Geography: a science for the ages

Luke Sandham *20 September 2021*

I am a Geographer

What does a Geographer do?

Quote from Peter Gould: *The Geographer at work*

“”….Yes, a geographer, I said with that quietly enthusiastic confidence that trips so easily from the tongues of doctors, engineers, airline pilots, truckers, sailors and tramps. After all, everyone knows what they do, and off the conversation goes onto the new bridge, the awful flu epidemic, or the latest jet etc. But a geographer?

We are using a part-stochastic part-deterministic computer simulation model to examine the threshold values in a regional development programme

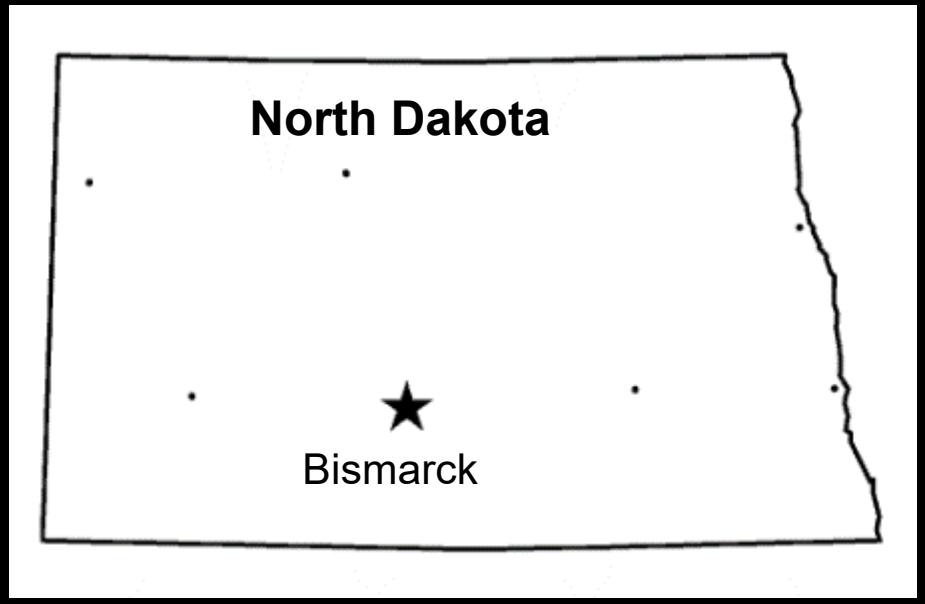
What does a Geographer do?

So that the next time someone says to me at a cocktail party "Oh you're a geographer are you? Er… what exactly do you do?

" I'm going to reply, I'm so glad you asked me that question.

I just happen to have a little book on me…" and I will reach into my pocket and hand him "The Geographer at work"

"*And perhaps in this way the glad tidings will spread. Even to those living in the capital of North Dakota*".



