailand has three seasons: hot, cool, and rainy (also called monsoon season). Here in Southeast Asia, the monsoon rains can be torrential. In the summer, as the sun heats the land, moist air blows in from the ocean and settles over the continent. In northern Thailand, the clouds will gather, full and low around the mountains, where they will hover for the whole season. Most days, in the afternoon or evening, the clouds will crack open and the rain will fall. In just a few months, the skies will dump 90 percent of the year's rainfall. Walking outside in this type

of rain can feel like walking through a waterfall. The water barrels down in thick sheets, making umbrellas and raincoats almost useless. And it falls and falls for months. In town, streets and alleys become little canals as all that rain drains downhill.

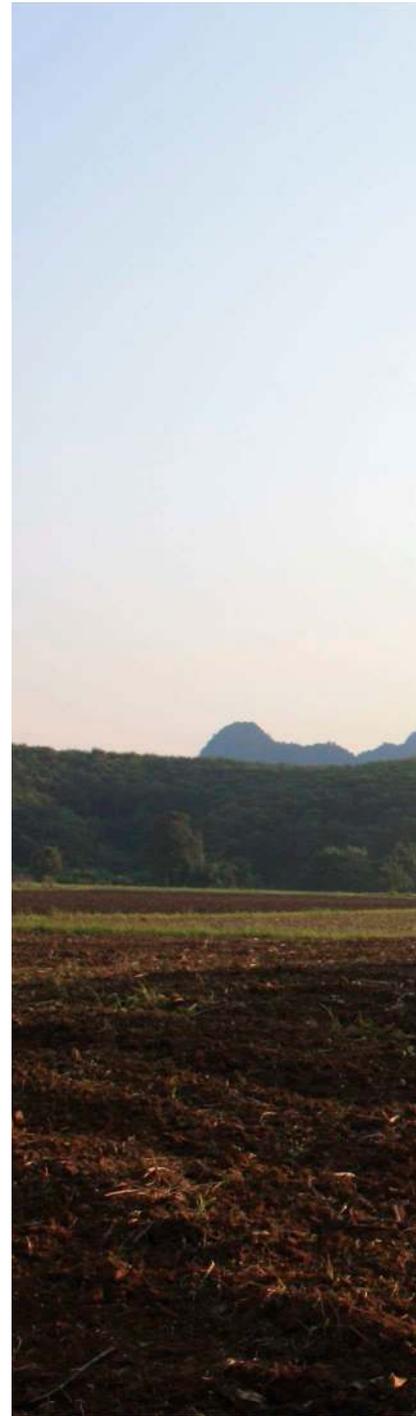
The monsoon brings the waters of life. The mountains glow green through the gray deluge. The rains run down through the lush forests, carrying nutrients into the surrounding farmland, making the soil rich and ripe for growing crops. As soon as the rains stop, the fields will burst with bounty: coffee, fruit, vegetables, and acres of rice. This area, once its own kingdom, is called Lanna, the Land of a Million Rice Fields.

The rainy season is usually predictable. People who live in low areas build their houses up on stilts, and anyone living close to a river or stream builds their home far away from the banks, knowing how they can flood. But even with preparation, floods can overwhelm whole towns, trapping people in their homes, washing away roads, and causing deadly landslides in the mountains.

A changing climate has been making the seasons less predictable. The warming planet has warmed the air, too. Warmer air can hold more moisture, making wet areas wetter and dry areas drier. All over southern Asia, rainfalls have become more extreme.

In the days leading up to June 23, the area around Tham Luang cave has had some unusually high rain. And it looks as though it's in for more. The clouds that have hung over the mountain all day drop lower and lower.

The rain begins beating down.





*Crop fields at the foot of the Nang Non mountains*



*The Nang Non mountains form the outline of the Sleeping Lady's face and body.*



# 3.

## The Cave of the Sleeping Lady

June 23, 2018

COACH EK LEADS THE TWELVE MEMBERS of his team up the steps to the mouth of Tham Luang. On the way, they stop to bow and pay their respects at a shrine to Jao Mae Nang Non, the Sleeping Lady. She is said to have been an ancient princess who fell in love with a servant. Knowing her father, the king, would never approve, she ran away with her lover, and the two of them hid inside the cave. But when the servant went out to look for food, he was captured and killed by the king's soldiers. The heartbroken princess killed herself. Her blood became the water flowing in the cave, and her body became the mountain. If you look at the Nang Non mountain range at the right angle, you can see the outline of her face and body.

