

LIFE

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Fine art of being in a mirror spot and reading shadows

● When UCT's plant conservation unit went up in flames earlier in 2021, images that are used to understand environmental change were lost

Hedley Twidle

The campus where I work is built around a central concourse of stairs leading up the slopes of Table Mountain.

On one side of this bisecting line are mostly arts and humanities buildings; on the other are mostly sciences. Seen from above, the two halves of campus mirror each other like a Rorschach test. Literature has its symmetrical twin in mathematics; architecture is echoed by astronomy, history by biology.

When a mountain fire swept down from the slopes on Sunday April 18 2021, embers carried by a hot, dry wind randomly picked out buildings for destruction. The cypresses and creepers outside my office were set alight, but the building survived (just, and with heat-induced cracks in the glass of our windows). But the roof of the Jagger Reading Room just opposite began to burn, perhaps because embers flew into the gaps between the roof tiles. Fire fighters were concentrating on buildings with gas cylinders and stockpiles more flammable than books.

By Sunday evening, pictures of the African Studies Library burning were on news sites around the world: its arched windows filled with red flames, its teak desks, open shelves and artworks utterly destroyed, the damage to the collections in the vaults unknown. Before and after pictures were soon circulated: a beautiful reading room; a charred wreck.

In the wake of the fire, there was an enormous salvage operation that relied on thousands of volunteers. You would get your plastic hard-hat and safety briefing, then go down into the dim, waterlogged stacks of Special Collections. Here you would fill up plastic crates (donated by local supermarkets) with rare books and boxes of manuscripts, maps, photographs, drawings – all carefully labelled. The key thing was to maintain the archival order as the crates came out and were stacked on big flatbed trucks, then taken to other locations, unloaded again, stacked again: it was labour-intensive work.

For more than two weeks, a long human chain stretched out of the building. Staff, students and volunteers passed along the crates, mostly too quick for you to see what was in them. Occasionally someone would shout "Triage!" and skip the line,



Helping hands: Volunteers help to save books from the Jagger Library at the University of Cape Town after wildfires swept across the campus of the university in April. / Misha Jordaan/Gallo Images

rushing a box of water-affected items to a marquee pitched outside, where conservators and curators assessed the damage. I watched as they picked through soggy photo albums with tweezers or flash-froze damp texts – this bought some time in combating mould, which was now the big threat.

It turned out that many of the most important holdings had survived, among them the 19th-century records of [Xam and 'Kung oratures (commonly known as the Bleek and Lloyd Collection) that are part of the Unesco Memory of the World Register. So it wasn't quite as bad as it had looked, and then there was the team effort of the salvage: the physical task of emptying the stacks, the quasi-medical drama of archival triage. The spectacle of mild-mannered librarians becoming lead actors in an unfolding drama, the collective gathering and sense of purpose after so much Covid isolation – all the palaeoecology provided a kind of solace.

Just 100m away, another building and another collection caught fire. But this didn't receive as much coverage, and was harder to make into a story about repair and renewal.

"When I saw that fire spreading," Timm Hoffman told me, "I knew we were toast."

Hoffman is a professor of botany and head of the plant conservation unit (PCU), which aims to understand how Southern Africa's extraordinary botanical diversity has changed over time in response to land use and climate. Bringing together a wide range of disciplines – ecology, environmental history, palaeoecology and social sciences – the PCU was located on the top floor of the biology building.

"In a flammable wooden turret with a palm tree outside," Hoffman said ruefully. "It shows

how tone-deaf our architecture was, in terms of the fire threat. As a botanist, I should have brought my chainsaw and cut that palm tree down myself."

