Plants, people, and place: Co-evolving global patterns through time

"Originality often consists in linking up ideas whose connection was not previously suspected, . . . The role of the imagination is to create new meanings and to discover connections that, even if obvious, seem to escape detection,"
(Beveridge W I B, 1957)

Seminar presentation at Pretoria University
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by
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Where leaders learn

Human-plant relationships

Have we underestimated the importance of human-plant interactions and symbiotic relationships far older and unrelated to domestication & agriculture?

All living things find and create niches that provide protection, shelter, and optimal living conditions, with food resources and water nearby.

There are 100's of caves, shelters, and presence sites in the Southern Cape, Little Karoo & Great Karoo, sheltered by surprisingly similar vegetation patches.

Comparing these plants with those used today as medicinal and useful plants in the southern Cape, can be extended to the whole of Africa and globally.

Background

Plants –
Over the past 15 years I collected, identified, and pressed every plant species within the distinctive dense thicket patches forming “Green Walls” of vegetation protecting 150 archaeological sites in the southern Cape – 8 around Grahamstown – 6 in the eastern Freestate.

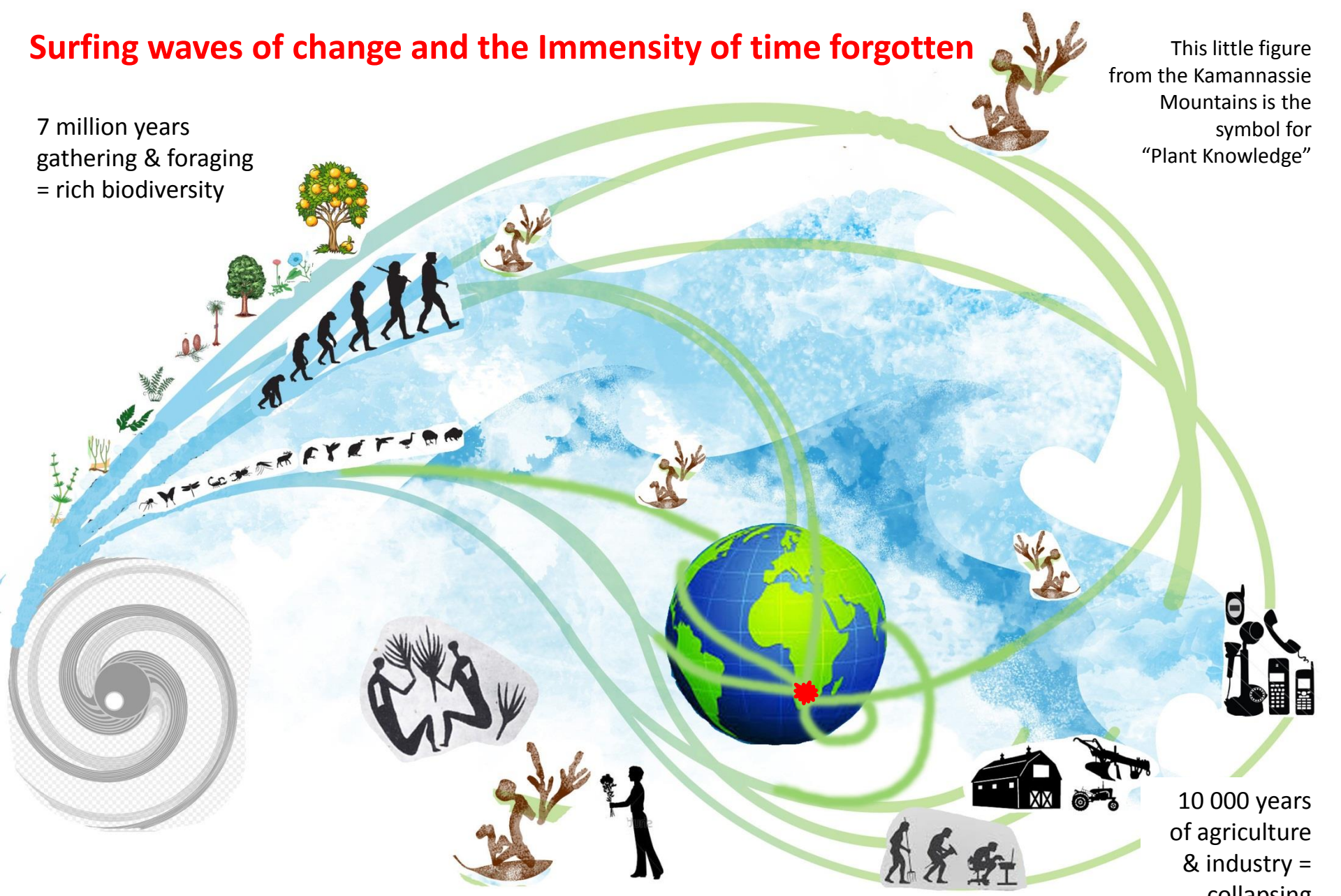
People –
Over the past 30 years I worked with various groups of autochthonous people collecting ethnobotanical data. 123 participants in the southern Cape, 35 participants In the eastern Cape, 3 in the eastern Freestate, 2 in Namibia, 1 in Botswana. Each specimen presented or pointed out by a participant was identified and pressed.