For many of the people of northern Thailand, caves are particularly sacred places that deserve respect. In the ancient stories, these caves are homes to monsters who have lured in princes. They house giants who were defeated by the Buddha himself. Some caves contain entire temples inside them, and Buddhist monks have been known to spend years



*Steps leading up to the cave entrance*



*The entrance into Tham Luang*

meditating in the darkness within. A mountain holds power, and a cave provides a way to tap into that power. But as the story of the Sleeping Lady shows, that power can be both enticing and dangerous.

As the boys step inside Tham Luang's impressive entrance chamber, they breathe in the damp air and the smell of wet, mossy limestone. The ceiling soars to about 100 feet, more than 30 meters, and the whole chamber is big enough to hold a 747 jet. Thick stalactite spires hang down like dragon teeth. Over thousands of years, water that dripped down from the ceiling left behind tiny deposits of calcium minerals that hardened into the sparkling formations. When the dripping water lands on the cave floor, it can also build a stack of minerals that grows from the ground up, called a stalagmite. When a stalactite and a stalagmite meet, they can form a column or even a flowing curtain of shiny stone.

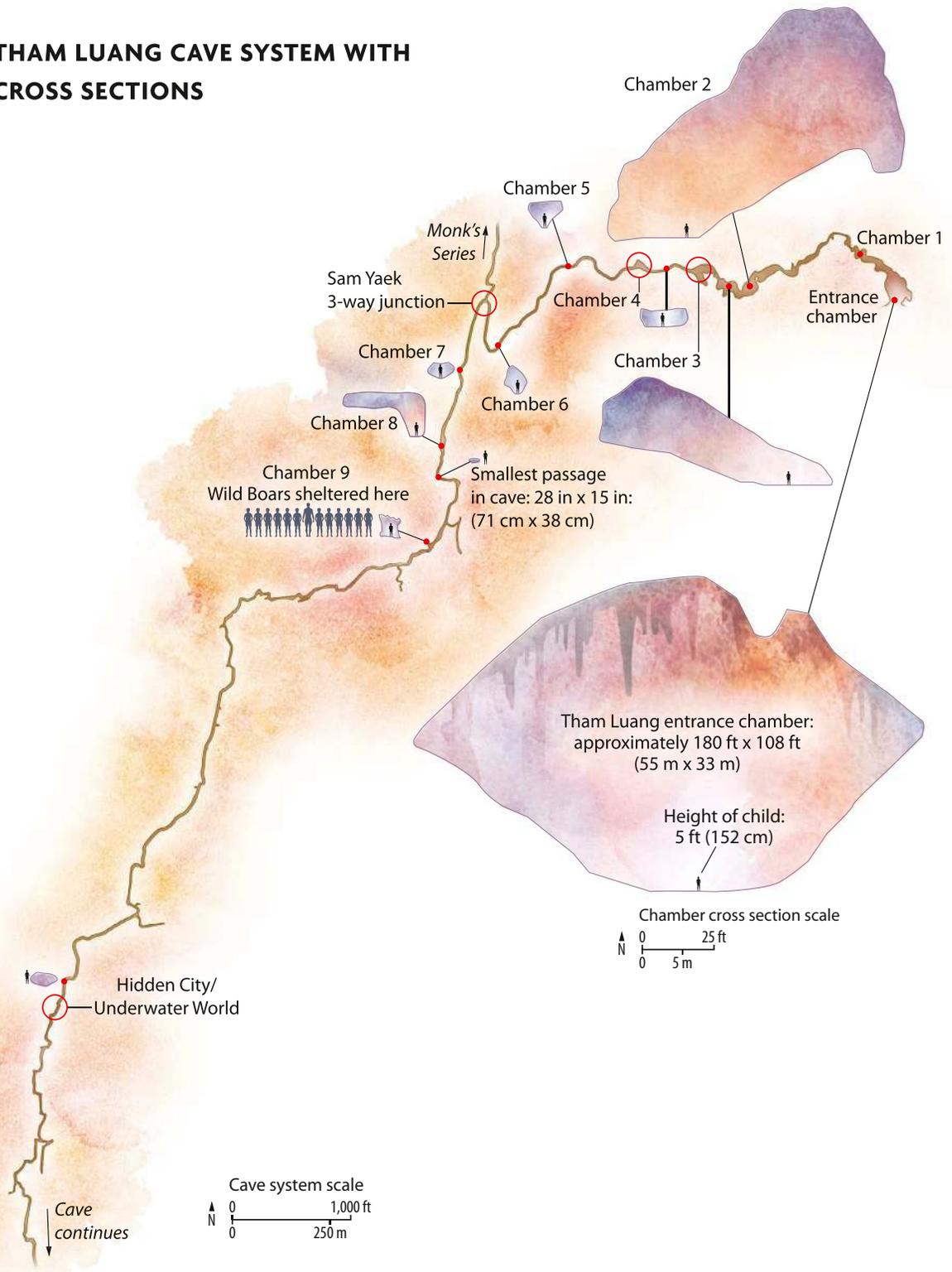
The Wild Boars gaze up at the slick cave walls. Twenty feet (six meters) up, a dark line of mud marks the highest level of the last flood. The floor of the cavern is dry and packed down by heavy foot traffic.