Next: The origins of Geography

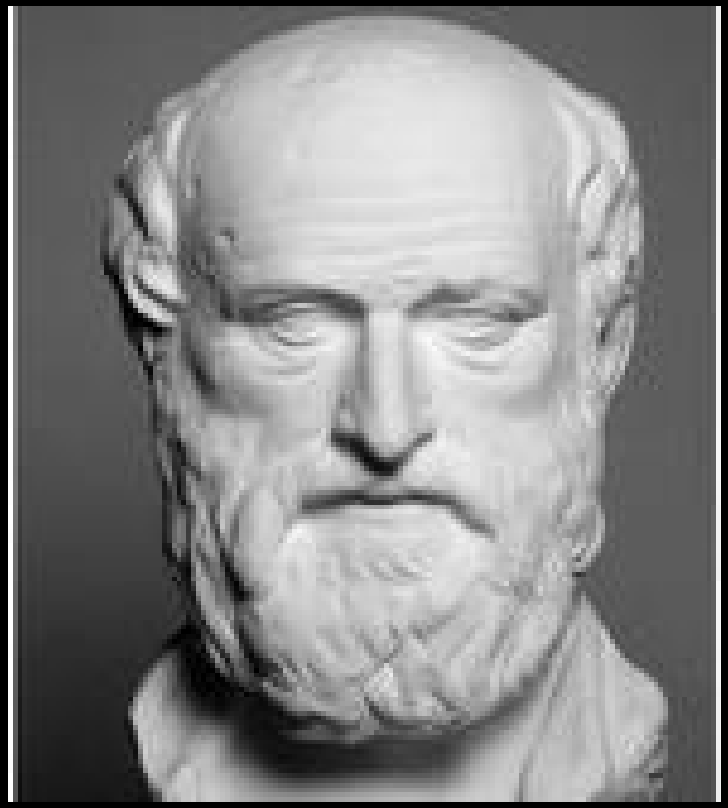
The origins of Geography

Three main periods – old *and* young science

1. Classical: c. 200 BC – c.1860 AD – Age of the polymaths
2. Modern: c.1860 – c.1960
3. Contemporary: ± 1960 - present

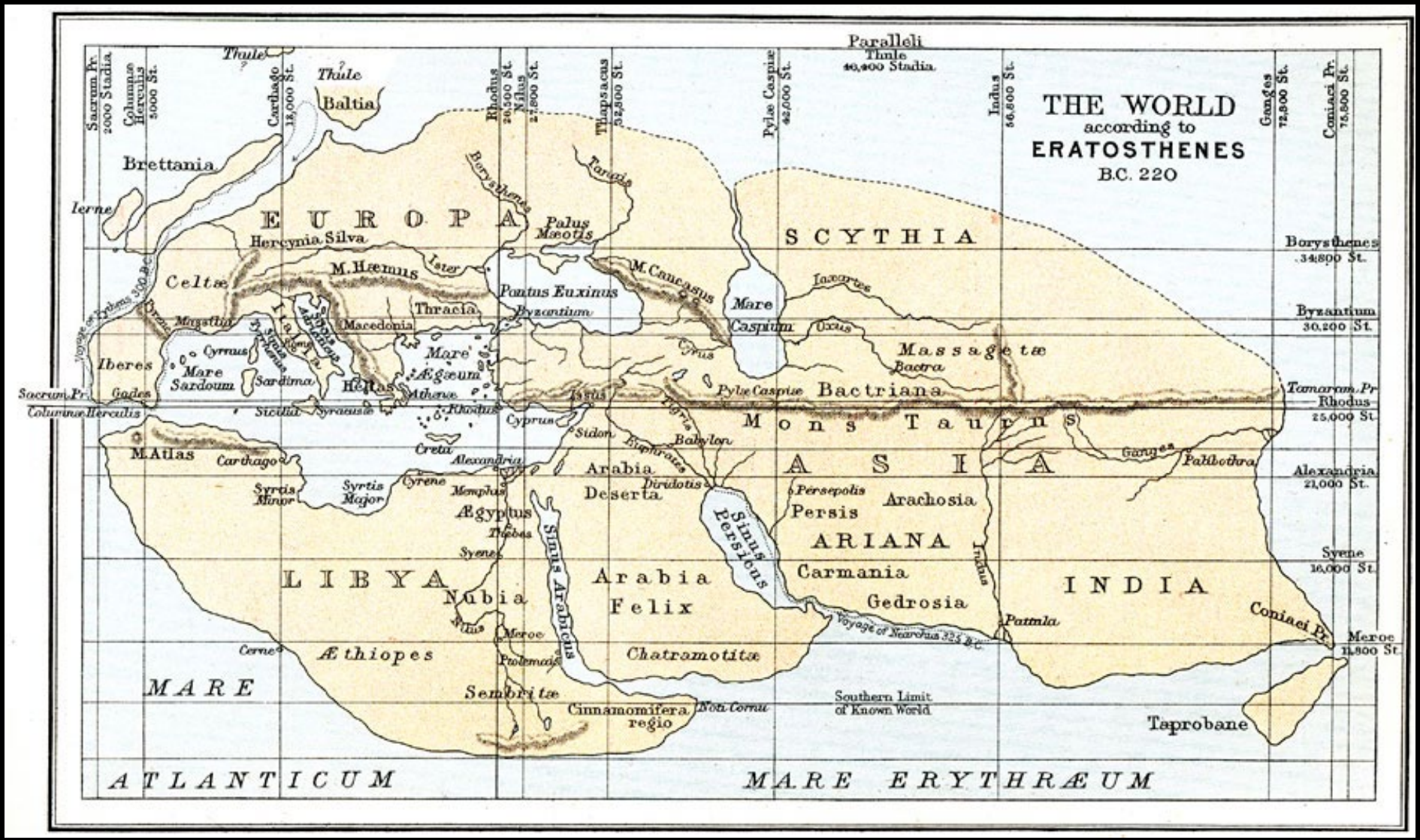
Classical period: Erasthostenes of Cyrene c. 276 BC – c. 194 BC)

