



Technology from 160,000 years ago... to the present... and beyond... that's sustainability!



Palaeolithic tools

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Sun dial at the Dias Museum, Mossel Bay

Pinnacle Point Beach & Golf Resort, Mossel Bay

Sculpture at the Pinnacle Point Beach & Golf Resort

This case study on Sustainable Technology at the caves at the Pinnacle Point Beach & Golf Resort was developed by Point High School in the Western Cape Province of South Africa. It won the 2014 Global Travel & Tourism Partnership (GTTP) Research Award in South Africa.



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Danie and Christa Swanepoel

Alwyn and Trudie Barnardt

Aloe Ferox



The team:

Marinei Bester

I've been a teacher for 32 years. I've taught Tourism for the last 6 years and I enjoy the subject and the learners tremendously. Tourism is the new gold!



Marizaan Beukes

I am 17 years old. When I finish school I would like to work in the tourism industry – specifically in hotel management.



Johan Venter

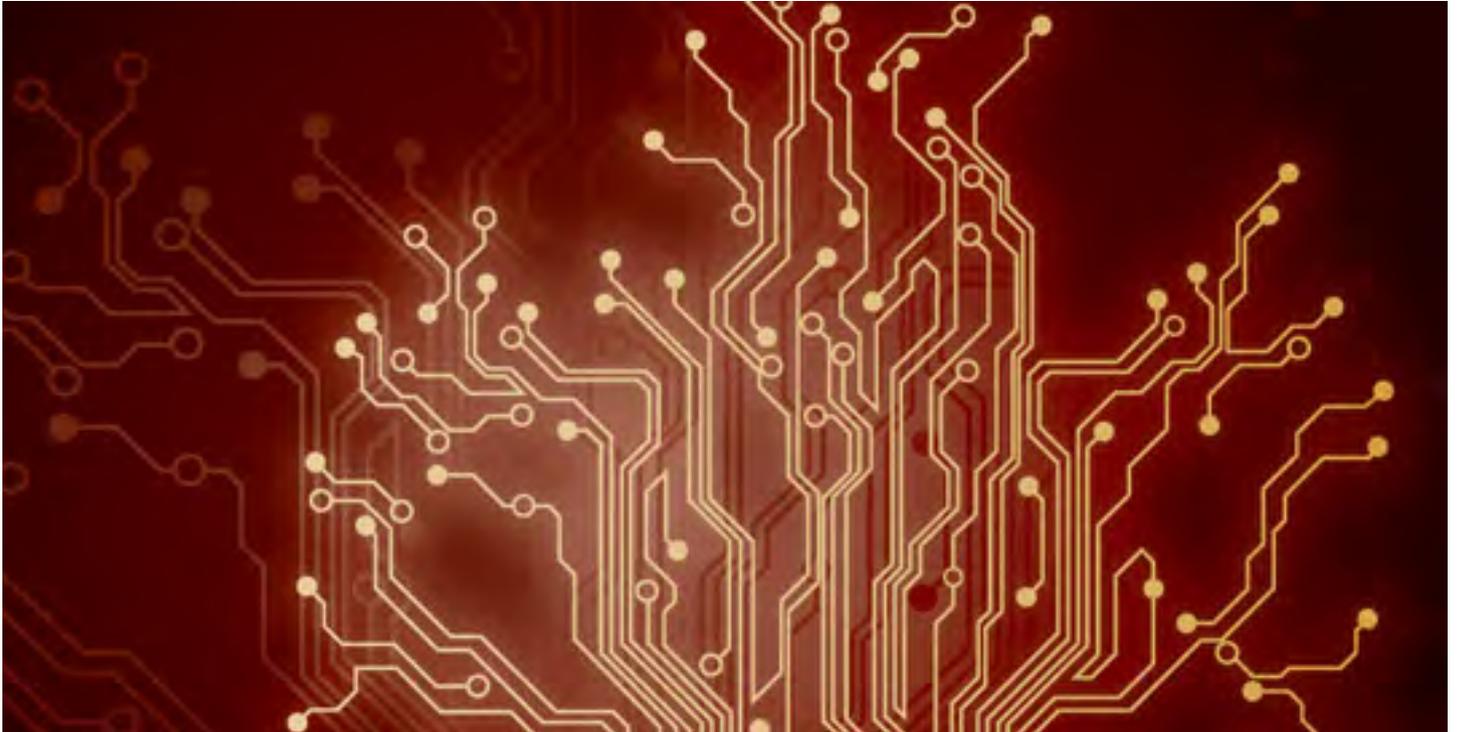
I am 17 years old. When I finish school I want to become a tour guide and eventually have my own tour company.

Contact us:

Marinei Bester
Marizaan Beukes
Johan Venter

Point High School
PO Box 266
Mossel Bay
6500
South Africa

Telephone: 0027 (0)44 691 2274
Fax: 0027 (0)44 691 3179
E-mail: hspunt@mweb.co.za
Web: www.pointhighschool.co.za



The topic of the GTTP's 2014 Research Competition – 'Technology and Sustainability' – pushed us to think and read beyond our everyday life.

We came across the following knowledge:

"... the international tourism industry is rapidly adopting a third "T": "Travel, Tourism and Technology."

– Antonio Lopez de Ávila

Tourism Technology Association CEO and founder, Apichai Sakulsureeyadej:

"As technology is evolving faster than ever before, it has made most travellers around the world much more technology-savvy than in the past. The internet has revolutionized the tourism industry more than any other factor in the last few decades."

"The Web has now surpassed traditional word-of-mouth as the primary source of inspiration for travel. Travellers search online before they decide where or how they are going to travel."

Antonio Lopez de Ávila, director of the Executive Master in Tourism Management, IE Business School:

"And in this age of technology in which we live, the international tourism industry is rapidly adopting a third "T": "Travel, Tourism and Technology."

"We predict two key areas for growth with regards to utilizing tourism technology in the tourism industry correctly. The first area is the marketing of the tourism destinations, products and services.

The second area is the infrastructure of the organization, which determines the readiness to respond to customer requirements."

We live in the era of technology and our whole lives are being dictated by technology, but what we came across when we began investigating the concept of 'Technology and sustainability' in our home town made for some very interesting research material.

We invite you to read travel, and experience our findings with us.

Marinei Bester / Marizaan Beukes / Johan Venter



The "Big Five"

Our country at the very southern tip of the continent is an excellent introduction to Africa.

South Africa is huge: at 1,233,404 km² in size, it's the 25th largest country in the world, and the 9th largest in Africa. In fact it's so big that it takes about 2 ¼ hours to fly between our largest cities: Johannesburg at 26° South, and Cape Town at 34° South. To put that in perspective: it takes about 9 ½ hours to fly across the length of Africa – from Cape Town to Cairo (at 30° North).

South Africa has almost 3,000 km of coastline, which is washed by the Atlantic Ocean on the West Coast, and the Indian Ocean on the South and East Coasts. In terms of biodiversity it is the third highest in the world (after Brazil and Indonesia) – largely because it is host to the smallest of the world's six Floristic Kingdoms: the Cape Floristic Kingdom, which is characterised by the fynbos (Cape macchia) with its proteas, heathers, Cape reeds, and epiphytes, or bulbous plants. (By contrast, the world's largest floristic kingdom – the Holarctic Kingdom – includes most of North America, North Africa, Europe, and Asia).

About 52 million of us live in the nine provinces of South Africa – which are very diverse both geographically and culturally.