Place –
The 138 sites visited in the southern Cape were reduced to 75 site complexes where two or more sites shared the same dense shrubby vegetation patch. The dark green patches stand out within a matrix of fynbos, renoster, or karoo vegetation, but have largely been ignored, even in fine-scale mapping. The taxa are not completely absent in the surrounding matrix, but it is the densification and overlapping suite of “useful” taxa forming the green walls which is noteworthy.

Surfing waves of change and the Immensity of time forgotten

This little figure from the Kamannassie Mountains is the symbol for "Plant Knowledge"

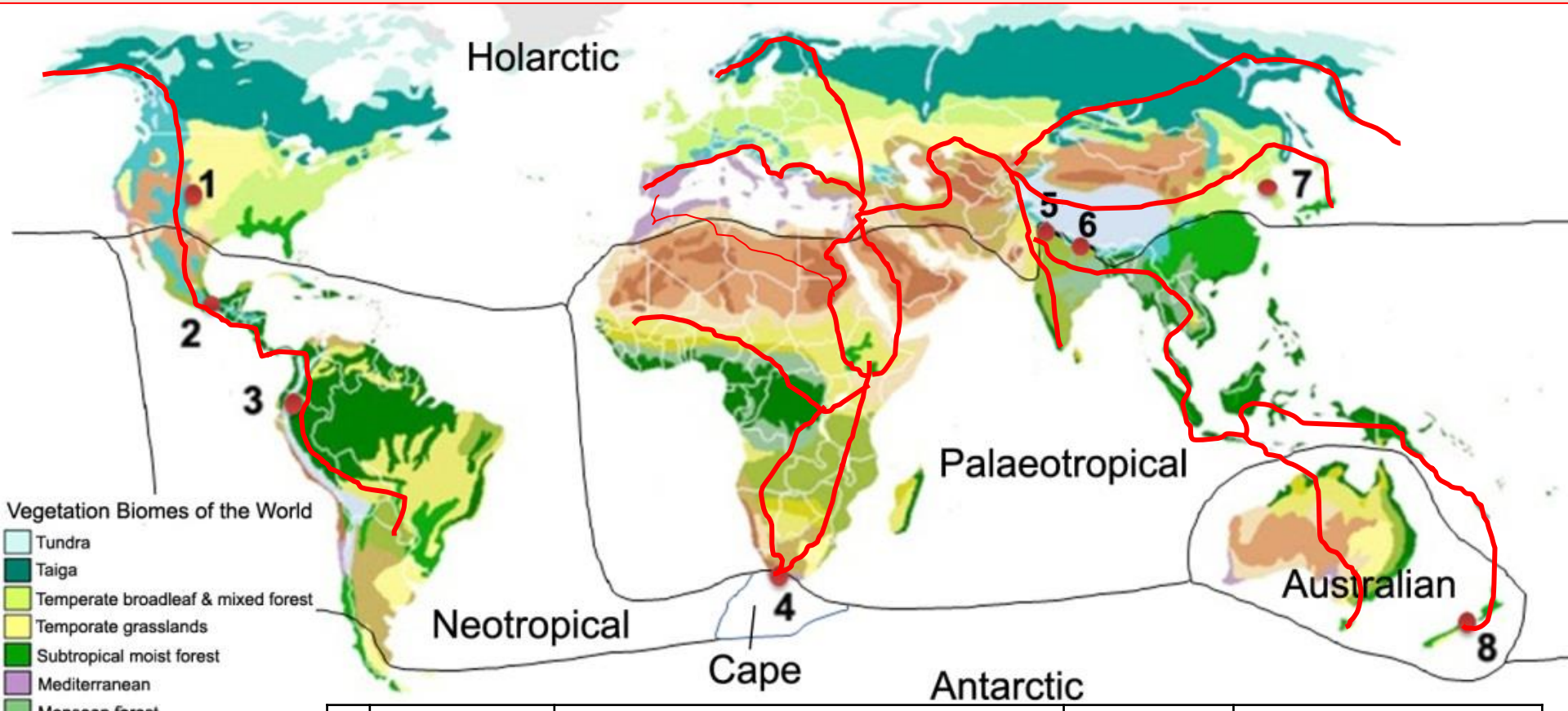
7 million years gathering & foraging = rich biodiversity



10 000 years of agriculture & industry = collapsing biodiversity

Gatherer-forager knowledge retains its value & validity by surfing & adapting to waves of climate & cultural change

Regression analyses locations; Major Global Vegetation Biomes and Floral Kingdoms; Early migration routes



