WEEK 4 A WINDOW IN TIME

ACT – Anusuya Chinsamy-Turan
PH – Pippa Haarhoff

ACT Hi everyone. We're standing here at the dig site at the West Coast Fossil Park and with me is Pippa Haarhoff, and Pippa is the manager of the West Coast Fossil Park. We're going to talk about this incredible site that tells us about the history and the diversity of animals that once lived here. Pippa, can you tell us about this site, please?

PH Yes, this is rated as one of the richest fossil sites of its age and kind in the world.

ACT And this is about five to seven million years old?

PH Yes, so we've got between 200 and, actually probably close to 300, different kinds of animals, invertebrates and vertebrates. And we're looking at one very common herbivore, was a very large herbivore, living at a time when the environment was very different from what it is today. Yeah, so the evidence and the evidence for the vegetation comes from the tiniest part of the plant that can become fossilized, which is the pollen.

ACT And what does it tell us? I mean, what kind of environment was this?

PH Well more, much warmer and wetter than it is today. So sub-tropical.

ACT And the kind of plants?

PH Palms and ferns, forest trees. But in amongst those pollens is evidence for the change that was taking place. So there are grasses and fynbos.

It's recorded, one of the earliest records of fynbos in this region.Yeah

ACT So it's incredible to see that the pollen tells us something about vegetation. But what do these fossils tell us? I mean, there seem to be so many different kinds of animals here.

PH Yeah and there is a huge diversity of herbivores many of which we think were browsers, which makes sense because of the wooded and forested environment. And we think this animal, these remains that we see here, there's a lovely big jaw of an adult. There's another jaw of a juvenile, both belonging to what's called *Sivatherium hendeyi*. So, it's an extinct kind of giraffid, giraffe. It had long horns and a short neck, but weighed about 2000 kilograms.

ACT It's quite amazing to think of a giraffe in this kind of environment, I mean, who would have thought that, hey?

PH Well, no, the environment actually supported at least three different types of giraffids. The Sivathere and early okapi-type animal, which obviously also indicates a forest-type habitat and then a giraffe that already had a long neck and short horns, which is probably the, possibly the ancestor, of the modern giraffe. So it's telling you that the habitat was suitable to support, for a time anyway, that diversity. And that's just the giraffids. And there was a huge number of other herbivores and carnivores, amazing diversity of carnivores as well.

ACT So sabretooth cats and things like that as well?

PH Exactly.

ACT Wow, it must have been amazing.

PH Yeah, a total paradise.

ACT So what do you think actually happened to change this? I mean, how did we get from a rich forest environment to what we have today? This fynbos that we see. I mean, low-shrub vegetation, mammals not bigger than a few centimeters probably.

And some duiker and steenbuck. But, I mean, it’s such a different world. What happened?

PH Well, climate change is a big topic and obviously that's what was happening here, five to seven million years ago. Climate change without any human influence, as it were.

ACT Natural changes...but what triggered it? I mean, do we know or have some sense of what may have been the trigger for these changes?

PH Well, yes. The role players include the Benguela Current. The rich, upwelling, Benguela current. It's a cold current that developed around about 14 million years ago. As a result, of course, of Gondwana breaking up and Antarctica becoming isolated. And then you get the development of the modern ocean current systems. And so this cold, upwelling system, together with the wind pressure systems have had a cooling, drying effect on the west coast of southern Africa. So that's been a major trigger. Major role player, and relating to why the climate changed so dramatically.

There's a lot of debate now as to whether it was already a winter rainfall regime or a summer rainfall regime or actually changing from summer to winter rainfall regime. And it seems like it's more like changing at this time, from summer rainfall to winter rainfall.

ACT Goodness, wow. It's incredible actually to see all this preserved, hey, both in the fossil record.

PH And even the teeth of this particular animal, as you well know, based on research done on...Because there's a huge sample, over 500 of these animals have been buried in this area, so there's a huge sample size of teeth, and those have been studied and a lot of them have a condition known as hypoplasia, which is indicative of nutritional stress. So it's indicating that these animals, that preferred to browse, were being forced... Were under stress, because they were being forced to take in more abrasive and less nutritional vegetation, probably in the form of grass.

ACT And some of the teeth also show that very unusual weathering also.

PH Abnormal wear, yes exactly.

ACT So how did these fossils actually... how were they discovered? I mean, did somebody excavate them or how did they actually come to be where they are now?

PH Okay, well they were first discovered through a mining operation way back in the 1940s. Actually, in another quarry, not this quarry. And then the first scientific observation was made in 1958 and thereafter this quarry was opened up. And the bulk of the fossils... This ended up, this is called the E-quarry, ended up being the richest deposits in terms of phosphate and fossils. And so different habitats have been identified, through the work of Brett Hendi and his colleagues. And it's continuing today, as we speak. So there is a beach gravel that's been identified, there's a river channel deposits, there's floodplain deposits, intertidal mudflats and so on.

ACT That's incredible.

PH That helps us understand why there's such a diversity of fossils here, of animals that once lived here. Yeah.

ACT So when we come to the fossil site we see that, you know, there are just these pockets of fossils that we can actually see. And outside we see that the vegetation has somehow been rehabilitated so that's very interesting in itself. So how did that come about?

PH Oh ok, so in 1993 the mine made a decision to close for economic reasons. And when a mine makes that decision, they have to address social, environmental and financial responsibility, so the rehabilitation of the mine was part of their environmental responsibility. And, so the plants that have been reintroduced onto the mining site are from seed that was collected from plants that naturally occur in the area.

ACT I think that's such a wonderful story and, I guess, it also tells us about what we, in modern societies, can do. So, I mean the responsibility of the corporate is, you know, if they find the fossils to let the people know about the fossils.

And then, of course, once mining operations are completed, I guess it is the responsibility of the mines to rehabilitate.

PH It needs a lot more monitoring, ongoing monitoring, to see how the naturally-occurring fauna is moving back into this landscape. And then there is also the social responsibility that has been addressed by the mine, whereby employees of the mine, who live in a village that was built by the mine, on the property continue to live there. And now have home ownership. The houses have been donated to the residents. And of course the rehabilitation of the mine and the Fossil Park project has created new jobs and generating an income and a whole new knowledge base.

And interacting with people from all over the world. I think fossils certainly help us understand how life changes in the past and gives us, helps us approach what's happening in the present and what could happen in the future. And I think it generates a sense of caring, you know, and the need to be totally conscious of the impact that humans are having on our environment. And particularly the, obviously, the fauna and the flora and the need to understand much better how the protection that those environments need to persist into the future.

ACT Thank you very much, Pippa it's been wonderful to hear about how this environment in the west coast of South Africa has changed over time. I think one of the messages that we're left with is that these environments are very fragile and, with these environments comes whole ecosystems that can be changed very, very quickly. And I think the responsibility that we, as people, have to protect and look after environments is very important. The West Coast Fossil Park, Langebaanweg site, was a natural change. We've seen mining operations come, change the environment, but we've also seen the good, social responsibility act of closing up, but rehabilitating the area as well. And, very importantly, we've seen the development of social communities that are able to also benefit from these developments. So, it is a really good story which we should actually remember for corporates in the future.