- Greek polymath: geographer, mathematician, poet, astronomer, and music theorist.
- Chief librarian at the Library of Alexandria.
- First use of “Geography”
- First to calculate circumference of the Earth
- First to calculate tilt of Earth’s axis
- Created first map of the world, incorporating parallels and meridians based on available geographic knowledge



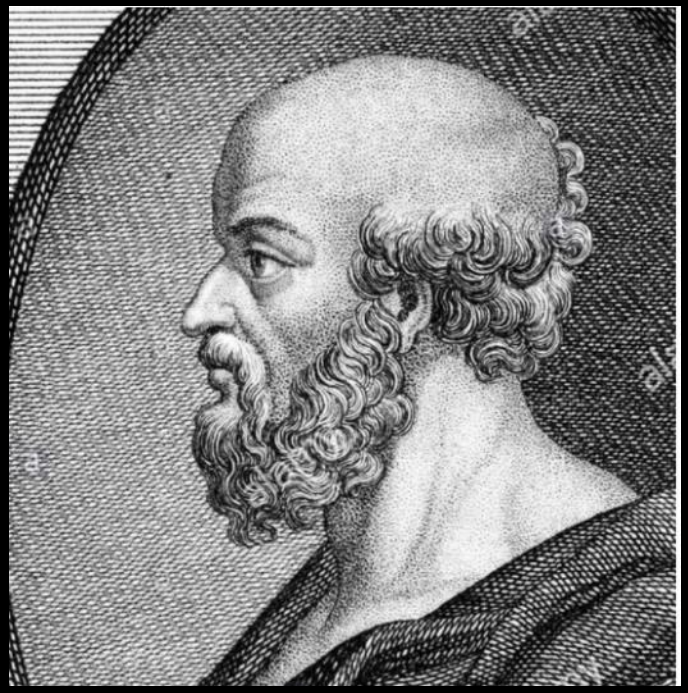
Erasthostenes

First world map - parallels and meridians - based on available geographic knowledge of his era.



Erasthostenes

- Eratosthenes yearned to understand the complexities of the entire world
- Core of Geography: interaction of mankind and the environment



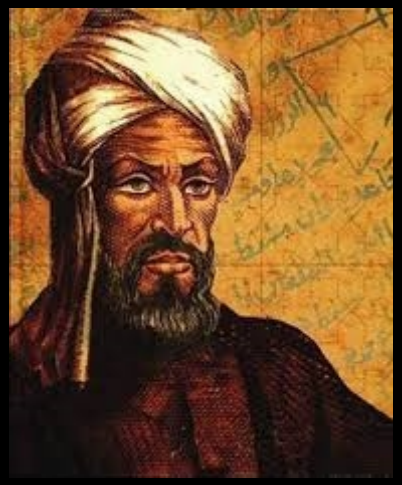
Classical period: 200 BC-1850 AD: age of the polymaths

After Greek empire - little support for academic inquiry - decline under Romans – 400,000 manuscripts lost 47 BC when Romans burned Alexandria harbour