The first 2,000 feet (600 meters) of the Tham Luang cave system are made up of big, airy rooms like the entrance chamber. Beyond this point, the cave narrows. Some sections force visitors into a crouch and then a crawl, where the ceiling drops to just a few feet high. Here, cavers are well beyond the "twilight zone," the part of the cave where light from the outside world still reaches. Without a flashlight the darkness is complete. If you are claustrophobic, this is where you turn around.

But the boys aren't deterred by the tight spaces, and there are no barriers, gates, or ropes to stop them from continuing on. The cave winds along, down steep and slippery sections. About one mile in, the route makes a sharp hairpin turn and dumps into a three-way junction called Sam Yaek.

From where the boys stand, the right-hand path leads to a lesser-explored stretch known as the Monk's Series. On the left, an opening low in the wall leads to the main cave. In caving lingo, the phrase "it goes" means that a passage continues on, without a dead end. To the left, Tham

# THAM LUANG CAVE SYSTEM WITH CROSS SECTIONS



Luang “goes,” and it goes quite far. The most recent survey measures the known end of the cave system to be almost seven miles, or 11 kilometers, away from the entrance.

At first the Wild Boars have no intention of going nearly that far. They’ve already spent more than their one hour of time and really should be turning back. But now that they’re here, deep into the cave, they fall into the allure that all cavers know well: *What if we go just a little farther?*

At Sam Yaek, they kick off their shoes, drop their backpacks, and head left.

Past the junction, Tham Luang pitches its visitors into more tight squeezes. Even without claustrophobia, you might get uneasy when the walls close in tight enough to force you to slither forward on your belly. You might feel out of your element here, thinking of all the miles of rock both above and beneath. Maybe you imagine getting trapped, being buried under millions of tons of stone. It’s not a pleasant feeling when you still have miles of passage between you and the exit.

Or maybe you are someone who views being inside a cave quite differently. A cave is one of the most serene places you can go. It’s no wonder that Buddhist monks have been known to seek out caves for long meditations. It is cool and fairly quiet. Without all the distractions that surround you aboveground, you can focus on the small things that you usually never notice, like the soft echo of your breath against the rocks.

And yet a cave is not sterile. A cave has a life of its own. In Tham Luang, if you hold quite still, you can feel it “breathing,” a light whisper of air flowing through the system. Maybe being this deep in the earth gives you the same perspective as astronauts floating high above it: a sense that you are a very tiny part of a very large universe.

The boys wriggle through tight spaces that cavers call squeezes and boulder chokes, where stones that fell from the ceiling long ago have clogged up the passages. They tromp up and down sandy, gravelly slopes. Their bare toes, toughened by years of shoeless soccer matches, grip

the slippery rocks as they climb through sections that dip steeply down before pitching back up again. Suddenly, they come upon a pool of water.

Coach Ek pauses.