We like to think of our country as many worlds in one: both modern and bustling, as well as rural and peaceful, with massive wilderness areas under the protection of South African National Parks and various provincial, municipal, and private conservation organisations.

Rainbow nation

Archbishop Emeritus Desmond Mpilo Tutu, the retired archbishop of Cape Town and the winner of the 1984 Nobel Peace Prize, named South Africa the 'Rainbow Nation' in celebration of the wonderful diversity of our people, who've emerged from a turbulent past that was deeply affected by colonialism and apartheid, and are now striving to live in peace with each other in sunny South Africa.

This diversity is reflected in our official languages (we have eleven: Afrikaans, English, Zulu, Xhosa, Tsonga, Swati, Tswana, Southern Sotho, Northern Sotho, Venda, and Ndebele), and in our varying origins, cultures, and religions. 79.2% of us are African; 8.9% are 'coloured' (in South Africa this term describes people of mixed race); 8.9% are white; and 2.5% of us are Indian. But – as we'll show in our case study below – all of us are related genetically!

*All the emotions
in one destination!*

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en un solo destino!*

– www.capetravelonline.com



Nelson Mandela



The South African flag

Nelson Mandela

Amongst all the famous South Africans (and there have been many – from Shaka Zulu, who united the Zulu Kingdom in the early 1800s, to Professor Christiaan Barnard, who performed the world's first heart transplant in 1967, to Jacob 'Baby Jake' Matlala, who won the World Boxing Organisation's world championship title in 1993), Nelson Rolihlahla Mandela probably stands out as the most famous of all.

As the president of the African National Congress (the ANC), he led South Africa out of apartheid and into democracy.

86,87% of 22 million registered voters turned out for our first non-racial, democratic elections, which were held in 1994 – and when the ANC won 62.65% of the vote, Nelson Mandela became the first state president of the new South Africa.

He served just a single term: from 10 May, 1994 to 14 June, 1999. He was loved and revered as a peacemaker and a man of great wisdom by almost everyone in South Africa and around the world – and he was particularly known for his love of children.

He received the 1993 Nobel Peace Prize jointly with Frederik Willem 'FW' de Klerk (the last president of the old South Africa), "For their work for the peaceful termination of the apartheid regime, and for laying the foundations for a new democratic South Africa." (www.nobelprize.org).

In 2009, the General Assembly of the United Nations declared that the 18th of July of every year would in future be observed as 'Nelson Mandela International Day.' This was the first time that the UN had ever dedicated a designated day to a person.

Nelson Mandela passed away on 5 December, 2013.

“I believe that South Africa is the most beautiful place on earth. Admittedly, I am biased, but when you combine the natural beauty of South Africa with the friendliness and cultural diversity of our people, and the fact that the region is a haven for Africa’s most splendid wildlife, then I think even the most scrupulous critic would agree that we have been blessed with a truly wonderful land. I would like to extend a personal invitation to you to come and see for yourself the splendour of South Africa. I know that my people will be delighted to welcome you and I think you will be enchanted by their warmth and hospitality. I am equally sure that you will enjoy our culture, our cuisine and the warmth of our people.”

– Nelson Rolihlahla Mandela.



Namaqualand wild flowers

Natural Wonderland

South Africa is a spectacularly beautiful country.

Because of its large size, and its unique position relative to the ocean currents (the cold Benguela Current which runs northwards in the Atlantic Ocean, and the warm Agulhas current, which runs southwards in the Indian Ocean), South Africa enjoys a mild but varied climate. Most of the sub-continent receives summer rainfall, but the coastal parts of the Cape Provinces – the area east and west of Cape Town known as the Cape Floristic Kingdom – receives the bulk of its rain in winter.

A long and ancient series of high mountains stretches from Cape Town and along the south and east coasts to form a significant rain-shadow that causes much of the interior and the west coast of the country to experience semi-arid and even (in the north-west) desert conditions.

The vegetation of the country includes vast areas of both savanna and bushveld (a mix of open forest and grassland); tropical, jungle-like bush along the north-eastern coast of KwaZulu-Natal Province; evergreen Afro-montane forests on the South Coast of the Western Cape Province; and, very significantly for the subject of our research, the fynbos of the coastal areas of the Eastern, Western and Northern Cape Provinces.

With a strong and proactive national policy for protection of the environment – which is supported and enhanced by many active civil society organisations – South Africa boasts some of the world’s finest wilderness areas (like the Kruger National Park); superb examples of Transfrontier ‘Peace’ Parks (Kgalagadi Transfrontier Park; Great Limpopo Transfrontier Park); and Africa’s oldest Marine Protected Area (the Tsitsikamma Section of the Garden Route National Park).

South Africa’s famous landmark – Table Mountain – is situated in Cape Town, which is 400 km from where we live in Mossel Bay.



Table Mountain from Blauwberg beach



Cape Winelands

Western Cape Province

The Western Cape Province forms the southern tip of the African continent. At 129,449 km², it's the fourth largest of South Africa's nine provinces – but with a population of about 5.8 million, it's home to only about 11.3% of the country's total population.

About half (49,6%) of the people in our province speak Afrikaans as their home language (they call the Province 'Die Wes-Kaap,' and people who live here 'Kaapenaars'), while about 24.7% speak isiXhosa (the language of the Xhosa people, who call the Province 'iNtshona Kapa'), and 20.2% are English speaking.

Cape Town is by far the largest city in the Province – with more than 3 million inhabitants – and it's also the legislative capital of South Africa, and the seat of the Provincial Parliament. (South Africa has three state capitals. The national legislature – Parliament – sits in Cape Town, while the judicial capital is situated in Bloemfontien in the Free State Province, and Pretoria, in Gauteng Province, is the executive capital.)

The Province is home to three of South Africa's great higher education institutions: the Universities of Cape Town, Stellenbosch and the Western Cape.

The Western Cape's economy accounts for about 14,5% of South Africa's gross domestic product through sectors such as finance, real estate, industrial production, information and communication technology, retail, tourism, agriculture, and fisheries.

Most people associate the Western Cape with its 300-year-old wine industry since the Province produces some of the world's best grapes, and much of our tourism is built around wines and wine farming. But the Cape also produces export-grade fruit (apples, table grapes, olives, peaches, oranges) vegetables, and grain (the Swartland and Overberg districts are considered South Africa's prime producers of wheat). The agricultural sector accounts for 60% of the Province's exports, while the local fisheries produce 75% of South Africa's total catch.



Houses of Parliament (Cape Town)



Robben Island

Tourism in the Western Cape

The Western Cape's natural beauty – majestic mountains, picturesque valleys, colourful patchworks of farmland, long, sandy beaches, rocky, craggy shores, and, further inland, the wide open landscapes of the country's heartland (the semi-desert Karoo region) – makes the Province one of the world's greatest tourism destinations.

