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Matching shadows: remembering the plant conservation unit

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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 18 April 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. Firefighters were concentrating on buildings with gas cylinders and stock-piles 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 labeled. 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 labor intensive work.

For over 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, 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 wet texts—this bought some time in combating mold, which was now the big threat.

It turned out that many of the most important holdings had survived, among them the nineteenth-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 there was some good news; 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 this provided a kind of solace.

Just a hundred meters 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."

Timm 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, paleoecology, 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," Timm 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 "vaporized." 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 photographs of southern African landscapes.

Over the last few decades, Timm and his co-researchers amassed over 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 re-photograph 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 rePhoto project (www.rephotosa.adu.org.za), 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 coordinates are logged, but a marker is also left in physical space. A rock cairn is constructed directly beneath the camera position, for future repeat photographers to find.

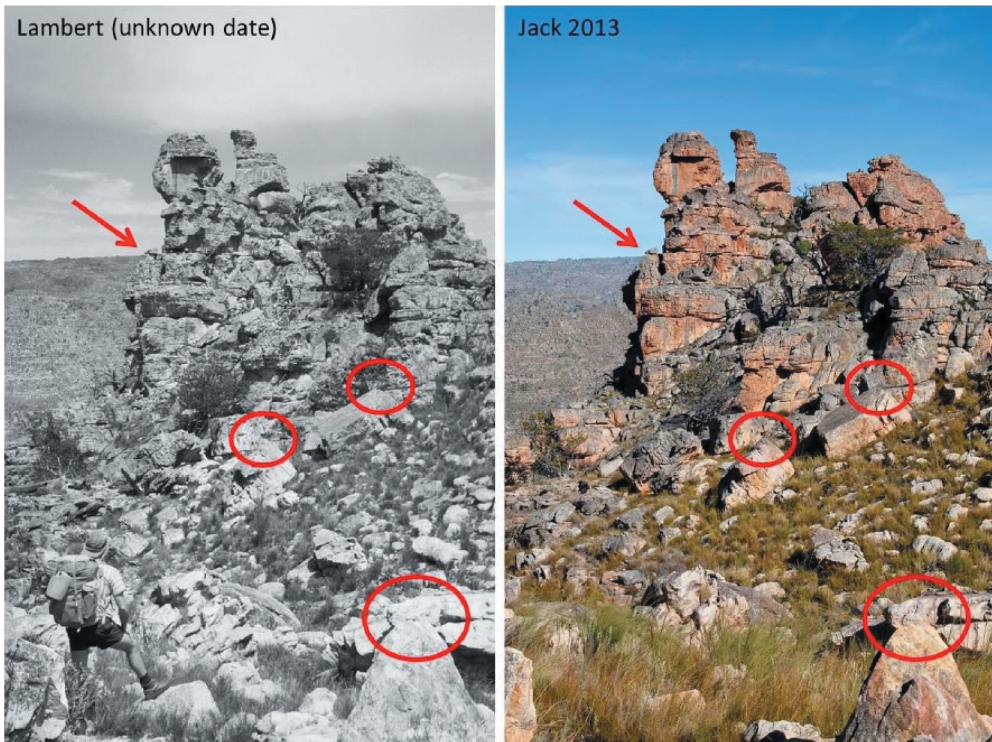
I first met Timm in 2012, during a workshop on what climate change would mean for the Karoo and southern Africa's rural and arid areas. We heard about climate forecasts but also hindcasts: models that go backward in time, predictions about what past environmental conditions might have been like. I had been intrigued by the PCU's work ever since. It seemed to raise questions around environment, history, and memory that went beyond the frame of the immediate scientific project.

