

phong nha-ke bang

World Natural Heritage Site



Karst and Caves in the Phong Nha-Ke Bang National Park





As an international cooperation enterprise for sustainable development with worldwide operations, the federally owned Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH supports the German Government in achieving its development-policy objectives. It provides viable, forward looking solutions for political, economic, ecological and social development in a globalised world. Working under difficult conditions, GTZ promotes complex reforms and change processes. Its corporate objective is to improve people's living conditions on a sustainable basis.

The German Federal Ministry for Economic Cooperation and Development (BMZ) is its major client. The company also operates on behalf of other German ministries, the governments of other countries and international clients, such as the European Commission, the United Nations and the World Bank, as well as on behalf of private enterprises. GTZ works on a public-benefit basis. All surpluses generated are channeled back into its own international cooperation projects for sustainable development.

GTZ has been working with its partners in Viet Nam since 1993 and promotes sustainable development in the three priority areas of Sustainable Economic Development, Management of Natural Resources and Health. Additional projects are situated within the cross-cutting sector Poverty Reduction, implemented on behalf of other German ministries or realised by GTZ International Services. The Centre for International Migration and Development (CIM) currently has 31 integrated experts working as professionals for partner institutions in Viet Nam.

On behalf of BMZ the Phong Nha-Ke Bang National Park (PNKB) Region Project has been assisting the National Park authorities and other partners since 2007. Activities are focused on integrated conservation and sustainable management of natural resources to protect PNKB as one of the most important ecological zones in the world. UNESCO¹ awarded PNKB World Natural Heritage Status in 2003 due to the significant geomorphic features of its karst landscape and cave system. To further support the conservation and development efforts for PNKB and raise awareness amongst its visitors and the general public, BMZ initiated a media accompaniment concept. The media products produced as part of this concept complement the activities of the PNKB National Park Region Project and other German development organisations.

¹ United Nations Educational, Cultural and Scientific Organization (UNESCO)

Karst and Caves

in the Phong Nha-Ke Bang National Park

**Published by**

Deutsche Gesellschaft für
Technische Zusammenarbeit (GTZ) GmbH
Phong Nha-Ke Bang National Park Region Project
2nd Floor, 9 Quang Trung
Dong Hoi, Quang Binh
Viet Nam
www.gtz.de/vietnam

Responsible

Dr. Joachim Esser

Author

Andrew P. Spate

Editor

Brenda Haas

Editorial Consultants

Dr. Thora Amend, Brian D. Clark, Suzanne E. Clark

Product planning and production control

Alix Bluhm, Kathrin Meinertz, Vu Hoang Anh

Photography

Alix Bluhm, Suzanne E. Clark, Howard Limbert, Kathrin Meinertz, Harald Schütz

Design

INCA Media, Hanoi, Viet Nam

© gtz, 2010



'Tell me, I forget. Show me, I remember. Involve me, I understand.'
Ancient Proverb

Content

■ FOREWORD	2
■ INTRODUCTION	3
■ THE BIRTH OF PHONG NHA-KE BANG'S LIMESTONE MOUNTAINS	4-5
■ HIDDEN WONDERS	6-7
■ A PLACE TO CALL HOME	8
■ LOCAL PEOPLE AND THE CAVES	9
■ WHY CONSERVE?	9
■ CONSERVATION BEGINS WITH YOU!	10



FOREWORD

We are an integral part of nature. Our fate is inextricably linked to biodiversity with its immense variety of animals and plants in their habitats and natural environments. Yet we are rapidly losing nature's bounty not least because of our own activities. It is vital to work to safeguard this natural heritage and reduce biodiversity loss for the well-being of people worldwide now and in future.

The Phong Nha - Ke Bang National Park was established in 2001. It has been described as one of the most important karst areas in the world. Its scenic beauty and scientific value is unmatched by any other protected area in South - East Asia. The significant geomorphic features of its karst landscape and cave system gave the United Nations Educational, Cultural and Scientific Organization (UNESCO) good reason to add Phong Nha - Ke Bang to the World Heritage list in 2003.

Recognising the general importance of conservation, the **National Action Plan for Biodiversity up to 2010 and orientations towards 2020** for implementing the **Convention on Biodiversity** and the **Cartagena Protocol on Biosafety** were approved in May 2007. The **Biodiversity Law** was passed by the Vietnamese Government on 13th of November 2008 and took effect in July 2009.

However the government alone cannot safeguard the park, its cave system and all life that thrives within it. Every one of us needs to be aware of the park's international significance and spread the message of conservation.

This brochure is designed to give you a special insight into the history and evolution of the park's cave system. It highlights the wealth of nature, beauty and knowledge provided by its magnificent caves and their unique ecosystems.