	Country	Major Vegetation Biomes	Kingdom	Author
1	North America	Mostly Temperate & montane forest & Grassland	Holarctic	Moerman
2	Chiapas	Montane & subtropical forest	Neotropical	Moerman
3	Ecuador	Tropical rainforest & Alpine tundra	Neotropical	Moerman
4	Cape, South Africa	Mediterranean, & Thicket savanna	Cape & Palaeotropical	Saslis-Lagoudakis, Coutts & Crouch, Van Wijk (this thesis)
5	Kashmir	Monsoon forest & alpine tundra	Palaeotropical	Moerman
6	Nepal	Monsoon forest & Alpine tundra	Palaeotropical	Saslis-Lagoudakis
7	Korea	Temperate mixed forest	Holarctic	Moerman
8	New Zealand	Subtropical forest	Australian	Saslis-Lagoudakis

Unexpected results

There is much greater overlap between species and genera at sites, in ethnobotanical lists, and in archaeobotanical reports, than would appear probable or possible

These overlaps are found globally - in particular along major pre-historic migration routes, and in countries with significant groups of autochthonous / traditional / indigenous peoples

Questions

Are the taxa locally and globally present at sites, in ethnobotanical lists, and in the archaeological record similar just because they are naturally widespread taxa, and able to adapt to different localities, climates, and growing conditions?

OR

Are these taxa locally and globally present at sites because they are all useful plants (food, medicine, fuel, etc.), which were valued, ingested, excreted, and therefore spread by generations of hominids through the millennia. Forming dense thickets and green walls at habitation sites, and travelling and migrating globally with hominins?

More Questions!

First – what acceptably scientific methods can be used to show similarity between plant taxa found and used? Qualitative – Quantitative – Statistical – Inductive – Deductive – Inferential

Which methods to use?

Extrapolate, Infer, Deduce - By combining botanical, anthropological and archaeological research, both past and present, is it possible to connect the distant past to the present, and inductively infer ancient life-ways, the history of plant use, and results of human-plant evolution?

Taxonomy: Indigenous or Linnaean or both – Can, or will, the disjunction between modern Western academic research be overcome and the legitimacy of indigenous knowledge as science be acknowledged. Can one recognise the validity of both western Linnaean taxonomy and the indigenous traditional taxonomy which underpins it, without forfeiting scientific rigour (Agrawal A, 1995).

Ethics, Rights, Indigenous Knowledge - Can ownership of knowledge and academic freedom go hand in hand? The danger of nepotism in the guise of “benevolent ownership of knowledge”, and contradictions in the interpretation of recognition and benefits due to informal participation, can be difficult to reconcile with academic freedom to disclose or make public the data gathered. (Tapela B, Büscher B, et al, 2009; Van Wyk, B-E. & De Beer, J.J., 2012).

Gathering and foraging of plants for food, medicine, fuel, etc. is inextricably linked with the development of human cognition.

Traits ensuring successful plant foraging and gathering for survival, are foremost among those that signal modern human cognition.

The development of modern cognition in Homo sapiens is hotly contested but groups of the following traits are frequently listed.

Spatial memory → Causal reasoning → Selection → Imitation → Copying → Gaze following

Dexterous hands → Skills → Tool use → Cutting → Digging → Picking → Food processing

Transmission → Gesture → Vocalisation → Language

Co-operation → Altruism → Food and tool sharing → Carrying → **Storage → Bartering**

Experience → Cultural inheritance → Environmental awareness → Empirical knowledge

Cumulative change → Adaptation → Invention → **Modification**

Natural selection → Transmittable culture and Gene-evolution

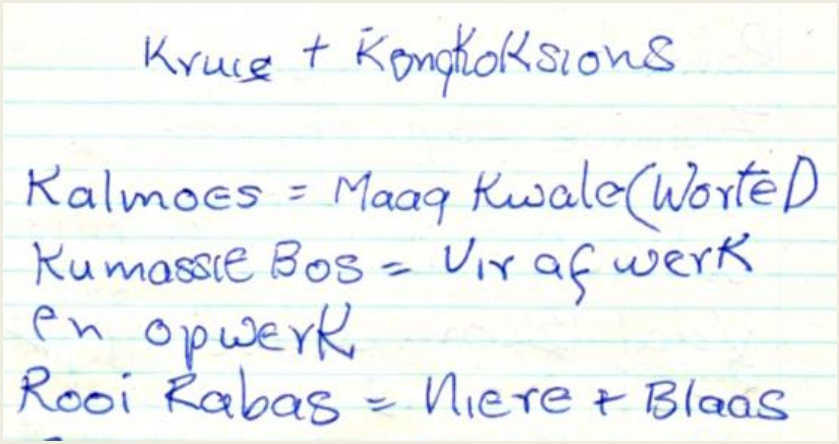
(See references at end of presentation)

Talking the same language

Transmission of information and knowledge depends on gesture and language on the part of the participant.

