SAFARIS and BioGaps: Joining early explorers to help with assessment and planning in the present

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Early explorers from around the world travelled, discovering oceans, lands, islands and people, biodiversity, minerals, phenomena, collecting specimens and recording information showing what landscapes and species were like then. Modern history describes expeditions around the Cape as much as 530 years ago. Of course, there had been people in South African and Africa for thousands of years.
Artists preparing illustrations for *De historia stirpium*, Basle 1542, by Leonhart Fuchs. From left to right: Heinrich Füllmaurer, the maker of the wood-cuts, and Albrecht Meyer, the artist.

Illustration of a dried inflorescence of *Protea neriifolia* from De l'Ecluse's *Exoticorum libri decem*, Leiden 1605.
There is a wealth of information in historical sources such as field notes and specimen labels, waiting to be mined – when it can be found.

Historical information helps to understand biodiversity in the present, showing what was here then to compare with what is here now for extinct, introduced or invasive species, species at risk, changes in climate and environment, plant utilisation, etc.
Specimens that they carefully preserved for future generations, and descriptions of the wonderful landscapes through which they travelled bring to life what sometimes can no longer be found in nature, can help us in our assessment and planning, and preserving our natural heritage for future generations.

Specimens of plants, crustaceans and other organisms, minerals and other samples. There are various methods of collecting and preserving the specimens. There is debate about the ethics of collecting specimens, especially with rare or endangered species.

Introducing SAFARIS (on ALA – Atlas of Living Australia) and Transcribe.
Herbarium specimens had been digitised since about 1979. Georeferencing was at a precision of only about 18 km.

SANBI started digitising historical records in 1993. Georeferencing of 1.5 km precision was possible for about 390 000 species distribution records from field notes recorded by John Acocks.
Other sources of botanical records that are becoming available are used with more than a million herbarium specimen records to investigate the potential effects of climate change on selected plant species; prepare Red List assessments; create lists of species for vegetation types; to help understanding species distribution ranges; etc.

It would be wonderful to have all information available in one place - NBIS (National Biodiversity Information System). I shall continue to dream of the time that this is a reality.
My interest in this work goes back to when I was a school in the 1960s. My mother and I went from the West Rand near Johannesburg to Pietermaritzburg for her to use family history records in the state archive.

We spent the time there, staying in a hotel, and travelling back. This cost time and money, and increasing our carbon footprint, but it did give my mother valuable information and it gave me precious memories.
But this kind of activity has problems.

For decades museum and herbarium specimens have been loaned from herbaria around the world for a taxonomic researcher to be able to study the material. Alternatively, the researcher would have to travel to different herbaria in order to study the specimens there.

Here you see a report on loss of irreplaceable herbarium specimens going from Paris to Australia, and visitors from Warsaw and New York visiting the Compton Herbarium in Cape Town.

There was a case recently where specimens arrived at an airport and the customs officials incinerated the specimens because they were foreign plant material, and were thus not allowed in the country! Specimens can be extremely valuable. They cost a great deal in terms of time, money and resources, and are usually irreplaceable. Some are type specimens – the one on which a species description is based.

Travelling to distant herbaria costs valuable time, money, resources, expanding our carbon footprint.
A seed was planted in my mind during 2012 that has led to the mobilisation of many species distribution records and powerful georeferencing capability in Africa.

With my varying degrees of input for more than twenty years with indexing birth, marriage and death records from microfilmed images of government and church records from mainly South Africa and the UK. We progressed from microfilmed records to web-based indexing.

I have benefitted from the indexing efforts of unknown volunteers who indexed records of some of my own family line, and so I wondered about making biodiversity records available in the same way.

Indexed records become searchable and discoverable. I even receive e-mail alerts from the system saying that an image of a source is available for an individual in my family line. It is fantastic! I was sure the same benefits would come to biodiversity work.
I approached our biodiversity information leads at SANBI and SABIF and they gave the go-ahead to proceed on something in this line. And I thought and schemed.

Shortly after that there was a meeting with delegates from several African countries, and from other continents including Australia, held at SANBI dealing with mobilising biodiversity information. This idea was still growing in my mind.

The birth of SAFARIS (Southern African Friends and Researchers Indexing Specimens) came as I enthusiastically announced the concept at this meeting.

In my thinking and scheming, I found that Les Powre was not the only person to have such an idea – several programmes were already available and we got ourselves involved with DigiVol – volunteers digitising biodiversity information. It is wonderful to use this facility provided by Atlas of Living Australia.

SAFARIS now has a cousin called Transcribe (Karoo BioGaps Project).
The data are in the cloud can be used in research, assessment, monitoring, policy, and any other conceivable application.

Instead of borrowing specimens or visiting herbaria or museums to view specimens, accessing high resolution images often meets the needs of researchers, unless physical access is required such as for chemical analysis of material from, or microscopic study of a specimen. Specimens and records are handled less because the images are viewed by most users. This is possible because digital images with text associated are searchable and discoverable online enabling more users to be able to view them.

Besides the taxonomic use of specimens, the species occurrence data are made available in databases and have been invaluable for species distribution mapping, biodiversity assessment, niche modelling, checking endemism of species, Red List assessments, impact assessment, and many other uses.
Type specimens are the permanent reference for a species description. This applies to plants and other organisms.
Plant specimens in the National Herbarium, Pretoria, were captured in the early 1980s, a leading initiative in the world. Georeferencing, if done, was at quarter degree level, a precision with a radius of about 18 km at best. This represents the national topographic map series at 1:50 000 scale.