We hope that it will be a helpful guide as you set forth on this journey of discovery.

Dr. Joachim Esser

*Chief Technical Advisor,
GTZ Phong Nha - Ke Bang National Park Region Project*



INTRODUCTION

The Phong Nha - Ke Bang National Park is located about 40 km inland from the Vietnamese coastal city of Dong Hoi, about 500 km south of Hanoi.

The park's name itself is a combination of two landmarks: the Phong Nha cave with its many fascinating rock formations, and the lush Ke Bang limestone forest.

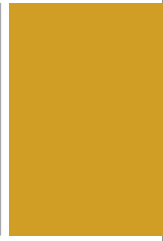
Phong Nha's beauty was recorded as far back as 1550 by Duong Van An, the first Vietnamese to write about the cave. It was also depicted as one of Viet Nam's principal landscapes on a dynastic urn at Hue.

In the late 19th century Léopold Michel Cadière conducted an expedition to the cave where he discovered Champa scripts. The French missionary pronounced it 'the number one cave of Indochina.'

From 1920 onwards the area was promoted as a tourist destination that was ranked second in Indochina. The Bureau of Tourism of the French Resident Superior in Hue issued a brochure in 1937 promoting tourism in Quang Binh and introducing the Phong Nha cave.

Before 1990, Vietnamese and foreign groups conducted several explorations here. Discovery and research expeditions increased from 1990 onwards. This eventually led to the drafting of documents recommending the site for UNESCO World Natural Heritage status.

Recognising its role in Vietnamese history and culture, the government officially declared it a Nature Reserve in August 1986. In 2001 it was declared a National Park to protect both its cave system and the ecosystem of its surrounding limestone forest.



In July 2003 Phong Nha - Ke Bang was accorded **UNESCO World Natural Heritage** status, based on Criterion viii of the World Heritage Convention that acknowledges its cave systems' universal importance,

'as an outstanding example representing major stages of Earth's history and significant geological processes and features.'



THE BIRTH OF PHONG NHA-KE BANG'S LIMESTONE MOUNTAINS

The cone-shaped hills that dominate the landscape of Phong Nha - Ke Bang National Park began life deep beneath an ancient sea more than 460 million years ago.

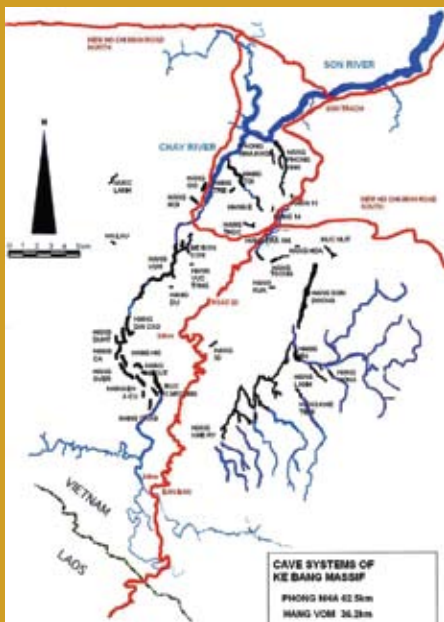
The two soluble minerals 'calcium' and 'carbon' (which many sea animals use to make their hard protective shells) combine naturally in seawater to create a new mineral called 'calcium carbonate', which is less soluble than the two original minerals. The fine crystals of calcium carbonate sink to the sea floor as they form and gather here as a layer of dark ooze or marine mud in which the shells and bones of many marine animals are found. Eventually the mud hardens into stone with the remains of marine animals preserved inside as fossils.

Changes in the sea's chemistry over millions of years, during which this mud forms and turns to stone, also change the stone's qualities. The stone is formed in layers and the boundary between two layers is called a 'bedding plane'.

When the powerful forces that shape the face of the earth lifted these layers of stone up from the sea floor to create the mountains of Phong Nha, the stone was tilted at an angle – and it cracked.

Now high above the waves this stone - called **limestone** - is exposed to the rain. Here is where we discover something remarkable about limestone. It is formed by a chemical reaction in seawater but in rainwater, it **dissolves**.

When the rainwater gets into the cracks (or 'joints') in the limestone, it is pulled down by gravity until it meets a bedding plane along which it flows until it meets another joint and is once again pulled down by gravity. Another bedding plane, another joint - this process continues until the water passes right through the limestone, all the time dissolving little bits of the stone and carrying them away. The joints become wider as the limestone is dissolved from inside out and the hidden wonders of Phong Nha are formed within the mountains.



The Earth's surface is composed of various kinds of rock such as granite, sandstone, and quartzite among many others. But there are only **three basic rock types**.