Reliably transcribing the information given requires personal understanding and knowledge of the meaning of both gesture and the idiomatic language.

Subtleties of idiom, slang, accent, and meaning can be lost or mistranslated unless both participant and researcher speak, and clearly understand, the same variation of the language.



“In the old days Wildeals was used in a house where the dead lay for family to say goodbye, “Maar nou wip hulle jou weg, en jy lê Klip-hard gevries tot die begrafnis’!”

"as dit werk dan werk dit!”

“Hang dan jou onderdele oor die stoom pot”

Plants – Botanical context

Hominins are seldom credited or considered as dispersers of plants – Why not?

Agathosma apiculata

Withania somnifera

Cyperus rotundus

Asparagus densiflorus

Kedrostis nana

Seed dispersal is attributed to either wind, water, birds, or wild and domestic animals. Pre-historic humans are very seldom mentioned. Only modern humans are credited, and then with problematic dispersal of alien plants and weeds.

All animals (humans too) ingest fruits and seeds, carry them in the gut, and deposit them as waste - ready fertilised and watered.

Seed was dispersed by Hominids, Hominins and pre-historic Modern Humans – further and faster than any other organism.

Lycium ferocissimum

Rubus pinnatus

Rhoicissus digitata

Diospyros dichrophylla

Capparis sepiaria

Plants - Evolution and natural selection

If a particular plant seems to be good for a certain purpose it will continue to be used in that way because it works

→ individual plants were judged as more active medicinally, to have tastier and larger fruit to eat, or to burn hotter and longer than others

→ these particular taxa would be unconsciously or purposefully selected for future use

→ would be taken back to habitation sites - permanent, seasonal, or temporary

→ would have seeds deposited into fertile and disturbed soil

→ would adapt and mutate (evolve) to suit new locations and conditions

→ would disperse with a succession of users, in waves through time.

= selection and survival of the fittest

→ evolution of selected plant taxa into new species over time.

Sample table of some plant taxa listed as ethnobotanically useful by S Cape participants + plant remains reported as macro- and micro-botanicals excavated at archaeological sites in the Cape Provinces + present at S Cape sites today

Family	Genus	Traditional Name	Ethno	Archaeo	Sites
Asteraceae	Artemisia	Wildeals	1	1	
Asteraceae	Helichrysum	Geita, Kooigoed	1	1	1
Asteraceae	Osteospermum	Bitou, Boetabossie	1	1	1
Asteraceae	Stoebe	Vaalbossie	1	1	1
Asteraceae	Tarchonanthus	Seesalie	1	1	1
Solanaceae	Solanum	Tandpynbos, Gifappel	1	1	1
Asparagaceae	Asparagus	Katdoring	1	1	1
Anacardiaceae	Searsia	Taaibos, Bessies	1	1	1
Malvaceae	Grewia	Kruisbessie, Koekies	1	1	1
Lamiaceae	Salvia	Strandsalie	1	1	1
Fabaceae	Lessertia (Sutherlandia)	Kankerbos, Gansies	1	1	
Ebenaceae	Diospyros	Snotterbel	1	1	1
Aizoaceae	Carpobrotus	Ghokum, Ghoena	1	1	1
Rutaceae	Agathosma	Boegoe, Buchu	1	1	1
Rutaceae	Clausena	Perdepis	1	1	1
Rutaceae	Zanthoxylon	Perdepram	1	1	1
Amaranthaceae	Exomis	Rambossie	1	1	1
Crassulaceae	Cotyledon	Plakkies, Kouterie	1	1	1
Cyperaceae	Cyperus	Watergras	1	1	1
Menispermaceae	Cissampelos	Dawidjieswortel	1	1	1
Moraceae	Ficus	Vye	1	1	1
Proteaceae	Leucadendron	Geelbos	1	1	1
Restionaceae	Restio (Ischyrolepis)	Besemgoed, Reed	1	1	1
Santalaceae	Colpoon	Notchou	1	1	1
Sapotaceae	Sideroxylon	Melkhoud, Milkwood	1	1	1
Vitaceae	Rhoicissus	Wildedruiwe, Wild grape	1	1	1
Oleaceae	Olea	Olive, Olyf		1	1

The ethnobotanical database holds 213 useful Species in 159 Genera (60% of site Gen), and 63 Families, with 1058 individual uses recorded.

560 Species in 261 Genera and 100 Families were collected from the 75 sites

107 Genera (40% of site Gen), have been reported from archaeological excavations in the Cape - Indicating thousands of years of use

(references at end).