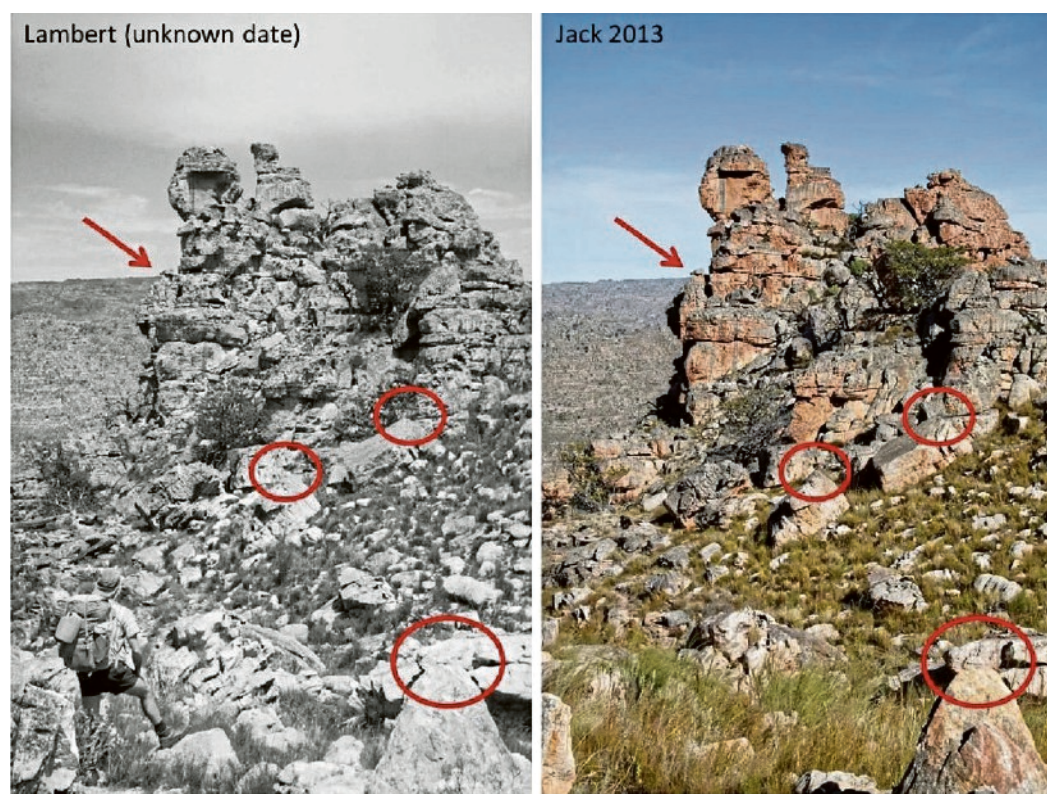
Not a thing survived the blaze: microscopes, scanners, lab equipment – all gone. Cameras locked in filing cabinets were "vaporised". Not a single scrap, not a shred remained of all his books and papers, or of the collection that had been at the heart of the unit's work: an archive of historical landscape photography.

Over the past decades, Hoffman and his co-researchers amassed more than 40,000 images (the earliest dating back to 1876) and then used them to understand the nature, extent and rate of environmental change in Southern Africa.

The method is wonderfully simple: find the exact same spot where the original picture was taken (sometimes harder than it sounds) and rephotograph the landscape. Then use the before and after photographs – the "then" and the "now" – to read, reconstruct and model processes of long-term ecological change.

"This method is fantastic. Because it's not a project which starts today and moves forward. It's a project that starts today, but you've already got 80 or 100 years of data in a picture. The photos are like little time machines. Each image is rich with information about the environment."

Via the PCU's rePhotoSA project, these sites became thousands of mini-observatories: monitoring stations for understanding the past and future trajectories of ecosystems all over Southern Africa. Once a photograph is retaken, the GPS co-ordinates are logged, but a marker is also



rePhotoSA project: Paired arrows and ellipses indicate nearer features that overlap with features farther away. The relative position of one feature to the other is a useful guide in finding the precise position of the original photographer. / © Plant conservation unit, University of Cape Town

left in physical space. A rock cairn is constructed directly beneath the camera position, for future repeat photographers to find.