Our greatest tourism attractions include:

- Table Mountain – one of the world's best-known natural landmarks, and recently voted one of its Seven Natural Wonders. The Mountain reaches 1,085 metres high, and its plateau is about 3 km wide. The Table Mountain National Park includes large areas of the Cape Peninsula, and features the Table Mountain Aerial Cableway, the Boulders Beach Penguin Colony, and Cape Point at the Southern tip of the Cape Peninsula.
- The V&A Waterfront – a working harbour with shopping and entertainment precincts in Cape Town's CBD.
- The Cape Town International Convention Centre
- The Cape Winelands – the Cape produces a variety of table, sparkling, and desert wines, and many of the wineries are open for tastings and meals.
- Robben Island – in Table Bay, about 14 km north of Cape Town's CBD – is both a South African National Heritage Site and a UNESCO World Heritage Site. In its history, the Island has served as a leper colony, a penal colony, and, most recently, as a jail for political prisoners. This is where President Nelson Mandela was imprisoned for 18 of his 27 years behind bars.
- The Cape Floristic Region World Heritage Site, which includes eight separate protected areas, covering more than 553,000 ha.
- Kirstenbosch National Botanical Gardens – on the slopes of Table Mountain – is acclaimed as 'the most beautiful garden in Africa,' and, with more than 7,000 species of plants in cultivation, it's one of the world's finest botanical gardens. It's managed by the South African National Botanical Institute.
- The Garden Route Coast and the 160,000 hectare Garden Route National Park, with its evergreen Knysna Forests, its endless sandy beaches, and its rocky Tsitsikamma Shore (the Tsitsikamma section of the Garden Route National Park includes Africa's oldest Marine Protected Area). The Knysna Estuary has the highest biodiversity of any estuary in South Africa. Our home town – Mossel Bay – is situated in the western portion of the Garden Route.
- The Klein Karoo (or Little Karoo) – the remains of an ancient shallow sea, now an open basin between the Outeniqua Mountains (which separate the area from the Garden Route) and the Swartberg Mountains (which separate it from the Great Karoo). This semi-arid area boasts two of South Africa's iconic tourist attractions: the Cango Caves (Africa's biggest heritage caves) and the ostrich farms surrounding the regional capital of Oudtshoorn. The area is also known for its wine, and particularly its desert wines.



Kirstenbosch National Botanical Gardens



Knysna lagoon – the Heads



Mossel Bay

Mossel Bay

Mossel Bay is situated exactly half way between Cape Town, the capital of the Western Cape Province, and Port Elizabeth, the capital of the Eastern Cape Province in a part of the country that enjoys exceptionally fine weather: with more than 320 days of sunshine in every 365 – and mild winter temperatures (around 19o C during the day) – every day's a beach day in Mossel Bay. (In fact, as we'll show in our case study, the weather in our area was one of the vital factors that made the region habitable for early modern humans, allowing our ancestors to survive the deep ice age that affected the world around 160,000 years ago).

The town's economy depends on agriculture, tourism, light manufacture, and the energy industry (the PetroSA Gas-to-fuel refinery, about 12 km west of the CBD, which processes gas from offshore fields, has won numerous awards for being the cleanest refinery in the world).

The town is home to about 130,000 people.

History of Mossel Bay

"162,000 years of holidays in Mossel Bay!" – one of the marketing messages used by Mossel Bay Tourism.

Although people have been living in the Mossel Bay area for more than 162,000 years, its recorded history goes back only to the 3rd of February, 1488: the day on which Bartolomeu Dias arrived at the present-day Santos Beach in Mossel Bay to become the first Portuguese explorer to land on South African soil.

Dias had been appointed by Portugal's King João II to lead an expedition to find both a maritime route to India, and the land of the Christian leader, Prester John.

Although he failed in his tasks (he never did get to India, and it turned out that Prester John was simply a legend), his trip did open the way for Vasco da Gama's 1497 Indian voyage – during which Da Gama came ashore at Mossel Bay and became the first European to barter with the local Khoisan people he met here.

Pedro Álvares Cabral also then sailed for India in 1500, where he traded with the ruler at Calicut (now Kozhikode) – but things heated up quite quickly there, and he and his men fled. On the return journey, Pêro de Ataíde's ship was separated from the fleet, and he made for Mossel Bay, where he hoped to reunite with his colleagues. They weren't here, though, so de Ataíde wrote a letter to João da Nova (whom he knew would be leading the next expedition to India) explaining the situation in Calicut.

He left the letter in an old boot – or possibly in an iron pot – in a milkwood tree by a spring (now the Post Office Tree), and sailed on.

Incredibly, Da Nova found the letter – and used the information when he fought Portugal's first significant naval battle in the Indian Ocean: the defeat of the Calicut fleet off Cannanore on December 31, 1501.



Dias replica ship, Dias Museum, Mossel Bay



Sky diving over Mossel Bay

Tourism in Mossel Bay

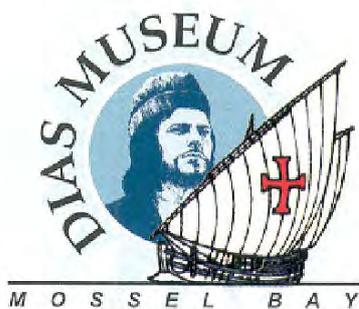
"Mossel Bay. Do stuff." – Mossel Bay Tourism's official marketing slogan.

Mossel Bay's tourism offering is unique for two reasons: the town has an unusually large number of attractions and things to do (more than almost any, similarly-sized towns on the coast of South Africa), and it provides sea-front accommodation for every budget – from campsite to 5-star luxury (most seafront accommodation in South Africa falls into the middle- and upper price ranges).

The Municipal area (a little over 2,000 km²) includes more than 60 kilometers of sandy beaches – of which four carry seasonal Blue Flag status (Santos Beach, Hartenbos Beach, Dias Beach, Klein Brak River Beach).

Major attractions include:

- Whale and dolphin watching – ongoing scientific observations by the Mammal Research Institute of the Department of Zoology and Entomology at the University of Pretoria have confirmed what locals have known for thousands of years: Mossel Bay is one of the preferred locations for migratory southern right whales and humpback whales, which come here from their feeding grounds in the southern oceans to mate and calve every year from about May to October. The Bay is also a permanent home to species like the common dolphin, humpback dolphin, and the Bryde's whale – so it makes for great boat-based, and land-based whale watching
- Water sports – beaches, sailing, shark cage diving, surfing, snorkelling, scuba diving, fishing, power boating, and many others.
- Aero sports – skydiving, tandem skydiving, and flight training (fact Mossel Bay has the largest private helicopter training school in Africa)
- Museums
- The Bartolomeu Dias Museum Complex (built around the Post Office Tree) includes a maritime museum that houses a life-size replica of a caravel – a kind of two-masted sailing ship on which Dias sailed.
- The Great Brak River Museum – which houses a collection of local history, as well as an exhibition that explores the place of the local Khoisan people in the story of modern human evolution
- The ATKV-Museum of the Great Trek (ATKV: the Afrikaans language and culture association), which =traces the history of early Afrikaners who migrated out of the Cape Colony in the early 1800s
- Human Origins Tourism – the Point of Human Origins Experience, which we explore more fully in our case study below.



The place where cultures meet!

Case Study: Sustainable Technology at the Pinnacle Point Caves and Pinnacle Point Beach & Golf Resort



Pinnacle Point Caves



Professor Curtis Marean of the Institute of Human Origins at Arizona State University and South African archaeologist, Dr Peter Nilssen, who, together with consulting archaeologist Jonathon Kaplan, found the first evidence in Cave 13B

Introduction

The Pinnacle Point Caves are situated in the cliffs of the rugged coastline of Mossel Bay. It was here that scientists and archaeologists made significant archaeological discoveries regarding the origins of all people alive on earth today.