Global Plant families widely used, present at modern sites, and found in excavations

Family	Global Top 20 straight count. Sites + Ethno + Archaeo	75 sites Top 20 present Southern Cape	Global Top 20 8 countries 5 continents Regression	Global Ethno-botany	Global Archaeo-botany	Modern drug plants
Asteraceae *	1	1	1	1	1	1
Solanaceae *	1	1	1	1	1	1
Euphorbiaceae	1	1	1	1	1	
Asparagaceae *	1	1	1	1		1
Anacardiaceae *	1	1	1	1	1	
Malvaceae *	1	1	1		1	1
Lamiaceae *	1	1	1			1
Asphodelaceae	1	1	1	1		
Fabaceae *	1	1		1	1	
Ebenaceae *	1	1				
Celastraceae	1	1	1			1
Rubiaceae *	1		1		1	1
Apiaceae *	1	1	1			1
Amaranthaceae	1				1	1
Apocynaceae	1					1
Scrophulariaceae	1	1				
Capparaceae	1			1		
Poaceae	1	1				
Aizoaceae *	1	1				
Rutaceae *	1					1

* Indicates families in the top 30 after regression of all data

People – Ethnobotanical and Anthropological context

- The early inhabitants not only left thousands of iconic rock art paintings to be found locally and globally. But also arguably left a lasting impression on the vegetation they so heavily relied on for food, medicine, and tools; a field which has not yet received the attention it merits.
- Participants in my ethnobotancal research "*represent the deepest historical population divergences among extant human populations" (Schlebusch C M, 2013 etc.),* confirming them as descendants of the early inhabitants of the sites.
- In spite of the loss of authentic language, culture, life-ways, and land under colonial rule, Cape KhoeSan plant knowledge and related beliefs, have demonstrated an uncannily persistent ability to surf, survive, and adapt to, waves of climate, vegetation, cultural change, and attrition
- Remarkable resilience in preserving extended family ties, as well a bond with the geographical area in which the family originates.
- Intricately interwoven cross-cultural histories of peoples must be acknowledged.
- Much cultural and genetic intermingling occurred, with knowledge transmitted in a horizontal and linear, as well as a vertical and random manner, over time.

IMITHI AMAYEZA

Ethnobotanical research in the southern Cape began in 1997 when Dr Janet Stanford at the Knysna Municipal Clinic asked for help in a project to include traditional remedies from the area. With the aim of saving money and encouraging self medication with simple First Aid home remedies for common ailments.

Talking to indigenous communities and Working with Hospice plus Municipal and Private clinics in the southern Cape; to identify, data-base, assess and then introduce simple, safe and affordable plant remedies for primary health care.

Empowering women and carers to confidently utilise simple and safe plant remedies for home care & first aid, based on culturally relevant Indigenous Knowledge Systems

People - Collecting & Recording information

Plants specimens pressed for the Herbarium

Detailed notes made & info voice-recorded; sometimes video-ed.

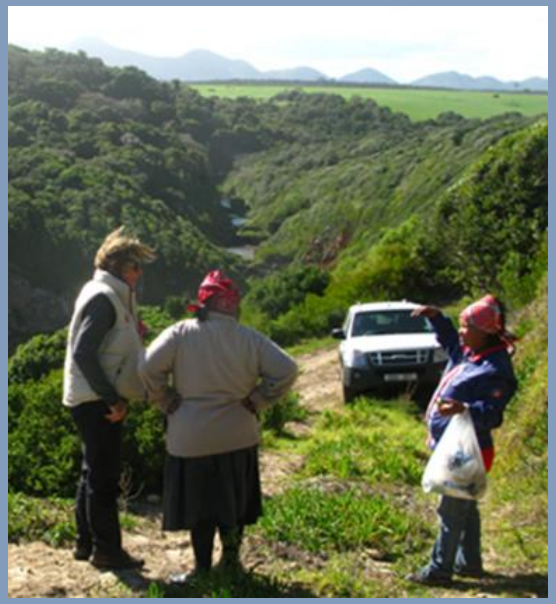
Talking about plants - gathering data at Klasies River

Yvette, William, Olive and Renee – using a rainy day for getting to know each other during discussions about Clarkson and local plant use