He has been in Tham Luang before, and he knows that the cave can hold pockets of water along the route, so he isn't concerned. However, Coach Ek is the type of leader who doesn't like to order other people around. Instead, he likes for the group to make decisions together. He wants every boy to feel as though he has a voice. When they come upon the water, he asks if the boys want to keep going.

Sixteen-year-old Thi offers to check how deep the water is. The rest of the team watches as he wades down into the pool and pushes off. Soon Thi is smiling on the other side.

"Come on. You can all follow me!" he calls back to them. His toes touched the bottom the whole way. The water's a little cold, but they can definitely make it.

The rest of the team follows, with the bigger boys carrying the little ones on their backs.

It isn't long before that gentle whisper of air they have felt throughout the cave becomes a roar. A sharp draft of wind sends a sudden spray of water droplets onto their faces, startling them. But Coach Ek knows where they are and leads them on.

They have reached a room that locals call Hidden City or Underwater World. Here, the roof lowers over a pool that exists year-round, even in the dry season. The water level of the pool is high right now, which pinches the airflow, making it gust faster. Even with the roaring wind, the room is lovely, in an eerie, haunting sort of way. Names of past adventurers who have reached this point are scrawled into the walls.

Tham Luang still goes, though few people other than the most dedicated explorers have ever made it past this point. Hardly anyone ever gets this far in the first place. It's a huge accomplishment, especially since some of the boys haven't even been inside the cave before. The boys have hiked in almost three miles, or five kilometers, and they have done most

of it barefoot. In a moment like this, you have to stop and soak it all in.

Coach Ek says that the cave keeps going beyond the pool. But if they want to see it, they'll have to get wet again, and this time they'll have to dunk their heads under. Do the boys want to go? Or should they head back?

Thi, the only one on the team wearing a watch, tells the others what time it is. They have spent almost three hours inside already. If they want to be out of the cave in time for Night to make his party, they are going to have to absolutely fly back home. They decide to turn around.

Everyone scrambles and squirms back toward the entrance. They swim back across the water they crossed on their way in. They hustle forward in single file, trying to go as quickly as possible without twisting an ankle on the slippery rocks.

And then Coach Ek hears Bew, who is up at the front of the group, call back to him.

“Coach, come see! There’s water here!”

Coach squeezes past the others to the front of the line.

“Hey, are we lost?” one of the boys behind him asks. “Did we take a wrong turn?”

“No,” Coach Ek assures them. “We can’t be lost. There’s only one way out, for sure.”

The boys point to the source of their confusion. They should be approaching Sam Yaek, the three-way junction, but now there is a pool of swirling water that wasn’t there before.

The water completely blocks the way forward. The passage they came through is somewhere under the turbulent water, but they can’t see it.

Tham Luang is flooding.



*The boys' bikes outside the cave*



# 4.

## First on the Scene

June 23, 2018

NIGHT misses his birthday party.

His family grows worried as the evening goes on and he still doesn't show up. Calls are made among family members, who then call friends and teammates. None of the boys had told their parents where they were going. The parents soon learn that their sons had messaged other members of the team to tell them of their plans to go to Tham Luang.

Now the families' worry turns to real fear.

At 9:45 p.m. on Saturday, June 23, Sangwut Khammongkhon, the director of the Siam Ruam Jai Mae Sai Rescue Organization, takes a phone call from the village chief near Tham Luang, who tells him that a team of soccer players has gone missing and relatives suspect that the children are trapped in the cave. Sangwut is not surprised as he listens to the details. He has taken calls like this before about Tham Luang, when tourists or hikers have been stuck in the caverns. A dropped flashlight or a dead battery is usually to blame, and it doesn't take long to find the missing



*Rescuer Sangwut Khammongkhon*

people. Sangwut follows his rescue protocol, grabbing ropes, flashlights, and first-aid supplies, and loads up his truck in the rain.

By the time Sangwut hits the highway, rain lashes his windshield. It's coming down hard now, and he takes the turn into the park cautiously. When he pulls up to the parking lot, he sees that some of the parents have already gathered near the mouth of the cave. Sangwut climbs out of his truck and assures the families that everything will be fine. He has already called the other members of his organization, and soon the eighteen-person rescue team has set up floodlights in the entrance chamber.