According to research which Prof. Curtis Marean and his team started publishing in 2007, this is probably where the small, core population that give rise to all humans alive today, first began to embed bladelets into other media to create complex tools, and where they first used fire to improve the quality of their stone tools. These Caves have also revealed the earliest evidence for the use of ochre (a kind of clay which was our earliest form of paint). This evidence puts the Mossel Bay area as the birthplace of both modern technology and culture.

The Pinnacle Point Caves were cut and carved naturally in ancient times. People have occupied and visited them sporadically for nearly two hundred thousand years. In ancient days they were used for shelter, security and a place to socialise, eat and sleep. Because the shoreline has offered a meal throughout the ages, Middle Stone Age hunter gatherers exploited this area and used the nearby Caves as a home.

The archaeological evidence in the Caves was discovered by Jonathan Kaplan – a consulting archaeologist and the director of the Agency for Cultural Resource Management – and PhD. student (now Dr.) Peter Nilssen during a routine survey for an environmental impact study of the land that would become the Pinnacle Point Beach & Golf Resort. Dr. Nilssen introduced the Caves to the scientific community, and was involved in the first test excavations, as well as subsequent studies.

The work in the Caves is now lead by The South African Coastal Palaeoclimate, Palaeoenvironment, Palaeoecology, and Palaeoanthropology (SACP4) Project under Curtis Marean, an associate director of the Institute of Human Origins and professor at the School of Human Evolution and Social Change at Arizona State University. Its first significant paper – ‘Early human use of marine resources and pigment in South Africa during the Middle Pleistocene’ – appeared in the peer-reviewed publication ‘Nature’ in 2007.

Problem Statement

We learned of two problems at the Pinnacle Point Caves:

1. The early development of the Pinnacle Point Beach & Golf Resort interfered with the integrity of the archaeological material in the Pinnacle Point Caves. Several tees, fairways and greens were constructed right above these Caves, and since the golf course needed a lot of watering and fertilizing, the Caves beneath became a high risk zone. The fertilized water seeped into the Caves and started to damage the rock formations and the artefacts.
2. The significant archaeological discoveries regarding the origins of all people alive on earth brought great interest in the Caves, which means more tourists want to visit the Caves.

Due to unsustainable human exploitation practices during recent times and the fact that the archaeological materials are very sensitive, the Caves are definitely not a site for mass tourism.

These differences in the way that the Pinnacle Point area is utilised created conflict that could have led to the destruction of a vital heritage site, and Mossel Bay can't afford to neglect the responsibility and privilege of honouring our ancestral legacy.

Our research revealed who these problems have been – and continue to be – resolved.



Pinnacle Point Caves

Research on Technology and Sustainability

Technology is the development and use of equipment and systems that are based on scientific knowledge, and which exist to solve various problems.

The use of complex (advanced) technology started with the early humans occupying the caves, who used their cognitive abilities to create composite tools (bladelets embedded into other media like wood or bone), which they used for different purposes.

Technology is deeply entrenched in our society today. It significantly affects human as well as other animal species' ability to adapt to their natural environments.

Technology has had great impacts on tourism as well as other sectors affiliated to tourism. Over the years, the use of technology in tourism has been enhanced uniquely to provide very exclusive services all across the globe.

The best thing about technology is that it has been very dynamic and vibrant.

Technology has transformed many aspects of tourism.



Heated stone tools from the Pinnacle Point Caves

Sustainable can mean "to maintain", "to support", or "to endure".

Sustainable development maintains the delicate balance between the human need to improve our lifestyles and the need to preserve natural resources and ecosystems on which we and future generations depend. Sustainable practices attempt to make a low impact on the environment and local culture, while helping to generate income, employment, and the conservation of local ecosystems.

Sustainable technology works to advance the development and application of technologies to address a variety of areas, including systems analysis, environmental management, clean processes, green chemistry, and green engineering.

Sustainable technology relies on resources that are either renewable or so abundant that we can treat them as such. For technology to be sustainable also means that using it does not have any long-term adverse impact on the environment.

Sustainable technology does not irrevocably destroy any resource that is not renewable.

Sustainable destinations have achieved balance. They have balanced the long-term economic needs of the local community with the short- and medium-term needs of businesses. Sustainable tourism destinations reinvest profits from their tourism activities in environmental conservation, historic restoration and preservation of local cultures.

A key to effective and sustainable destination management is to work together. Partnerships should include local government, representatives of tourism businesses and civil society bodies, representatives of the local community, as well as cultural and environmental bodies.



Excavation team at Pinnacle Point cave site



Curtis Marean at Cave 13B LC-MSA section – early shellfish and pigment – photo by Donald Johanson

Technology can be used to improve sustainability

By making sure that methods such as those described below are put into practice, technology can be a great advantage in keeping a tourism business sustainable.

Integrated environmental, social and economic planning analysis should be undertaken prior to the commencement of any major projects, with careful consideration given to different types of tourism development and the ways in which they might link with existing uses, ways of life and environmental considerations.

Throughout all stages of tourism development and operation, a careful assessment, monitoring and mediation program should be conducted in order to allow local people and others to take advantage of opportunities or to respond to changes.

Agencies and individuals should follow ethical principles with respect to the culture and environment of the host area.

Good information, research and communication on the nature of tourism and its impact on the human, cultural and natural environment should be available prior to and during development. This is especially applicable to individuals and local communities, so that they can participate in and influence the direction of development and its affects as much as possible.

Local people should be encouraged, and are expected to undertake leadership roles in planning and development with the assistance of government, business, financial and other interests.

Tourism should be undertaken with equity in mind, to fairly distribute benefits and costs among tourism promoters and host peoples and areas.

Partnerships should be formed.

Using this knowledge of technology and sustainability, we look into the identified problems with the development of Pinnacle Point Beach and Golf Resort and the Pinnacle Point Caves:

Background

Pinnacle Point Beach & Golf Resort is situated on a 4-km-long cliff-side overlooking the Indian Ocean just outside Mossel Bay (which itself is situated 400 km from both Port Elizabeth and Cape Town, and 40 km from the nearest domestic airport at George Airport – the regional capital). The golf course and estate enjoy magnificent sea views and are characterised by prolific indigenous terrestrial and marine wildlife, birdlife and fynbos (Cape macchia).

When the golf course opened in 2006, the American publication *Golf Travel & Leisure* named it as one of the top ten new courses in the world. It has since also been rated among the top twenty courses in South Africa. 2011 Open Champion Darren Clarke described it as “The best golf course on the planet.”

Pinnacle Point offers a continually expanding range of facilities and activities – including an 18-hole championship course, a driving range with high performance centre, and club house with pro shop, and a 6-hole SNAG course and SNAG lessons (SNAG – Starting New at Golf – is designed to introduce both young children and adults to the sport).

According to course marketing material the course itself

“Inspires the golfer to play this challenging layout with a level of respect due to its dramatic views and breathtaking terrain. The 72 par layout is characterised by 7 majestic holes that line the Indian Ocean rock cliffs, four of which are played over ocean and cliff. All 18 holes were designed to fit the contours of the land.”

“Pinnacle Point has received the ultimate accolade and is recognized for its outstanding service standards, having been awarded the Complete Golfer 5-star Experience Award.

“Assessment for this award is based on various categories, including clubhouse facilities, golf course, halfway house, practice facilities, customer service quality, price/value relationship, services offered and ambiance. Recognizing performance excellence in the golfing world and seen as the ‘Oscars’ of the golfing industry, the Complete Golfer 5-Star Experience Awards, celebrates the top 25 South African clubs that represent the country’s finest golfing experiences. The Pinnacle Point golf course, which is open to the public, has gone from strength to strength and is now rated as one of the top courses in the world.