Janie and Yvette gathering plants & information

Tant Soekie talking about Withania

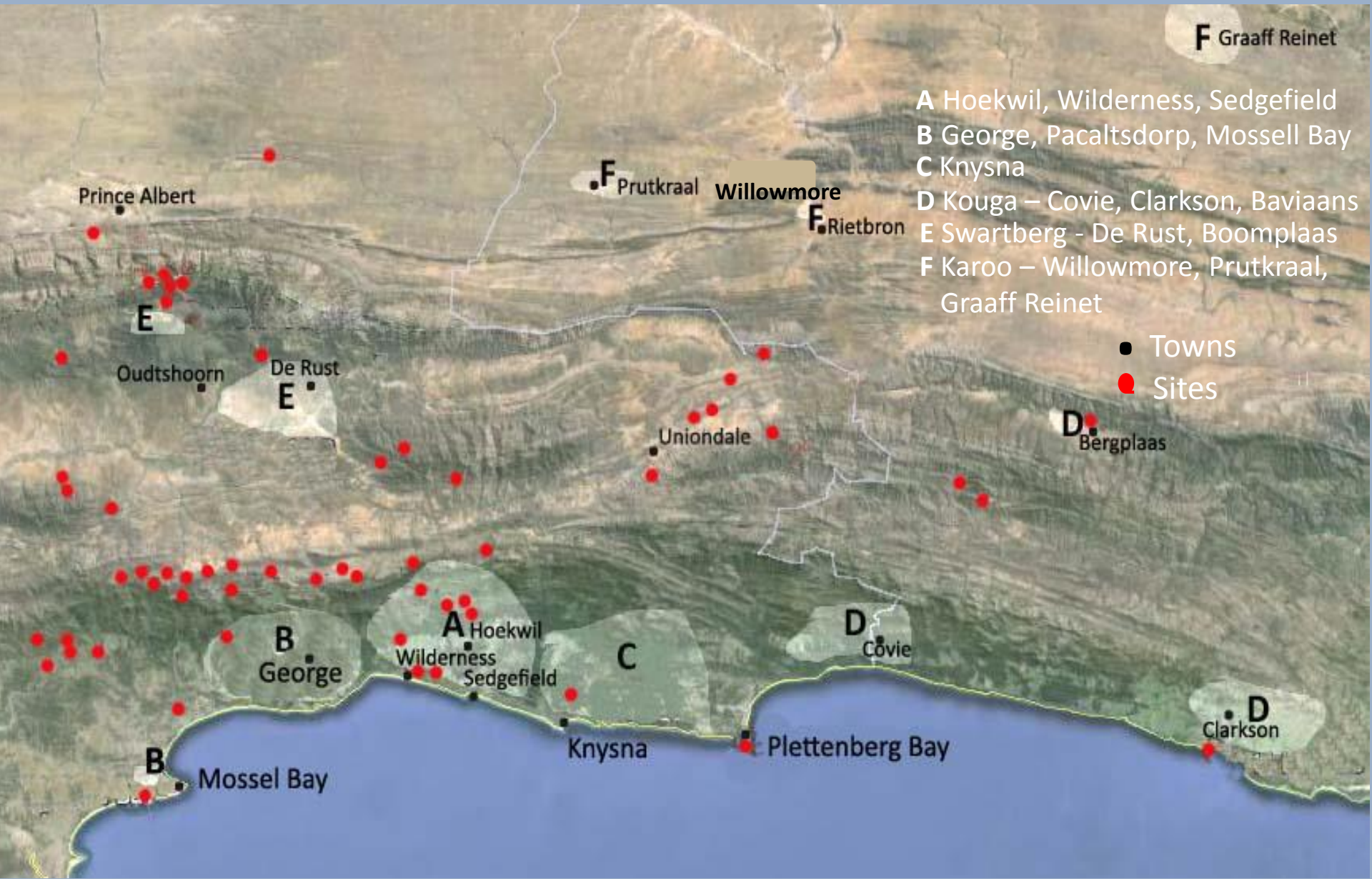
Janie and Olive walking-in-the-veld just above the Klasies River



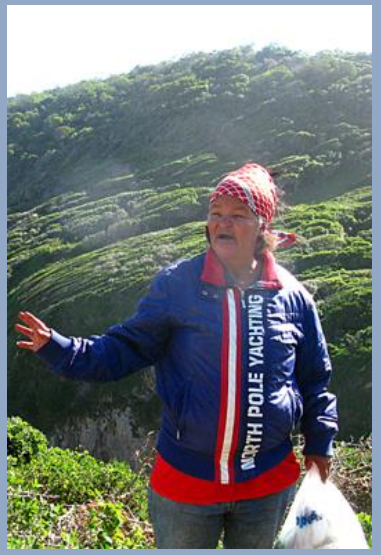
Overlooking Klasies River – Renee and Olive with Janie telling a Mermaid story