Middle ages – Geography slumbered as part of wider decline of science

7th century Islamic expansion → scientific enquiry not stifled → geography, maths, astronomy flourished in centres of learning in Cairo, Algiers and Timbuktoo

Al Khorizmi – persian mathematician and geographer and astronomer – gave us the word algorithm



Classical period: 200 BC-1850 AD

1453 – Renaissance and the age of exploration

1486 – 1522: Diaz, Columbus, Da Gama, Magellan

1769 – 1780: Cook – pacific voyages

Navigation needs maps

Much new to describe and to map

16th century: 2 fundamental innovations:

– rise of academic freedom ⇒ “free” universities

– separation into distinct disciplines ⇒ widespread by mid 19th century

<u>The last of the polymaths:</u>
Alexander von Humboldt and Carl Ritter

Classical period ended with their deaths in 1859

Next: The modern period

2. Modern period: c.1860 – c.1960

- Establishment of Geography as a discipline in university departments around the world
- Descriptive tradition – maps of land use
- Regional checklists and inventories
- Regional monographs – describing the features of physical and human environment of a region
- Train schoolteachers

- Sub-disciplines: Geomorphology, Climatology, Biogeography, Urban Geography, Economic Geography, Political Geography, etc.

Next: The Contemporary period

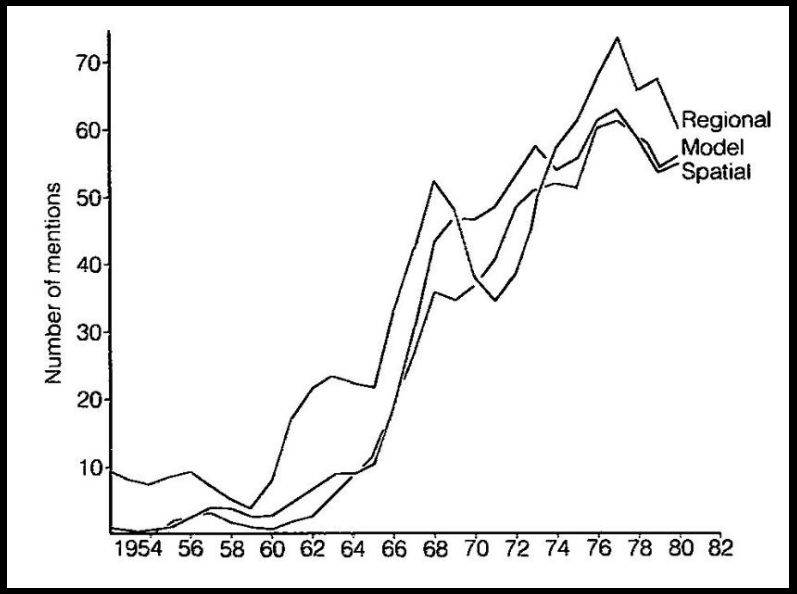
3. Contemporary period: c.1960 – present