The boys' bikes have been moved from where they were left on the ground, and now they lean against the railing at the entrance, with soccer cleats lying at the tires. Sangwut isn't sure that the boys are actually inside the cave; they could have been exploring somewhere else in the area. But with rain coming down in torrents, he gets an itching worry in the back of his mind. Before he goes into the cave, he makes a call to the Sirikorn Rescue Association, in the nearby city of Chiang Rai, and asks them to come to Tham Luang. Sirikorn has special equipment that Sangwut's team lacks: scuba-diving gear.

Sangwut leads his team into Tham Luang. Despite the heavy rains pummeling the mountain outside, the first chambers of the cave are completely dry. An hour and a half later, Sangwut's team arrives at Sam Yaek, the bowl-shaped chamber where the three main branches of the cave meet. To their left and lower down, a passage leads southwest.

At least, it usually does.

Sam Yaek is full of water. The left-hand passage sits low in the chamber, and water that has pooled in the bottom of the junction has covered up the opening completely.

Even more discouraging, Sangwut finds footprints and sees a pile of backpacks and sandals near the junction. He cups his hands around his mouth and shouts for the children. He calls up into Monk's Series as loud as he can, but he hears nothing back. With a sinking feeling in his stomach, Sangwut understands that the team must have gone left and are now trapped by the water pooled over the opening to the passageway.

The Sirikorn rescue specialists arrive at Tham Luang and enter the cave at 1:00 a.m. Twenty-two rescue workers, park staff, and even some Royal Thai Army soldiers who were in the area carry ropes and air canisters into the cave, back to Sam Yaek. At the junction, Sirikorn's divers strap on their equipment. With no wet suits, the cold water is a shock as they sink in and begin to look for the left-hand opening. They surface and dive again and again in the swirling water and finally manage to locate the hole through the muddy murk. But the opening is too small. The divers' bulky air tanks, mounted on their backs, ram against the top of the passage.

The Sirikorn divers use scuba gear for recovering bodies from the bottom of lakes or rivers, not for diving through flooded caves. The divers aren't equipped to make it through the narrow passage. They decide to halt the diving and hike back out to the cave entrance to talk through a plan.

When they emerge into the open air at 4:00 a.m., Sangwut is surprised to see that the number of family members waiting outside has



*The boys' worried family members gather at the cave.*

multiplied. When the families see the rescue workers come out — with no children in tow — they are furious.

“What are you doing?” they shout. “How can you stop searching now?”

Some of the boys' cousins who have been inside the cave many times try to barge past the rescue workers. “We know the way!” they say. They are ready to pull the boys out themselves, if that's what it takes.

The boys' mothers and fathers call into the cave. Their voices crack with anguish. “My son, I'm here! Come home! I'm waiting for you!”

Sangwut's heart breaks to hear them, and he understands their frustration. He calms the families, but he doesn't tell them about the water at Sam Yaek junction. He doesn't want them to panic. Instead, he tells them that the team has come out of the cave because it's so late, and they will resume the search first thing in the morning. The families grudgingly accept this explanation, but they do not leave the scene.

The governor of Chiang Rai province, Narongsak Osatanakorn, has arrived on-site. He calls a meeting for all the rescue workers in one of the park headquarters buildings. They agree to pause the rescue because it's too dangerous to dive without proper equipment. They also agree that they must shut down the cave. No one can go in or out without passing a checkpoint. The last step they agree to will fall on the governor's shoulders to carry out: they must tell the parents that their children have been trapped by floodwaters inside. Even though the families are sure to panic, they need to know the truth.

Sangwut leaves the meeting, the heavy clouds over his heart matching those in the sky. He knows this cave very well. And he knows that when water reaches Sam Yaek at this time of the year, it doesn't go down until after the rainy season is over.

That night Sangwut knows they are in for a long, long rescue.



*Rescue workers in the entrance chamber of Tham Luang*



*A creek flows with water that has drained off the Nang Non mountains.*



# 5.

## Trapped

June 23, 2018

THE WILD BOARS are only about a mile from the cave entrance, about an hour-and-a-half hike from their bikes. They look down at the water pooling at their feet where there had previously been dry ground. It is as cloudy as a cup of milky coffee. They can't see the forward passage at all, but they know it's there.