“The view from the 60 m-high cliffs to the sheer rock faces and down onto the great jagged sandstone teeth that poke out of the ocean is simply mind-blowing.”

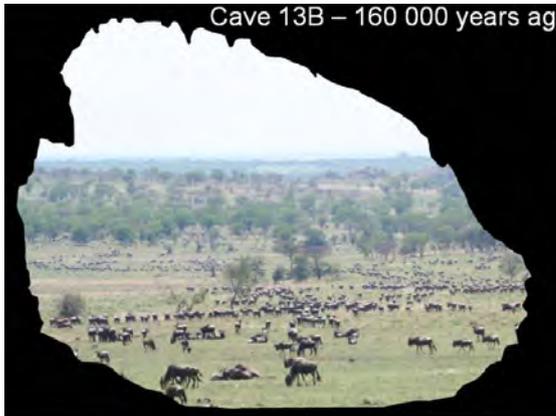
In the cliffs below the course, you’ll find ...



Pinnacle Point Beach & Golf Resort



Cave 13B - today



Cave 13B – 160 000 years ago



Pinnacle Point Caves (top to bottom):
 the view from Cave 13B as it is today
 artist's impression of the view 138 – 160 000 years ago
 Palaeolithic tools found at the site
 archaeologists at work in the cave

The Pinnacle Point Caves

Under the provisions of South Africa's National Environmental Management Act (Act 107 of 1998), the developers who bought the piece of land now called Pinnacle Point Beach & Golf Resort were required to undertake an environmental impact assessment (EIA) before any work could begin.

Jonathan Kaplan, a consulting archaeologist and the director of the Agency for Cultural Resource Management, and a local archaeologist, Peter Nilssen, undertook an archaeological survey of the land – which included the caves – as part of the environmental impact assessment.

As soon as he saw the material in the Caves and the sediments adhering to the walls of the Caves, Dr. Nilssen knew that this was a significant Middle Stone Age site. He contacted his friend and PhD advisor, Professor Curtis Marean, and in 2000 they co-founded and co-directed the Mossel Bay Archaeology Project (MAP). In 2005, Prof. Marean established the SACP4 Project (South African Coastal Palaeoclimate, Palaeoenvironment, Palaeoecology and Palaeoanthropology Project). This project now includes scientists from around the world studying cultural evolution, ancient climates, and ancient environments.

Evidence in the Pinnacle Point Caves shows that ancient people lived here between 170,000 and 40,000 years ago, and that their food included marine resources sourced from the rocky intertidal zone.

The floors of the Pinnacle Point Caves provide more than 40 scientists with plenty to think about in terms of ancient human lifestyles!

The dripstone formations suspended from the roofs of the Caves provide information about what the water, flora and the weather were like in ancient times. The relationships between the archaeological sediments and the dripstone formations provides scientists with an opportunity to understand how humans have adapted to climate change, and offers opportunities for making predictions about how we might be expected to adapt in the future. This is an important part of what makes the Pinnacle Point Caves such a special place.

The findings at Pinnacle Point Caves have dramatically changed our view of our origins by pushing the timeline for the development of complex thought back by 100,000 years. The previously-accepted theory for the development of modern behaviour was that it began around 40,000 years ago in Eurasia, with the earliest evidence for heat-treatment of materials coming from France from about 20,000 years ago.

According to Prof. Marean, modern behaviour is defined by several scientific criteria, including:

- Symbolic behaviour – such as the use of ochre for decoration;
- Cognitive skills – which allow people to make tools, and improve the quality of raw materials with the use of heat; and which allow the tracking of the tides for gathering food from the ocean

The focus of excavations has been Pinnacle Point Cave 13B (PP13B), and Caves 5 and 6 (PP5–6), which have revealed the earliest evidence for the manufacture of finely made stone tools (bladelets), and the earliest evidence for the use of heat to treat the rock used in making these tools. The only human remains on the site were recovered from deposits at PP13B. Caves 5 and 6 contain at least 14 vertical meters of sediment. Dr. Nilssen said that Cave 13B contains the oldest shell midden yet found anywhere in the world.

Results of research from the Caves have featured in the prestigious, peer-review journals Science and Nature, and the SACP4 Project is now one of the best-funded research projects of its kind in the world.

Excavations take place for about twelve weeks a year, after which evidence is taken to labs for further study. Professor Curtis Marean and his teams reside in Mossel Bay when excavations are underway.



Pinnacle Point Caves



Pinnacle Point is a Provincial Heritage site

Heritage Site

Heritage Western Cape – the provincial heritage resources authority – declared Pinnacle Point a Provincial Heritage site in terms of Section 27 of the National Heritage Resources Act 12 December 2012. This provides the site with the highest form of protection under South African law.

This is a first step towards having the site declared a National Heritage Site and, eventually, a UNESCO World Heritage Site.

The local municipality is driving an initiative to develop an interactive interpretive museum for the origins of modern human behaviour, which will be situated at The Point, Mossel Bay (near the Cape St. Blaize Lighthouse).

Development brings problems!

The Environmental Impact Assessment gave exact orders as to how the Golf Course and the development should be built. The developers were required to seal all the irrigated areas so that water carrying fertilisers would not penetrate the natural sediments or the Caves.

The golf course and residential estate opened in November 2006.

By 2007 water seeping into the Caves – already then recognised as one of the world’s most important early human habitation sites. This caused irreversible damage to material dating back to the Middle Stone Age.

It was evident that the water problems were the result of a failure by the developers to adhere to the agreed construction and monitoring conditions. The golf course had not been built according to the agreement, and large amounts of water was sinking into the ground and into the Caves, and not being returned to the waste water treatment works as agreed. Water was also running over the cliffs. The seepage happened because the agreed drainage system had not been installed on the golf course.

Prof. Marean said in 2007: “In my opinion there is ongoing damage (from the golf course irrigation) to the archaeological sites, and likely to be severe damage the longer water is allowed to flow into the caves and shelters... In my opinion, the only sure solution to the ongoing damage is to stop all irrigation.”

Two very important projects had thus come into conflict, and for both it was a matter of survival.



United Nations
Educational, Scientific and
Cultural Organization



World
Heritage
Convention



Point of Human Origin tours at the Pinnacle Point Caves

Solutions must be found

In May 2008, the Wildlife & Environment Society of South Africa (WESSA) unsuccessfully attempted to get an urgent High Court interdict to force the resorts company, Pinnacle Point Resorts, to stop irrigating on the golf course and so prevent further damage.

Dr. Steve du Toit, WESSA's representative in George, said that, in terms of the original agreement between WESSA and Pinnacle Point, a sub-surface drainage system should have been installed, and that this would ensure that all irrigation water was returned to a water purification plant.

He said that golf course must be constructed in a way that would prevent damage to the cliffs and the Caves.

Although Judge Anton Veldhuizen dismissed WESSA's application, the Western Cape Department of Environmental Affairs stepped in – as reported on the LegalBrief web site:

Hope for historic caves despite court ruling

www.legalbrief.co.za/article.php?story=20080603092446534

Published in: Legalbrief Environmental

Date: Tuesday 03 June 2008

Category: Environmental Health

Issue No: 0063

The Pinnacle Point golf course in Mossel Bay is being partially redesigned to stop water from the irrigation of its greens from damaging an important archaeological site situated in caves beneath it.