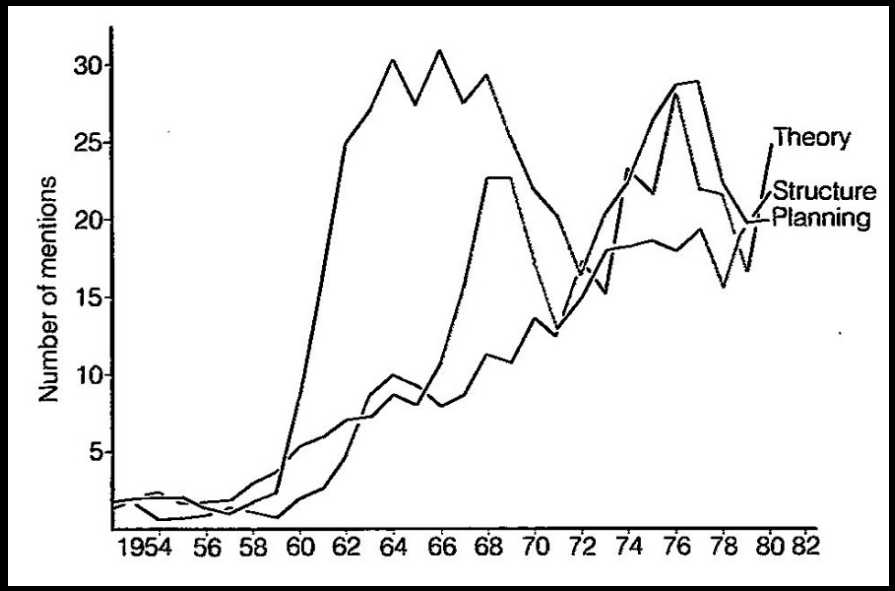
Quantitative (r)evolution

Rapid increase in use of new terms – counted in titles of papers in English language Geography journals

Reflect new way of thinking

– e.g. *model* of land use patterns ⇒ attempt at understanding and explanation ⇒ very different perspective to mapping land use of a *specific* region





3. Contemporary period: c.1960 – present

Quantitative (r)evolution

Previous slide reflected the early years of revolution

Similar patterns for more recent words :

Environmental management, sustainability, GIS, resilience, global warming, visual impact assessment, environmental impact assessment (EIA)…….

Reflect new way of thinking

– e.g. *resilience* - effort to understand and explain how communities respond to adversity ⇒ very different from describing how a specific community copes with a drought

Next: Geography in South Africa

Geography in South Africa

	University	Established	Age
1	Stellenbosch	1914	107
2	Wits	1917	104
3	Pretoria	1920	101
4	Rhodes	1921	100
5	Free State	1922	99
6	Potchefstroom	1934	87
7	Cape Town	1935	86
8	Natal Durban	1941	80
9	Fort Hare	1944	77
10	Unisa	1946	75
11	Military academy	1950	71
12	North	1960	61
13	Western Cape	1961	60
14	Zululand	1961	60
15	Durban Westville	1962	59
16	Port Elizabeth	1965	56
17	RAU	1968	53
18	Transkei	1976	45
19	Bophutatswana	1980	41
20	Venda	1982	39
21	VISTA	1982 - 2003	21
22	Monash	2001	20
23	Mpumalanga	2017	4
24	Sol Plaatje	2019	2

South African Geographical Society 1916

- Established in all Universities
- Mostly along with university itself
- Straddles modern and contemporary periods

Next: Geography at Potchefstroom

Geography at Potchefstroom

NB: Not speaking about the other campuses – Vaal had it briefly, Mafikeng was another University

Founded 1934

1. 1934 - 1970: only degree programmes
2. 1970 - 1998: diplomas and post graduate
3. 1998 – present: fully fledged teaching and research