Since then, I have visited the Unit several times, speaking to Timm and meeting his students and co-researchers. During years of political battles on campus, I thought of this top-floor lab (on the other side of the Rorschach blot) as a kind of refuge. This was no

doubt a romantic or idealized view, but the PCU seemed like a happy space. When you entered that attic with its plants and pictures and posters of biomes, you could sense it was a healthy ecosystem. Timm radiated a kind of serenity and calm that was rare in academics;



Barberton_15_4681: South of Barberton. Original: Acocks 1946. Repeat: N. and D. Oosthuizen 2015. Images copyright of rePhotoSA (<http://rephotosa.adu.org.za/>) under a CC BY-NC 4.0 Creative Commons license.



Taking a repeat: Paired arrows and ellipses indicate nearer features that overlap with features further away. The relative position of one feature to the other is a useful guide in finding the precise position of the original photographer. Images copyright of the Plant Conservation Unit (University of Cape Town) under a CC BY-NC 4.0 Creative Commons license.

he seemed like a man who knew what he was on earth to do, and was doing it. Adjoining the PCU is the paleoecological unit, where Professor Lindsey Gillson and her co-researchers look through microscopes at fossilized pollen, layering other timescales into the work.

“The photographs can only take us back so far in time, obviously,” Timm 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, traveling 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 honor ways of knowing often absent or unfashionable in the critical humanities: an idea of collective experience and enquiry; a wonder at the biophysical world and a desire to be out in it; an awareness of orders of existence beyond the human. Sometimes Timm 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 rePhoto project invites you to be part of it—quite literally. Once the photographs are digitized (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.



Three Sisters_49_4797: The Three Sisters. Original: Acocks 1948. Repeat: du Toit 2016. Images copyright of rePhotoSA (<http://rephotosa.adu.org.za/>) under a CC BY-NC 4.0 Creative Commons license.



Silvermine_92_5264: Encroaching pines, Silvermine/Noordhoek border. Original: Cowen 1995. Repeat: Watermeyer 2016. Images copyright of rePhotoSA (<http://rephotosa.adu.org.za/>) under a CC BY-NC 4.0 Creative Commons license.

On the web database, each image has already been broadly pinned down within a Quarter Degree Square (roughly 25×25 km), but the rest of the sleuthing, the “fine-scale positioning,” is left to the volunteer photographer.

Does it matter what time of day or season I take a repeat photograph? The FAQs and guidelines for how to match up past and present through a viewfinder make for intriguing reading: “The time of day becomes a factor when there are shadows in the photograph, which can make analysis difficult. If possible, try and 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 (like 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 analyze 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 dangers of how compelling a picture can be.

“If you’re not careful, you can pick and choose your data points,” Timm 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 analyze thousands of photographs at different spatial scales. It’s harder than it looks.”

The origins of the project lay in the 1980s, when Timm was working for the National Botanical Institute, now the South African National Biodiversity Institute (SANBI). Here, he came across the photographic archives of earlier botanists, often forgotten, ignored, or unlabeled. At the time, his focus was on questions of land use and degradation: the question of “desertification” and whether the dry Karoo was getting larger. His work with photographic archives showed 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 nineteenth century shows that Afromontane forest cover has substantially increased over the last 100 years.

The idea to open the project to the public came from early citizen scientist platforms like 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 weaverbirds 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 contextualizing, interrogating, or nuancing models of future environmental change. In the early climate change models, Timm 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 signaled 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 synthesized the work of the PCU over many years, and inclined toward 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," he said wryly. The public success of the project resulted in a cruel irony. As the rePhoto gained visibility, many scientists and botanists donated their own photo collections to the PCU. So Timm 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."

"I was very invested in that collection," he went on: "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 realize. 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, that you belong to something, something—I won't say noble, but forward looking, a positive endeavor. Then it's all gone."

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

Disclosure statement

No potential conflict of interest was reported by the author(s).

Notes on contributor

Hedley Twidle is a writer, teacher and researcher based at the University of Cape Town. His essay collection, *Firepool* was published by Kwela Books in 2017. *Experiments with Truth*, a study of narrative non-fiction and the South African transition, appeared in the African Articulation series from James Currey in 2019.