Some grid cells have between 10 000 and 20 000 specimens collected. Transcribing of specimen label information was well advanced by 1984. Precise Georeferencing occurred for selected taxa before 1999 for bioclimatic modelling.
We saw the opportunity to relate species distribution to climate data. The climate data were at about 1.5 km precision, so the effort was made to geo reference specimens for specific species to improve the 18 km radius to at least about 1.5 km precision.
For the descriptions of vegetation types on the national vegetation map, we checked species ranges relative to vegetation, particularly for endemic species.
The localities and habitats for endemics were carefully georeferenced and checked.
IUCN declarations for extinct, endangered, threatened, vulnerable species. Initially plants, then butterflies, reptiles, spiders, and other groups. Essential to know where species occur, how many individuals, threats, health of populations.
Other value has also been derived from SAFARIS. Information in BODATSA (Botanical Database of Southern Africa) for herbarium specimen label transcriptions with typographical errors have been identified and corrected, including a year transcribed as 1838, in the century before the collector was born, instead of 1938, a collector name not recorded in full, and selection of the wrong named locality.

Duplicates of the same collection in different herbaria with different Det status and species names.

The more people there are interrogating and using the data, the more likelihood there is of errors being detected.
Plants and other sessile organisms, rooted in the ground. Can measure anthers, leaves, petals, take photographs, describe texture, collect specimens. Nuisance is strong wind, spines, succulent leaves. But they stay put.

Animals move around – sometimes very rapidly, and over large distances!

It is important to know where the specimen or information was collected.
Especially for specimens that have precise locality information, but are not georeferenced, or are imprecisely georeferenced.

- Locate the plant
- Species range
- Model the climate
- Endemism
- Red listing
- Environmental impact
- Etc.
Millions of records remain to be indexed and since 2012 volunteers have transcribed collecting registers and field notes for SAFARIS (Southern African Friends and Researchers Indexing Specimens).

Karoo BioGaps has been transcribing information from specimens of plants and several animal groups.
This is how you can get involved.

Go to http://volunteer.ala.org.au
Or
http://transcribe.sanbi.org

Click on Log in.
Create an account or sign in with an existing account.
Here are the institutions using DigiVol. We are in good company.
Click Get involved.
Select from

**Collection labels:** Capture data from specimen and object labels to make it accessible for scientific and cultural research.

**Historical documents:** Transcribe text and capture data from historical documents to make them digitally accessible.

**Images:** Identify and tag images of animals and collection objects to support information discovery and research.
Or the SANBI DigiVol (digitising by volunteers)
Select an expedition (project)
Get started to start transcribing.

Here are some examples of transcribing specimens and field notes.
Transcribe the text that is visible on the image.

Verbatim text, then splitting it into appropriate fields such as collector name, date, locality, species.
Basically the same for all kinds of labels.
Some use a mapping tool to georeference the record.
Not only biodiversity.
A pilot with a complicated schedule, snatches moments at hotels at night when, rather than watching TV, he can do something that actually helps others, accomplishing something that makes him feel really good.

A mother grabs moments while her older children are at school and younger children are having a nap, to index a batch of vital records. She says that, while some household chores seem to be never ending, her indexed batches give a definite sense of accomplishment and achievement. ‘Before I began indexing, I didn’t feel very useful. Now I know I am helping others. And it’s not just that. Indexing helps me with coordination in my hands, and it keeps my brain working. It’s therapeutic for me in a lot of ways.’

SAFARIS volunteers: Two of our greatest contributors, each in Australia, are a fungus guru, a retired geologist, and someone using her time doing valuable work whilst seeking employment. They have made a tremendous contribution.

Personal links: The fungus guru in Australia is related to Galpin from South Africa and felt a special bond transcribing a record for Mosdenia phleoides named for the farm Mosdene where Galpin lived after he retired.

An unemployed volunteer: ‘I think it has been a positive experience to contribute in research, learn about history and science and improve on proofreading skills. Currently I am unemployed. It would be nice to be more independent and not rely on the government. I believe that to be able to work is to have freedom. It is why I like to volunteer which provides work and helps to gain skills and experience. I have put
my name on an employment website to look for transcribing or proofreading work. Lately I have been writing an overview for the site to help gain a better chance of finding work.’
Time for questions and then sum up with call to action.
It is exciting and fascinating traveling with these early explorers – come and join in.

Volunteers are acknowledged by their names appearing on the leader board

Many **volunteer indexers** are enjoying travelling around our regions with early explorers as they transcribe these historical records making the information available for various uses, liberating the information from paper and elevating it to the Cloud.

Many **collections managers** are using DigiVol and similar transcription platforms for mobilising data from specimens, photos and historical records.

Many **researchers**, **policy makers**, **environmentalists** and **others** are using the data that have been mobilised.

Come and join safaris and expeditions and help this citizen science initiative, adding value to biodiversity research, assessment, sharing, and much more.
Thanks go to:

**Early biodiversity explorers in southern Africa**
Each **tax payer** of South Africa for their part in funding SANBI work
Each **tax payer** in Australia for funding DigiVol
SAFARIS **volunteers**
**Interns**
SANBI **staff** and **other colleagues**

**Thanks for being here**
I enjoy sharing things – I hope you were not bored out of your wits....