Coach Ek wonders how bad the flooding is. If the flooded section isn't too long, maybe they could manage to swim out. He will give it a try first.

Coach Ek unspools the coil of rope he brought with them. He ties one end around his waist and hands the other end to Thi, Night, and Adul.

As he wades into the water, he gives them instructions. "Once I swim in, if I can't find any way forward, I'll tug the rope twice and you'll pull me back. But if I don't tug on the rope at all, you'll know we can make it through, and you can swim in after me."

The boys nod and grip tight to the rope. Their heartbeats race as they watch their coach take a deep breath and plunge into the water.

The cold current swirls around Coach Ek. It's strong, and it pushes him back toward the boys waiting behind him. They shine their flashlights into the water to give him some light. But even with his eyes wide open, he can't see through the dirty swill. He swims forward for a few strokes, stretching his feet down to check if he can reach the bottom. His toes kick sand. He reaches overhead. The water goes all the way to the rock above. There is no air space at all.

What if this flooded section is just a short duck under? Maybe the surface is only a few feet away. Maybe he can reach it. But his air is running out. If he goes any farther, he might not have enough air in his lungs to make it back. Even if he does make it to the other side, it's doubtful that the boys can get through. And what if he is unable to swim back to help them?

Quickly, he yanks the rope twice. He feels the tug of the boys on the other end. He kicks his legs as they reel him in.

Coach Ek gets out of the water, dripping and chilled. He knows that if he uses the word "trapped," the boys could panic. He stays calm and explains that they won't be able to get out this way with the water so high. But if they wait, it will go down, and then they'll be able to swim out.

The boys look at one another. They don't understand. They just came this way. How could the water have risen so quickly?

In order to understand how the Wild Boars became suddenly stranded inside the cave, you have to understand more about the cave itself. Tham Luang is the fourth longest cave in Thailand. Compared to the longest known cave in the world, Mammoth Cave, in Kentucky, which is 405 miles (653 kilometers) long, the Cave of the Sleeping Lady is just a baby. But it's not the cave's length that makes it dangerous.

It's the way it floods.

The mountain that holds Tham Luang cave is made of rock called karst limestone. This is a very holey type of rock found all over the world,



*Karst formations in Halong Bay, Vietnam*

from Southeast Asia to the United States. Wherever you find karst, you almost always find caves.

When rain falls on the Nang Non mountains, it doesn't just run over the surface. Much of that rain sinks straight down into the mountain's millions of holes, soaking into the ground like a sponge. When the Wild Boars walked into Tham Luang, it was dry. But what the boys didn't realize was that the heavy rains that hit the area a few days before had completely saturated the ground beneath their feet. The boys didn't know that the dry ground they walked on masked a mountain already filled to the brim with water.

Any extra water—like the rain that started to fall after the boys went inside—has nowhere else to go, so it flows through the cave itself. And it flows fast. Karst caves are known to flash flood in an instant. The network of tunnels in a karst mountain is like an underground river system. Tiny passages near the surface carry rainwater deeper into the mountain, where the passages widen and join bigger streams, which connect to even bigger streams. In some cave systems, entire raging rivers of water gush through the rock, putting white-water rapids to shame.