I first met Hoffman in 2012, during a workshop on what climate change would mean for the Karoo and Southern Africa's rural and arid areas. We heard about climate forecasts but also hindcasts: models that go backward in time, predictions about what past environmental conditions might have been like.

Since then I had visited the PCU several times, speaking to Hoffman and meeting his students and co-researchers. Their work intrigued me, and seemed to raise questions around environment, history and memory that went beyond the frame of the immediate scientific project. When you entered that top-floor attic with its plants and pictures and posters of biomes, you could sense it was a healthy ecosystem. Adjoining the PCU is the palaeoecological unit, where Prof Lindsey Gillson and her co-researchers look through microscopes at fossilised pollen, layering other timescales into the work.

"The photographs can only take us back so far in time, obviously," Hoffman said. "After that, or before that rather, we have to look at pollen. With pollen you get to the level of families, but with photographs you can get to individual stands of trees, even individual plants across time. I often wish that hunter-gatherers had carried little disposable cameras."

I envied biologists their field trips: getting out into the world, travelling all over the country in a kind of geocaching treasure hunt, or a spatial-temporal

detective story. It must create a kind of camaraderie, a bank of shared memories, in a way that was less common in the more solitary disciplines of reading and writing. It seemed to honour ways of knowing often absent or unfashionable in the critical humanities: an idea of collective experience and inquiry; a wonder at the biophysical world and a desire to be out in it; an awareness of orders of existence beyond the human. Sometimes Hoffman spoke about a stand of proteas in the Drakensberg, or a single aloe in Namibia, with the kind of affection normally reserved for family snapshots.

What also caught the imagination was that the rePhotoSA project invites you to be part of it, quite literally. Once the photographs are digitised (and most of them have been), they are posted on a website, with an invitation for members of the public to find the sites and do the repeats themselves.

On the web database, each image has already been broadly pinned down within a quarter degree square (about 25km by 25km), but the rest of the sleuthing, the "fine scale positioning", is left to the volunteer photographer. The guidelines for how to match up past and present through a viewfinder make for intriguing reading: "If possible, try to

THE PHOTOS ARE LIKE TIME MACHINES. EACH IS RICH WITH INFORMATION ABOUT THE ENVIRONMENT

estimate the time of day that the original photograph was taken, by looking at the shadows." The key tip is to find clearly defined objects that overlap each other from the photographer's viewpoint but are separated from each other by some distance (such as two large rocks at different depths in the photo): "Such objects are easily identified by standing in the position occupied by the original photographer [your best guess at this stage is fine] and moving one's head from side to side. The objects that are most useful are those that move the most relative to one another."

Most historical photographs, the site advises, are likely to be located in the vicinity of old and current transport routes "as these provided convenient access to early photographers who were carrying bulky photographic equipment". In terms of a broad scale search in mountainous terrain, the website also recommends "tilting the Google Earth view to an oblique angle (similar to what the photographer would have seen) and 'flying' over the terrain so as to match historical and satellite images".

When it comes to interpreting the photos, this change in perspective – as you move from (flat) aerial views to (tilted) ground-level images – is where things get tricky. In an aerial photo, each part of the image is one to one (a hectare is a hectare). Trying to analyse how much space a landscape photo contains is more complex, because the oblique view is different in every case. There could be sometimes just a few hectares in a photograph, sometimes hundreds. Or both: a foreground that is just a small

space overlooking a huge valley – different parts and planes of the image can represent vastly different scales. The challenge for the PCU was developing tools for analysis that worked across such varied images – and then guarding against the danger of how compelling a picture can be.

"If you're not careful, you can pick and choose your data points," Hoffman says. "And go for the charismatic data. The power of images can be a problem: they can be so effective in winning over an audience. So you must bring all the ecological literacy and environmental history into the interpretation, and then demography, the age and size of plant populations. And then find a way to systematically analyse thousands of photographs at different spatial scales. It's harder than it looks."