The provincial government ordered the Pinnacle Point resort again this year to make changes that will stop excessive seepage into the caves. A report in The Sunday Independent says the first order was issued in June last year. The Western Cape Department of Environmental Affairs, Development and Planning has also reserved the right to take further action against Pinnacle Point should it fail to stop the seepage. The resort has to report to the department every quarter. Remedial measures taken by the resort stopped seepage between November last year and February, but reseeding and increased irrigation in March again caused excessive water flows into the caves. The Wildlife and Environment Society of SA therefore turned to the Cape High Court to force the resort to stop irrigation on 12 of the 18 holes and the practice greens. But the court dismissed the application, with costs, on the grounds that the 700 individual owners of stands in the resort had not been joined as defendants.

After the Estate's environmental liaison committee met on July 6, at which the archaeologists and a water expert provided clear and compelling evidence that effluent used in watering the course was infiltrating some of the Caves, the owners of the golf course were ordered to stop irrigating the course by the Western Cape Department of Environmental Affairs and Development Planning.

Between 2010 and 2012 the Pinnacle Point Resorts Company and Developers began to experience serious financial trouble, and the company was liquidated.

The course was taken over by the Pinnacle Point Homeowners' Association, which began negotiating with the scientists and members of the heritage community

Together with the civil engineers and golf-course designers, they agreed that remedies would have to be implemented if sub-standard drainage systems were found to be the cause of the problem. The design of the drainage system of three of the greens was also reviewed.



Technology and sustainable development

To avoid negative impact on heritage resources, a unique partnership was formed between the scientists, the Pinnacle Point Golf Club, and the Pinnacle Point Home Owners Association.

After a further impact study, they realised that only sustainable technology would help the situation.

The Pinnacle Point Home Owners Association then took the necessary steps to correct the sub-soil drainage where necessary.

The Pinnacle Point Home Owners Association also commissioned the development of an Archaeological Conservation Management Plan that was approved by Heritage Western Cape.

The plan sets out eleven conservation and management goals to be implemented by the role players:

The Pinnacle Point Conservation Trust was established. Its board includes two trustees from Pinnacle Point Home Owners Association (PPHOA); one trustee appointed by Home Owners Association as the Estate Environmental Officer; one trustee appointed by the Municipality of Mossel Bay; and one trustee acting as the Environmental Officer for the Estate

As the managing body for the Estate, the Pinnacle Point Home Owners Association is required to

- Ensure that adequate funding is available to manage the responsibilities of the approved management plan; Ensure that unrestricted access is granted to the archaeological and paleontological sites and geological features for scientists approved by Heritage Western Cape, the South African Heritage Resources Agency, and the South African Council for Geosciences;
- Ensure that there is controlled access to the sites by the public for the purpose of public education – conservation through education.
- Ensure that proper information signage is installed at all the major sites and to update these signs as new information arises
- Ensure that all walkways and stairs leading to the sites are maintained.
- Ensure that proper security measures are in place to avoid any unnecessary access to the archaeological sites by unapproved visitors.
- Ensure that all Home Owners abide by the conditions of the archaeological management plan
- Ensure that a qualified Archaeologist is present whenever any excavation work is done on the Estate – either for private dwellings or any other works.
- Create awareness amongst the Home Owners and visitors about the significance and sensitivity of the archaeological sites
- Ensure that all the conditions of the archaeological management plan are met.
- Ensure that no erosion takes place that might damage any artefacts or sensitive archaeological areas
- Stabilise and conservation of sites
- Stabilise PP7 “before the entire midden collapses and is eroded away.”
- Find a permanent solution to the problem of water run-off into PP5-6 North.

In terms of the archaeological management plan, sites must be regularly inspected by the Mossel Bay Archaeology Project or another suitable archaeological consultant: “The archaeological sites will receive a regular evaluation to check for site security, erosion, and damage. This will be done by an independent monitor approved by HWC” (Heritage Western Cape).

The Department of Environmental Affairs & Developmental Planning (DEA&DP) and Heritage Western Cape are required to make sure that the PPHOA complies with the responsibilities and requirements of the management plan.

In the end, the problem was resolved to the satisfaction of all parties.

Pinnacle Point Caves (top to bottom):



Sustainability for the Caves as a destination

"Mossel Bay is gearing itself up to preserving its archaeological record for future generations." – Mossel Bay Tourism.

The Pinnacle Point Caves have become a very important place for all people of the world. Everyone is fascinated by the story of human evolution and the archaeology of ancient times, and this is driving a whole new niche in tourism. The Caves have now been opened to the public for the first time, with tours for small groups.

To satisfy the need for controlled access to the Caves, the Point of Human Origins Experience was created. Access to the Caves is provided in collaboration with the Pinnacle Point Home Owners Association, the SACP4 Project, Mossel Bay Archaeology Project, and Heritage Western Cape, and The Point Of Human Origins Experience is the only operator allowed to manage guided tours the archeological sites.

These tours operate on a demand-driven schedule and can accommodate a maximum of twelve people. 20% of each ticket sold goes to a Trust for conserving and maintaining the site.

Due to unsustainable human exploitation practices during recent times and the fact that archaeological material inside is very sensitive the Caves are definitely not a site for mass tourism.

We realised that Mossel Bay Tourism, the Mossel Bay Municipality, Heritage Western Cape, eventually UNESCO, as well as the scientists, the Home Owners Association and representatives of the local cultures will have to come together and discuss how they can perhaps use modern technology to make this site available to more and more tourists and keep it sustainable.

Innovation and the implementation of appropriate technology within a tourism business can assist business managers in effectively responding to the changing environment and continuing to develop and grow.

With this in mind we think that there is an answer to the problem of sustainability for the Caves as a destination: the construction of a world-class Discovery Centre in the heart of the town of Mossel Bay (the proposed site next to the St Blaize Cave at The Point.)

This development is envisaged as a multi-functional, multicultural centre that will reflect Mossel Bay's heritage and development from as early as 200,000 years ago.

The Centre could include a reconstruction of Cave 13B at Pinnacle Point. Artefacts can be replicated through the use of modern technology, which will allow visitors to touch specific items and big screen can be used to show videos illustrating the way of life of each specific time (Mossel Bay in the Middle Stone Age, etc.).

This way visitors will experience the culture of ancient times through the use of modern technology.

The Centre will also create jobs for members of the local community, and become a place for local entrepreneurs to sell their crafts. With a large auditorium and various activities and interactive areas, it will be a place for social cohesion.

The Point of Human Origin Experience – the tours of the Pinnacle Point Caves – can accommodate only small numbers of visitors. The interpretive centre, though, will provide large numbers of people with access to the available information, and make it possible to understand different ways of life over the last 160,000 years.



Discovery Centre – conceptual plans by Fanus Buys and Bret Petzer



Dr. Peter Nilssen conducting a Point of Human Origin Tour at the Pinnacle Point Caves

Interviews

We visited the Caves to do our own investigation and to interview the archaeologist Dr. Peter Nilssen. We enjoyed the Point of Human Origins Experience and walked across Mossel Bay's spectacularly located Pinnacle Point Golf Course to the cliff edge. We descended the 175 steps to sea level and followed a boardwalk up to the Cave entrance. We sat in the dusty cave looking at the sandbags protecting the fragile excavation sites, and the exposed layers of sediments that have revealed so much about our ancestors and our evolution.