People & Place

Map of southern Cape with sites, towns, and participant communities



Place – people in the landscape & topophilia



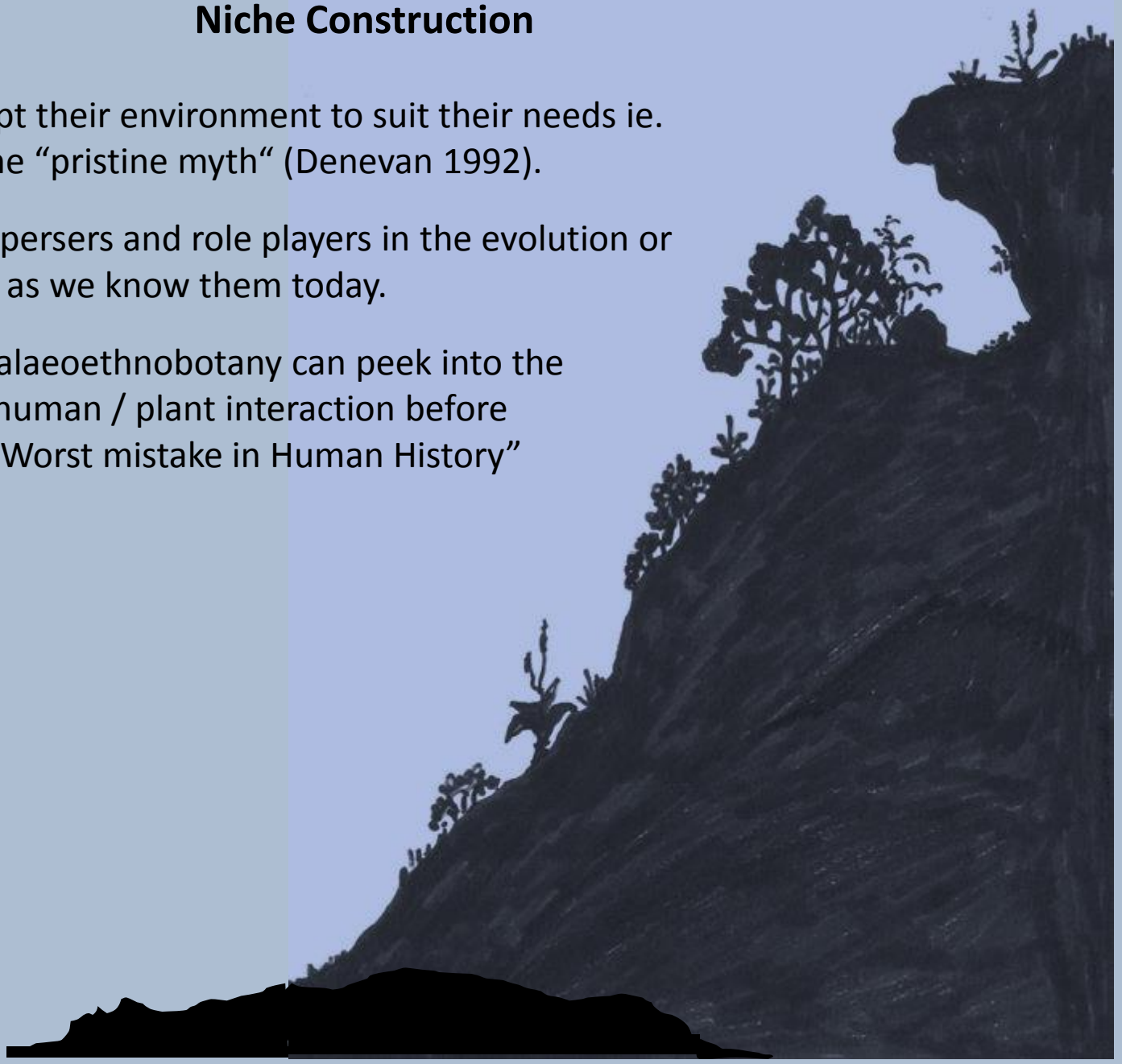
Janie walking alone with her memories across the pebbled coves below main site at Klasies.

Janie Windvogel joined us in 2016 and regaled us with stories about “watermeide”. She eagerly shared her knowledge of plants and their uses. She grew up close to the Klasies sites and had not been able to get back there for years. She revelled in being among the “bossies en bome” that she remembers from childhood.

Her obvious love for the wild vegetation, the beach, and the river views, were a sobering and sad reminder of all that so many people with a deeply felt topophilia have lost, due to their removal and exclusion from the areas where they lived for generations along the coastal strip. Janie remarked “m*y hart is seer dat ek so ‘n mooi plek moet weggaan*”.

Niche Construction

- All living things adapt their environment to suit their needs ie. construct niches. The “pristine myth“ (Denevan 1992).
- Humans as seed dispersers and role players in the evolution or speciation of plants as we know them today.
- Archaeobotany & palaeoethnobotany can peek into the millions of years of human / plant interaction before we fell for the “The Worst mistake in Human History” (Diamond 1997)



Place – Typical “Green Walls” sheltering entrances to sites

Place - Archaeological Context

- "*Without knowledge of the landscape, and without situating the rock art in relation to the features of the rock and the landscape, we cannot fully understand and interpret informed sources such as ethnography and histories, Rock Art is fundamentally based in the land*" (Ross M, 2001).
- *"… the tools of the Academy seldom transfer to others the wonder of place, person and history"* (Ouzman S, 2005)
- Research into animal (faunal) foods, and the consumption of seafood at coastal sites, has been dominant in archaeology. Archaeoethnobotany has only relatively recently become a factor.
- Climate and vegetation change have generally been the main drivers of archaeobotanical research to date, yet ethnobotany and archaeobotany act as important windows into the past.
- Current research into macro- and micro-botanicals is slowly painting a picture of what plants were present in the past, and were probably being used in various ways by past inhabitants of the sites.
- My results make a strong case for the wide use of the rich plant resources around archaeological sites in the past. Until more robust identifications of seeds, phytolyths, charcoals and pollen in the sediments are made it is difficult to quantify just how successfully modern use and presence can be used to extrapolate past use and presence.