The origins of the project lay in the 1980s, when Hoffman was working for the National Botanical Institute (now the SA National Biodiversity Institute). Here he came across the photographic archives of earlier botanists, often forgotten, ignored or unlabelled.

At the time, his focus was on questions on land use and degradation: the question of "desertification" and whether the dry Karoo was getting larger. His work with photographic archives showed up some counterintuitive findings: that vegetation cover had actually increased in many parts of the country thought to be becoming more arid.

The same is true on the slopes of Table Mountain. Conventional wisdom would assume that the slopes have been denuded of indigenous trees; but using images from the 19th century shows that Afromontane forest cover has substantially increased over the past 100 years.

The idea to open the project to the public came from early citizen scientist platforms such as the Bird Atlas, where members of the public log and post information on species sightings and migrations. The university's animal demography unit had already run similar projects around everything from weaver birds to sea anemones. They offered to host the landscape photographs, which are posted along with any additional information to help in locating their origin.

"The level of metadata varied enormously: sometimes very detailed, sometimes just scraps of paper. I had 20 or more research assistants over the years. We just scanned and scanned and scanned."

In the 1990s, the focus shifted to climate change, and here the window into the past

provided a way of contextualising, interrogating or nuancing models of future environmental change. In the early climate change models, Hoffman explained, other scientists were writing about catastrophic futures while he and his colleagues were dealing with the past.

The challenge was trying to fit these projections together: to understand if forecasts and hindcasts could be matched up within "normal" bounds of variation; or whether a mismatch signalled that African environments had shifted into an entirely different paradigm – or (to use a disturbing phrase from the literature) a "no-analogue future".

A 2018 paper synthesised the work of the PCU over many years, and inclined towards a more hopeful view, while also suggesting how the research could be used for developing mitigation strategies for some of the worst aspects of climate change in the future. The article was titled "Rethinking catastrophe?"

"I might adopt a slightly different approach now," Hoffman said.

The public success of the project resulted in a cruel irony. As the rePhotoSA platform gained visibility, many scientists and botanists donated their own photo collections to the PCU. So Hoffman had become the de facto curator of many private collections and personal legacies. And now all the images that were in his keeping had been destroyed, which had left him with a feeling of guilt: "They probably should have been in a real archive somewhere."

He went on. "I was very invested in that collection. All the things I'd accumulated over decades of my working life, which was my life. My whole identity was tied up in that archive. Far too much, I've now come to realise. You could open up a file and look at a picture, a slide, a glass plate. It makes you feel a lot more connected to a long line of information gatherers and plant enthusiasts. Like standing in the same place to take the picture. You find connection. It makes you feel part of something – I won't say noble, but forward-looking, a positive endeavour. Then it's all gone."

The physical pictures, plates and negatives may have burnt, but more than 30,000 exist on the digital database. Fewer than 10% of them have "contemporary partners", and so the invitation to find these sites, to reposition oneself carefully in space and time, remains open.

● To find out more, visit rephotosa.uct.ac.za.

● Twidle is a writer, teacher and researcher based at the University of Cape Town.



1948: A historical photograph of the Three Sisters taken by John Acocks in 1948.

/ © Plant conservation unit, University of Cape Town



2016: The repeat photograph of the Three Sisters taken by citizen scientist Justin du Toit in April 2016. The buildings are no longer there and there has been an increase in trees and shrubs in the area.

/ © Plant conservation unit, University of Cape Town



1946: A historical photograph of pine plantations south of Barberton taken by John Acocks in 1946.

/ © Plant conservation unit, University of Cape Town



2016: A repeat photograph taken by citizen scientists Nico and Delia Oosthuizen in November 2015. The pine plantations have expanded since 1946 and bush encroachment has increased.

/ © Plant conservation unit, University of Cape Town