- **Igneous** rocks like granite and ironstone are 'formed by fire' and spewed onto the Earth's surface by volcanoes.
- **Sedimentary** rocks like sandstone and limestone are formed by fine grains of various minerals settling to the bottom of seas and lakes and becoming cemented together to form layers of rock.
- **Metamorphic** rocks like marble are formed when the crystalline structure of an igneous or sedimentary rock is changed by exposure to heat, pressure, chemical reaction or a combination of two or more of these.

HIDDEN WONDERS

While Phong Nha - Ke Bang's extensive cave system has beguiled explorers for their sheer magnificence, they also contain significant scientific and historical finds that continue to emerge through expeditions and painstaking research.

Phong Nha Cave

The Phong Nha cave is over 7.5 km long and contains several grottoes or chambers, including the Bi Ki grotto. Its cave system features underground passageways and river caves filled with stalactites and stalagmites. The stalagmites that used to stand at the cave's entrance apparently inspired its name: Phong Nha means 'Wind and Teeth.'

Phong Nha is famous for its rock formations that bear intriguing names such as 'the Lion', the 'Fairy Cave', the 'Royal Court' and 'the Buddha'. After flowing about 19 km underground, the Son River flows out from the mouth of this cave draining a huge area of the limestone mountains around Phong Nha.

Just outside the cave is a Champa era temple that is believed to date back to the 10th century.

Scientists have thus far surveyed many grottos inside Phong Nha. However visitors can only enter up to a distance of 600 m.

Bi Ki Grotto

Visitors can also access the archeologically important Bi Ki Grotto that is located about 600 m inside the Phong Nha cave. It is believed to have housed a Champa mosque sometime between the 9th and 11th centuries.

Tien Son Cave

A local discovered Tien Son in 1935. It lies 150 m above the Phong Nha cave and is about 1 km long. Tien Son and Phong Nha are clearly part of the same cave system although they appear not to be connected at present. Millions of years ago the Son River probably flowed through Tien Son but it now flows lower down the valley.

Tien Son is filled with enormous columns, stalactites and stalagmites. Perhaps its most surprising feature is its many fallen stalagmites.

Visitors can enter 400 m into the cave via a winding pathway amongst the speleothems. It is not possible to visit Tien Son without touching the formations. Therefore care needs to be taken to use the formations for support only when necessary.



Son Doong Cave

In 2009, the British Cave Research Association announced the discovery of 'the world's largest cave' by Ho Khanh a local farmer, who had named it Hang Son Doong or the Mountain River Cave. It is presently measured at 7.2 km in length, 150 m high and 200 m wide over most of its length, and between over 150 m to 250 m high at parts of its length. These are preliminary dimensions and will be verified during future expeditions to the cave.

Since its discovery, the British cavers and their Vietnamese counterparts from the Hanoi University of Science have conducted several more expeditions to Son Doong.

Its towering stalagmites have been estimated to be taller than 70 m, placing them amongst the tallest known in the world.

An expedition in March 2010 unearthed several probable new species including white spiders, scorpions and woodlice that are being analysed by the Hanoi University.

As it is located within dense forest, Son Doong is not open to visitors. Scientists however continue to study this 'active cave' that is expected to yield even more new discoveries.





A PLACE TO CALL HOME

A cave habitat is a fragile and easily disturbed environment, therefore making its inhabitants vulnerable. Cave-dwelling animals, also known as **troglobites**, will not survive if they are removed from their cave environment.

They adapt to the lack of light and food differently from their surface-dwelling cousins:

- Some do not have eyes, as they are redundant in total darkness.
- Many have extremely long antennae that are ideal for feeling their way around and detecting prey.
- Some insects have spindly legs that allow them to quickly leap onto their prey or escape danger.
- Cave insects lay much larger - but fewer - eggs compared to their surface-dwelling relatives.
- Many have developed white or transparent bodies due to the total darkness.
- Many bats and some cave-dwelling birds use 'echolocation' to find their way around in the dark.

Food can only enter the cave via flowing water, vegetation, when other animals fall into the caves from the surface, or from bat and bird excreta.

Troglobites have great scientific value as they help us understand how they adapt and evolve in this special habitat.

Besides 46 species of cave-dwelling bats, cave explorers have noted large centipedes, spiders, scorpions, crickets, woodlice, snails, crabs, fish, reptiles and amphibians living in the caves of Phong Nha. Most of them are still being analysed and are yet to be scientifically named.



LOCAL PEOPLE AND THE CAVES

The caves have provided sanctuary to the local people during tumultuous periods. In 1885, Emperor Ham Nghi, the final emperor of the Nguyen Dynasty, built a base at the caves for the Vietnamese resistance who fought against French colonialism. Local villagers claim that his royal treasure remains hidden in these caves.