It was almost too much to take in.

Before we went down to the Caves, though, Dr. Peter Nilssen made a presentation about the Caves and what has been learned from them. He ended his talk by saying, "The real question is 'where to now?' We as a species are in severe trouble. We're placing our environment under extreme stress and there's plenty to confirm this.

"Our cognitive skills have developed well, but we've lost our intuitive abilities. When it comes to technological advancement, humans have been impressive. But have we lost our connection with nature, our reverence for life?

"There are signs of an awakening even in tourism; a movement back to consciousness. And that reconnection is a real thrill."

As he spoke we began to understand: the archaeology of the Pinnacle Point Caves is a reminder of who we are and where we've come from.

These tours are effectively an outreach program – a way of getting the message from the archaeology out there, and this will hopefully be enhanced by the opening of the Discovery / Interpretive Centre.



Dr. Peter Nilssen conducting a Point of Human Origin Tour at the Pinnacle Point Caves

Conclusion

Sustainable development relies on technological change to achieve its aims – but will the role players take the tough steps that are required to force radical technological innovation? Such measures would require a long-term view and a preparedness to bear short-term economic cost while industry readjusts.

We really hope that a Discovery / Interpretive Centre will become a reality. With good planning and through the use of modern technology we might be able to conserve the technology that Middle Stone Age people used more than 160,000 years ago and make it available to our children's children.

If we embrace the ever changing world of technology and make it one of the partners in a tourism business, we will certainly be able to take the responsibility of honouring our ancestral legacy – and take it from the present and beyond!



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Teacher's Guide

3.1 Introduction

This teacher's guide is based on a case study on **Technology and Sustainability in Tourism conducted in the Western Cape Province of South Africa**. It contains educational resources that will assist learners to:

- Understand the international significance of tourism and the need for tourism to be sustainable, well-developed and well-managed.
- Investigate the role of technology to ensure sustainability in the tourism industry

3.2 The case study will develop the following skills:

- Research skills through the sourcing of information on the internet, libraries, newspapers, brochures, magazines and publicity organizations.
- Improve verbal and non-verbal communication.
- Develop a sense of responsibility towards the community and the maintenance of a sustainable environment.
- The ability to network with and develop relationships with business people.
- Develop and present a proposal.
- Organization.
- Critical thinking.
- Evaluation and problem solving.

3.3 How to use this guide

The activities have been designed in line with the South African schools' curriculum and material has been designed for Grade 11 (17 year olds) learners in the Tourism Learning Program. Activities are designed to be flexible - please adapt them, using your own ideas and knowledge. The teachers' guide contains the following materials:

Lesson plans:

- Stating the specific outcomes, assessment criteria and aims/objectives.
- Teacher activities, learner activities, different types of assessment sheets that can be used, rubrics and equipment needed.

Attachments:

Learning activities - Activities/worksheets are to assist educators in using this case study to encourage learners to learn more about technology and sustainability in Tourism. The activities are learner centred and have been compiled in such a manner as to encourage responsible learning through self discovery.

Assessment sheets with rubrics - Help to assist educators in assessing learners to determine whether the aims/objectives have been met and the outcomes reached.

We hope you will find these educational resources useful.

LESSON PLANS

SUBJECT: TRAVEL & TOURISM GRADE 11

SPECIFIC OUTCOME: To interpret and apply the concept of technology and sustainability in tourism at national level in the tourism context covering technology and sustainable tourism development.

ASSESSMENT CRITERIA:

We know the learner has achieved the specific outcome and objectives when he/she is able to:

1. Define related concepts.
2. Identify opportunities within the community where technology can be used to sustain a tourism destination .
3. Establish and determine the importance of sustainability in tourism products in terms of the physical and cultural (community) environment.

AIMS/OBJECTIVES:

To define the concept of technology and sustainability in tourism or travel.

To identify aspects associated with sustainable tourism products.

To identify core characteristics of using technology in sustainable tourism products.

To demonstrate how the concept of sustainability in tourism could be applied within a community.

To investigate the possibility of technology and sustainability in tourism in the learner's own town/province.

To investigate and make recommendations for transforming existing infrastructure into a viable, sustainable tourism product using technology.

To determine the advantages and disadvantages that it could have on the community.

To identify stakeholders that must be involved and determine what their roles and responsibilities are.

TEACHER ACTIVITIES:

First assignment (Group discussion)

1. Divide the class into groups and provide each group with worksheet 1 (attachment 1) and a dictionary
2. Facilitate the report back by groups on the black/white board.
3. Hand out attachment 2 and facilitate group assessment (attachment 2).

Second assignment (Formative assessment)

Hand out Worksheet 2 to each learner. They must read the extract from the research on Technology and Sustainability and answer the questions in their workbooks.

Third assignment (Investigation)

Give the learners the assignment to identify and investigate a destination in their area where technology is used to make the destination sustainable.

At the end of the unit, hand out a self-assessment sheet (attachment 5)

WORKSHEET 1 - Group activity

Activity 1.

1 Use a dictionary to define the following words:

Technology:

Sustainable:

Development:

Destination:

2 Discuss the following concepts in your group:

Sustainable development:

Sustainable technology:

Sustainable destination:

3 Use the Internet to search the concept “Environmental Impact Assessment (EIA)”

ATTACHMENT 2**Group assessment**

Group:		
Group leader:		
Group members		
1.	3.	5.
2.	4.	6.
Learner reporting back:		

Theme: _____

Criteria	:)	: 	:(
1. All the group members understood the task and knew what they had to do.			
2. Each group member had a chance to participate.			
3. Each group member wanted to participate.			
4. Group members gave one another a chance to explain their opinions.			
5. Group members respected one another's opinion.			
6. The group could work quietly.			
7. Group members concentrated on the task.			
8. Group could give solutions/answers to the problems.			
9. Our group leader could summarise our answers efficiently.			
10. Group members encouraged and praised one another during the task.			

ATTACHMENT 3

Worksheet 2

Read the following case study and answer the questions below.

Case study: Pinnacle Point Caves



162,000 years of holidays in Mossel Bay

Why did our ancestors live in the area of what we now know as Mossel Bay, on the south coast of South Africa's Western Cape Province? And how? And what did they learn here?

These are among the central questions which a team of more than forty scientists from around the world – the members of the SACP4 Project - are working to answer.

The South African Coastal Palaeoclimate, Palaeoenvironment, Palaeoecology, and Palaeoanthropology (SACP4) Project is led by Curtis Marean, an associate director of the Institute of Human Origins and professor at the School of Human Evolution and Social Change at Arizona State University. It produced its first significant paper in 2007: 'Early human use of marine resources and pigment in South Africa during the Middle Pleistocene' appeared in the peer-reviewed publication 'Nature.'

It was the result of more than eight years of study.

Prof. Marean and his co-authors wrote that "Genetic and anatomical evidence suggests that Homo sapiens arose in Africa between 200 [thousand] and 100 thousand years ago."

In Mossel Bay, said the scientists, they'd found the earliest evidence for systematic harvesting of seafood; the earliest evidence for a complex technology in which tiny, beautiful, and precisely-made stone blades (bladelets) were embedded into other materials (probably wood or bone) to create advanced tools that greatly improved our ability to hunt. Later discoveries showed that this is also where humankind first learned to treat silcrete with heat in a controlled way – and so transform a rather poor quality raw stone into a top quality material from which to make our tools; and that this is where we first worked with the pigment ochre (the earliest form of paint) – which indicates that this is where symbolic behaviour – culture - began.