## A Cave Is Born

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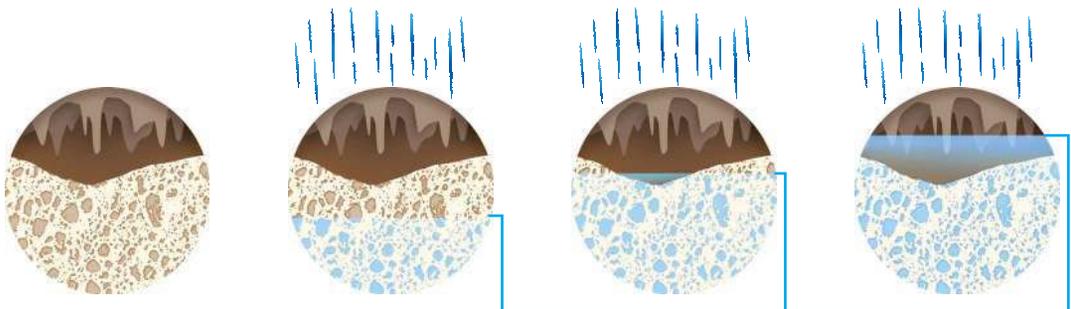
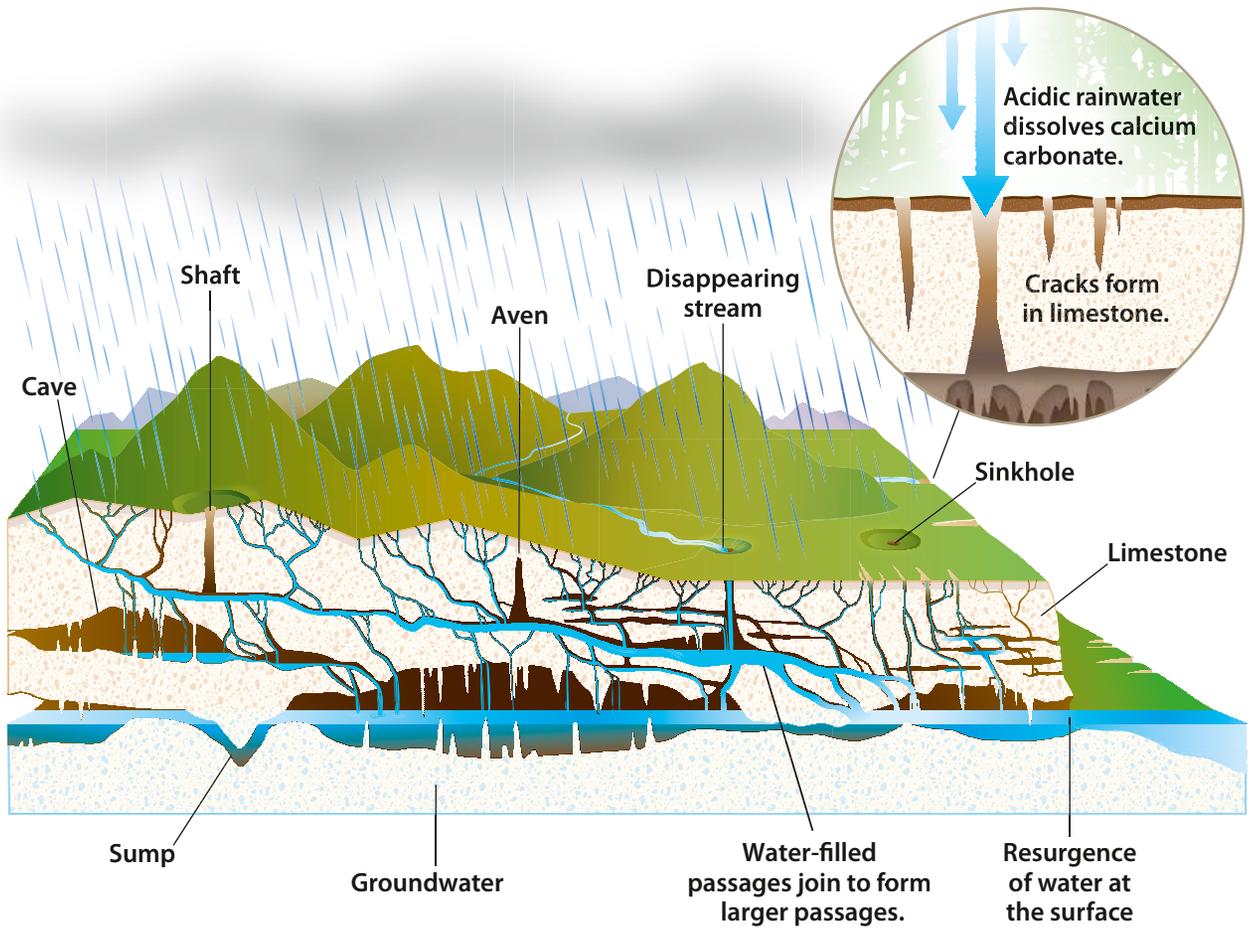
Like all limestone, Thailand's karst began with dead marine creatures. Around 250 to 500 million years ago, the surface of Thailand actually sat beneath a sea teeming with animal life. Corals, clams, sea fans, and millions of other species lived in the sea. When they died, they sank to the bottom. Their bodies decomposed, but a mineral in their shells and skeletons, called calcium carbonate, remained. The calcium carbonate combined with mud on the seafloor as more and more remains of dead organisms continued to float down. Over millions of years, the pressure of the ocean sitting on top gradually pressed all those layers of calcium carbonate into limestone.