More than seven decades later, the Phong Nha cave and Bi Ki grotto were used as underground hospitals, ammunition stores or shelters during the American War. Consequently, they became strategic bombing targets. Scars and other traces caused by bomb explosions can still be seen on the limestone wall that towers above the entrance into Phong Nha.

The Arem, Ma Coong and Ruc who are part of the Chut minority ethnic group also once lived in the area. For many generations these hunter-gatherers lived in the caves and the forest. Their skills and intimate knowledge of the forest meant that they were able to put the forest products to good use. Their knowledge extends to many medicinal plants and species that are economically valued today.

Today more than 50,000 people live in the buffer zone of the Phong Nha - Ke Bang National Park. The government is currently developing sustainable livelihood systems for the locals who once depended on the park's natural resources. This will enable the people to earn a decent living without jeopardising conservation efforts in this World Heritage Site.

WHY CONSERVE?

Phong Nha - Ke Bang was designated a World Natural Heritage Site because it is '*an outstanding example representing major stages of Earth's history and significant geological processes and features.*'

That is why **conservation** is of utmost importance to ensure that the unique scenery and rich biodiversity that we now observe in the cave systems and in the park will be preserved for the enjoyment of future generations.

People also depend on the natural resources of the park and its buffer zone for their livelihood, while an intact ecosystem has long-term benefits for the country's economy.

Therefore the area must be developed in a sustainable manner. For example, tourism activities must be designed to help raise awareness about nature conservation and offer those living in the park's buffer zones job opportunities and additional income. However with approximately 300,000 tourists visiting the area every year, tourism must be carefully balanced with the conservation needs of the fragile cave and forest ecosystems.

Recognising the general importance of conservation, the **National Action Plan for Biodiversity up to 2010 and orientations towards 2020** for implementing the **Convention on Biodiversity** and the **Cartagena Protocol on Biosafety** were approved in May 2007. The **Biodiversity Law** was passed by the Vietnamese Government on 13th of November 2008 and took effect in July 2009.

It is also proactively working towards sustainably managing the cave systems and the forest. The park administration and Vietnamese scientists regularly conduct research, protection and restoration activities with international bodies and specialists.

Initiatives include ranger training, land-use planning, capacity building for law enforcement and the formulation of a Sustainable Tourism Development Plan for PNKB region.



CONSERVATION BEGINS WITH YOU!

'He who is in harmony with Nature hits the mark without effort and apprehends the truth without thinking.'

Confucius

The Phong Nha - Ke Bang National Park and its magnificent cave system clearly display a vast wealth of irreplaceable wonders within. And given its difficult terrain and dense forests, scientists are certain that there is much more to discover.

We need to be aware of our fragile environment and how mankind and the environment depend on each other.

Although we may not immediately see or experience it, all our actions or inactions have a direct impact on our environment.

As visitors we can do our part by strictly adhering to the following rules:

- Do not smoke, litter or spit in the caves. Solid waste such as cigarette butts, paper or plastic bottles take many years to break down.
- Do not bring or consume food or drinks in the caves.
- Do not leave money in the caves.
- Do not stray from the marked pathways, both for your safety and the protection of the caves. One careless step by a visitor could destroy centuries of rock formation.
- Do not touch, break, deface or knock on the stalactites and stalagmites. They have taken thousands of years to grow and cannot be replaced. The oil on your fingers discolours them, and they can be easily broken.

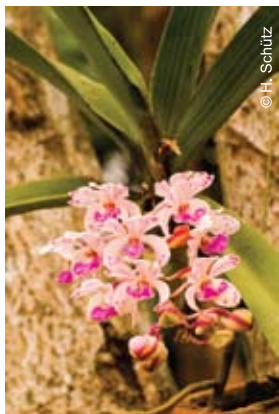
Raising environmental awareness is not merely the responsibility of the government, media or large organisations.

When we visit the Phong Nha - Ke Bang World Heritage Site, we accept the responsibility to protect it not only for ourselves, but also for our children and our children's children.

Therefore, conservation begins with you!



© H. Schütz



© H. Schütz



© H. Schütz



Contact Information

Nature Conservation and Sustainable Management of
Natural Resources in Phong Nha - Ke Bang National Park Region

2nd Floor, Department of Planning and Investment

9 Quang Trung, Dong Hoi City

Quang Binh Province, Viet Nam

T +84 52 38 43 179

F +84 52 38 50 941

E office.pn-kb@gtz-vietnam.com.vn

I www.gtz.de/vietnam

www.gtz-mnr.org.vn