The archaeological evidence had been discovered by Jonathan Kaplan – a consulting

archaeologist and the director of the Agency for Cultural Resource Management - and PhD. student (now Dr.) Peter Nilssen during a routine survey for an environmental impact study of the land that would become the Pinnacle Point Beach & Golf Resort. Such studies are required by law in South Africa before any development can take place.

Dr. Nilssen called in Professor Marean, and their preliminary findings were sufficiently promising to warrant a series of test excavations. Finance was raised from various international organisations (including South Africa's National Research Foundation), and that first dig was so successful that it led to another, and another, and another – and the work continues today. The bulk of the US\$ 10 million that's gone into the Project so far has come from America's National Science Foundation, and the Hyde Family Trust - and South Africa's Iziko Museums, Mossel Bay's Dias Museum Complex, and the people of Mossel Bay have lent - and continue to lend - considerable support, too.

But the caves at Pinnacle Point – where the scientists have concentrated their work – are important for another reason, too: studies into Carbon and Oxygen isotopes embedded in dripstone formations formed during times when the Caves were sealed off to the outside world have revealed detailed information about the water and climate regimes that reigned over the period 400 thousand to 30 thousand years ago. Put together with the evidence of human habitation starting 162,000 years ago, this information could hold clues as to how we survived climate change in the past – and what we might face in the future.

The early development of the Pinnacle Point Beach & Golf Resort interfered with the integrity of the archaeological material in the Pinnacle Point Caves. Several tees, fairways and greens were built right above the Caves, and since the golf course required a lot of watering and fertilizing, the Caves became a high risk zone. Fertilized water began seeping into the Caves and damaging the both rock formations on the ceilings of the Caves, and the middens (artefacts) on the floors.

Also, the significance of the discoveries brought great interest in the Caves - which meant that more tourists wanted to visit them. But due to the sensitivity of the archaeological sites, the Caves cannot be opened to mass tourism.

These differences in the way that the Pinnacle Point area is utilised created conflict that could have led to the destruction of a vital heritage site. However, after the liquidation of the original developers of Pinnacle Point Beach & Golf Estate, the land was taken over by the Pinnacle Point Homeowners Association, and a mutually acceptable management plan was put in place. This included the reconstruction of parts of the golf course so that irrigation water is now led safely away from the Caves.

The need for tourism solutions has been addressed in two different ways:

- (a) Through his 'Point of Human Origins Experience' (which is presented in cooperation with the Pinnacle Point Home Owners Association, the SACP4 Project, the Mossel Bay Archaeology Project, and Heritage Western Cape), Dr. Nilssen now leads small tours of up to twelve people at a time into the Caves on select dates; 20% of each ticket sold goes to a Trust for conserving and maintaining the site.

- (b) The Municipality of Mossel Bay is driving an initiative to create a 'Gateway Museum' that will interpret the important Middle Stone Age sites in the region for visitors. This museum will be able to accommodate larger groups of people, and is envisaged as a multi-functional, multicultural centre. It is expected that it will become a major new tourism attraction for both the town and for South Africa as a human origins tourism destination.

The Provincial heritage resources authority, Heritage Western Cape, declared the Pinnacle Point Caves a Provincial Heritage site in terms of Section 27 of the National Heritage Resources Act on 12 December, 2012. This provides the site with the highest form of protection under South African law, and is a first step towards having the Caves declared a National Heritage Site and, eventually, a UNESCO World Heritage Site.

More information: www.visitmosselbay.co.za/archaeology

Questions

- 1.1 Where, according to the research of Prof. Curtis Marean, was the origin of technology associated with modern humans? (2)

- 1.2 According to the evidence found at Pinnacle Point the first advanced technologies consisted of ... (2)

- 1.3 What led to the development at Pinnacle Point? (2)

- 1.4 What measurements were required before any development at Pinnacle Point could take place? (2)

- 1.5 Identify TWO problems that arose after the development of Pinnacle Point. (2)

TOTAL: 10

2. **Use the passage below to determine FIVE methods needed for the sustainable development of a tourism business. (10)**

Methods needed for the development of a sustainable tourism business

Integrated environmental, social and economic planning analysis should be undertaken prior to the commencement of any major projects, with careful consideration given to different types of tourism development and the ways in which they might link with existing uses, ways of life and environmental considerations. Throughout all stages of tourism development and operation, a careful assessment, monitoring and mediation program should be conducted in order to allow local people and others to take advantage of opportunities or to respond to changes. Agencies and individuals should follow ethical principles with respect to the culture and environment of the host area.

Good information, research and communication on the nature of tourism and its impact on the human, cultural and natural environment should be available prior to and during development. This is especially applicable to individuals and local communities, so that they can participate in and influence the direction of development and its affects as much as possible. Local people should be encouraged, and are expected to undertake leadership roles in planning and development with the assistance of government, business, financial and other interests. Tourism should be undertaken with equity in mind, to fairly distribute benefits and costs among tourism promoters and host peoples and areas

Partnerships should be formed that include all the different role players.

3. **Evaluate the development of the Golf Course to determine the causes of the problems they experienced in 2007. (10)**

The difference in the purposes of utilizing Pinnacle Point has created an inevitable conflict that could lead to the destruction of humanity's heritage and neglecting the responsibility and privilege of honouring our ancestral legacy.

4. **Give a critical opinion on "people's needs for entertainment" versus "sustainability" (10)**

TOTAL: 40

Worksheet 3

Read the extract below to guide you in your assignment.

Sustainable technology works to advance the development and application of technologies to address a variety of areas related to sustainability, including systems analysis, environmental management, clean processes, green chemistry, and green engineering. Sustainable technology relies on resources that are either renewable or so abundant that we can treat them as such. For technology to be sustainable also means that using it does not have any long-term adverse impact on the environment. Sustainable technology does not irrevocably destroy any resource that is not renewable.

Sustainable destinations have achieved balance. They have balanced the long-term economic needs of the local community with the short and medium term needs of businesses. Sustainable tourism destinations reinvest profits from their tourism activities in environmental conservation, historic restoration and preservation of local cultures. A key to effective and sustainable destination management is to work together. Partnerships should include local government, representatives of tourism businesses and civil society bodies, representatives of the local community, as well as cultural and environmental bodies.

1. Find a tourism destination in your surroundings in order to conduct the following assignment:
 - 1.1 Investigate the use of technology in keeping the destination sustainable.
 - 1.2 Write a report on your findings.
 - 1.3 Suggest ways in which technology can support sustainability at the destination.
 - 1.4 Present your findings to your class.

Questions that can be useful in your investigation:

1. Who should be in control of sustainability?
2. What are the problems associated with keeping a destination sustainable?
3. What role, if any, has technology in their sustainability?
4. What are the costs associated with sustainability?

ATTACHMENT 5

Self-assessment

Name: _____

I can:	:)	: 	:(
1. Explain what technology and sustainability means			
2. Determine the aspects associated with sustainable tourism products			
3. Give my opinion on technology and sustainability in tourism when we do group work.			
4. Explain why a tourism destination must be sustainably developed and managed.			
5. Identify problems affecting sustainable destinations in an area.			
6. Investigate a particular issue or problem affecting sustainability in tourism			
7. Identify stakeholders that must be involved and determine what their role and responsibilities are.			
8. Give realistic recommendations to improve / address these problems			