Methods, Conventions, Problems

Methods for collecting ethnobotanical data should ideally be unbiased. No **leading** questions, plants collected and presented by participants themselves, and **all** information noted. Walks-in-the-veld where participant leads and offers information of their choice.

The Genus as terminal taxa – Indigenous / traditional taxonomy reveals the common substitution of morphologically similar related species or genera, with similar properties (Hather, 1994; Bonzani 1996). Chemotaxonomy and Phylogenetic research supports the scientific validity of this practice (Yessoufou K, Daru B H, Muasya A M, 2015; etc.).

Insistence on Identification to the species level and ignoring species and genera substitution by traditional / indigenous users in ecological, ethnobotanical, and archaeobotanical research, is counter-intuitive. Much published research is not reliable due to mis-identification at species level, or is not published at all although identifications to genus level are made.

It is not possible to compare presence sites with non-presence sites – No evidence of presence is not proof of absence. Wherever the topography affords some sort of niche suited to either hominin habitation or presence, some evidence of anthropogenic effect can be found. Stone tools, paintings, pottery shards, ochre, ostrich eggshell, and the anthropogenic plant taxa.

San Bushmen and Khoekhoen are not extinct, their genes are strongly present in the majority of modern “coloured folk” in the Cape today (Lombard M, Schlebusch C M, Soodyall H, 2013). It is difficult to separate them morphologically or by DNA. No acceptable name for a cohesive group is as yet agreed, Khoisan or KhoeSan is normally used, but politically aware and the younger generation self-identify, and are attempting to unify, as Khoisan.

Problems

Non-archaeologists usually consider the millions of years during which early hominids and humans gathered and hunted in the area, as insignificant pre-history ecologically speaking = a time with no-history = at least 7 million years where little happened of relevance to us today.

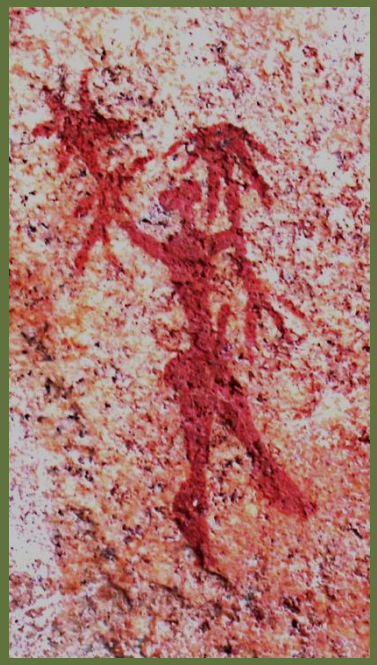
From the 1700's when adventurers and explorers began documenting their travels through the area (Skead C J, 2009), "History" was written and viewed through the lens of Western European concepts of "civilisation" versus "primitive pre-history".

There is a paucity of research into the both the history (and pre-history) of the original San (Bushman) and the later Khoekhoen of the Cape, South Africa and Africa, in general. They are the Forgotten People (De Jongh M, 2016), who have been effectively eradicated from the story and been lost in the Great Forgetting (Quin D, 1996).

Emphasis on the use of geophytes as a major source of protein and fall-back foods in the area (Deacon H, 1993; Singels E, Esler K J, 2016), obscures the importance of fruits, whole plants, and leafy herbs, as foods and especially as medicines used by early humans and pre-colonial San-Bushmen and Khoekhoen.

It is almost impossible to be certain how archaeobotanical remains might have been used in the past, so we recorded ethnobotanical data for a wide range of uses - food, medicine, fuel, and other utilitarian plant uses.

"With every audience and every individual, I have to begin by making them see that the cultural self-awareness we inherit from our parents and pass on to our children is squarely and solidly built on a Great Forgetting that occurred in our culture worldwide during the formative millennia of our civilization".



"Historians wouldn't touch this other stuff, and here's the excuse they fashioned for themselves. They didn't have to touch it … because it wasn't history. It was some newfangled thing called prehistory. . . What was forgotten in the Great Forgetting was not something important, it was just prehistory. A huge, long period of nothing happening".

"The Great Forgetting"
By Daniel Quinn
(Excerpt from "The Story of B" 1996)

Value Adding

What sort of value are we adding?

Who or what does ‘added value’ ultimately benefit?

Who will dare to move beyond our Western Worldview?

Is it too late?

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Autochthonous = Origin in and pre-historic occupation of the land or a country
Hominid = All modern and extinct great apes. Gorillas, chimps, orangs, and humans, and their immediate ancestors.
Hominin = Any species of early human that is more closely related to humans than chimpanzees, including modern humans themselves