Our seemingly solid Earth is actually in constant evolution. The planet's crust is made of continental plates that float on layers of flowing magma. The Indian continental plate is sliding underneath the continent of Asia, forcing it up. Over millions of years, that lifting action eventually raised the limestone of Thailand higher and higher, until what was once the bottom of the sea became the top of the mountains. Up on the mountain, that limestone was then exposed to the climate, including rain. And a tropical area like Thailand gets lots and lots of rain.

Rainwater is slightly acidic. When it falls on a forest and flows through decaying leaves on the forest floor, it becomes even more acidic. Acid dissolves calcium carbonate in the limestone, forming a new type of landscape called karst.

If you were to drop a limestone rock in a glass of white vinegar, you'd see fizzing and bubbling as the acid in the vinegar dissolved the calcium carbonate in the rock. Picture the same thing happening to the limestone mountains of northern Thailand—only much slower and over millions of years—and you can imagine how caves like Tham Luang were formed. As water dissolved holes into the karst, the slope of the mountain and the cracks in the stone allowed the water to flow from one hole to another. With enough time and enough water, long tunnels and huge rooms formed deep underground.

# A KARST CAVE SYSTEM



When the ground beneath the surface is completely saturated with water, continued rainfall can cause flooding.

Trapped as they are, the situation for the Wild Boars could be even worse. Tham Luang has only partially flooded for now. The rains outside have not created a deluge inside the mountain.

Not yet.

At 5:00 p.m. on Saturday, the boys are more afraid of their parents than of the cave. None of the boys told their families where they were going. Mark realizes how late it will be by the time he gets home and worries about the scolding he'll get once he does show up. Thi knows his mom is going to be furious. Some of the boys start thinking about all the homework they have to do for school.

Coach Ek wonders if they can dig a canal for the water to flow into. Maybe if they dig it deep enough, that will allow the water to subside and make enough space for them to swim through. The boys grab rocks and start digging in the gravelly dirt. They dig and dig, but it quickly becomes clear that they're not making any change in the water levels.

Suddenly everyone is exhausted. It isn't late, but the rush of adrenaline from realizing they are trapped has now worn off, and fatigue hits them like a truck.

Thi checks his watch again. It's 6:00 p.m. now. "Coach, do you think we should find someplace to sleep?"

The boys all agree that they should rest and wait for the water to go down. Coach Ek leads the way deeper into the cave to a section where the ground is sandy and water drips from the rocks along the cave walls.

Night thinks about his party and all the friends and family invited. He thinks about the food he knows his mother has been cooking all afternoon, and the cake.

His teammates are thinking of food, too. It's useless, though, unless they want to eat flashlights for dinner. They have no food with them. The only snacks they had were eaten before they entered the cave. Luckily, they do have the most important thing their bodies need — water.

Coach tells them that drinking the murky water from the pools on the

cave floor isn't safe. It could have run straight over the ground and into the cave, carrying all sorts of harmful bacteria. But the water dripping from the walls has probably filtered down more slowly through the rocks overhead, cleaning it somewhat.

The boys drink the water as best they can, cupping their hands to catch the drops as they fall. It tastes good and clean, like spring water.

They find the driest spots they can and lie down together. Coach knows that he needs to keep calm and positive so that no one gets upset. Luckily everyone seems all right. Other than worrying about being in trouble with their parents, none of the boys are panicking. Before they go to sleep, he tells them all to pray together, just as they would before going to bed at home.

When the prayers are finished, Coach Ek tells them not to worry; the water will go down, and the parks department staff will be looking for them. One by one, the boys drift off to sleep, thinking about tomorrow, when they'll be able to get out.



*Caver Vern Unsworth maneuvers through a squeeze in Tham Luang.*