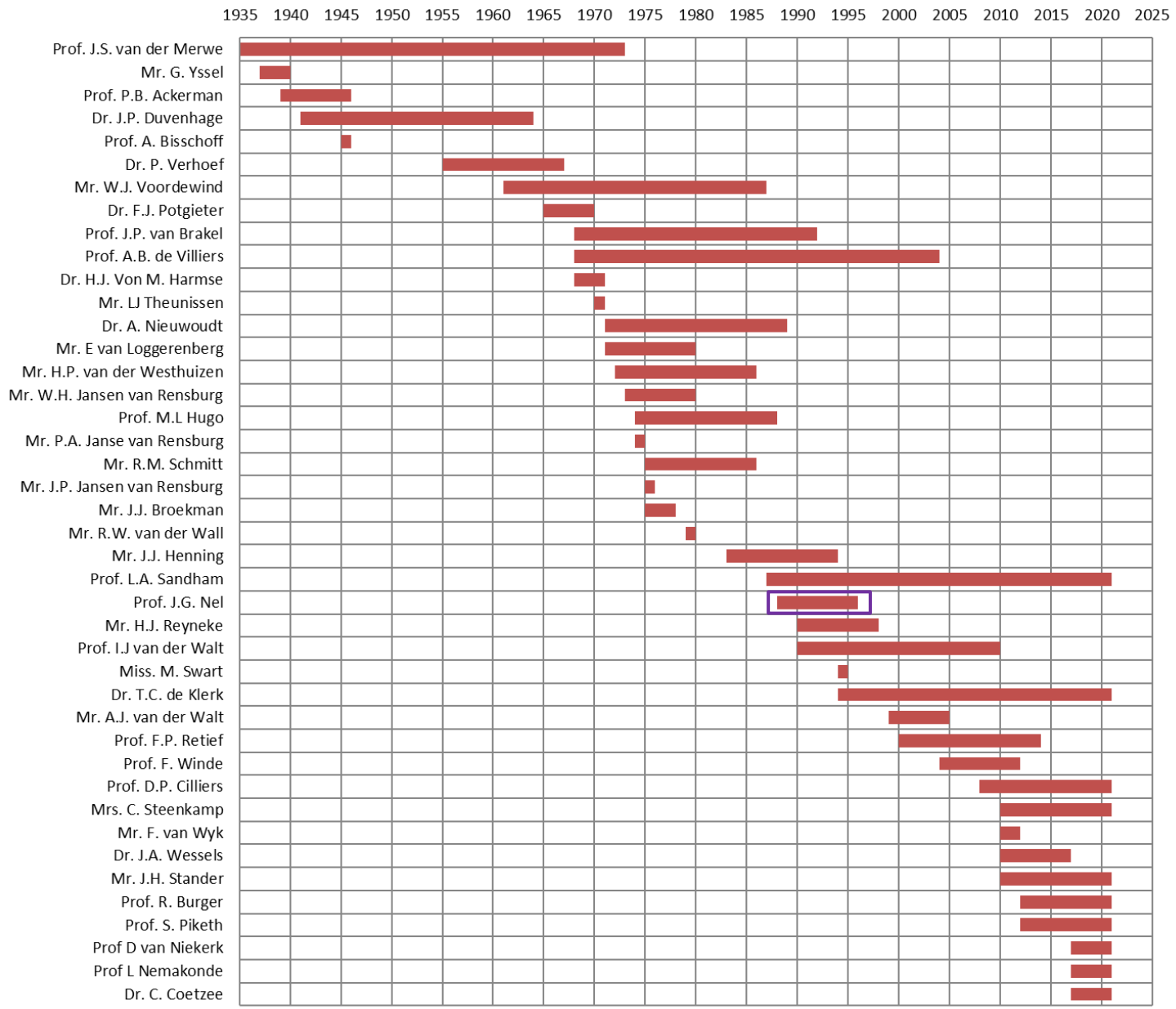
Disciplines becoming independent:

- Geology - 1946
- Town and Regional Planning - 1970
- Soil Science - 1971

Prof Jan van der Merwe

Humble beginnings

Permanent academic Geography staff (1935-2021)



Geography and Environmental management

1980's - Advent of Environmental Management, including Environmental Impact Assessment – spearheaded by Johan Nel

Environmental Management (EM) = management of human actions to achieve sustainability in the natural environment

Environmental Impact Assessment (EIA) = assess in advance whether a development project will have adverse impacts on human and biophysical environment

- Mandatory in South Africa since 1998
- By 2012 virtually all countries had EIA
- Very widely used EM tool

Geography and Environmental management

- Environmental Management also in most other Geography departments in South Africa
- Geography as academic home of EM is contested
- But…..impacts happen in a place and are connected to other elements of the environment ⇒ Geographers have an advantage because of wholistic, integrated, spatial perspective
- Many sciences study items too small for the human eye, whereas Geography studies phenomena too big for the human eye
- Some sciences need greater magnification – Geographers generally need to stand back to be able to see bigger picture more clearly
- "***from too close looking follows loss of sight***" Jacquetta Hawkes
- In Environmental Assessment – bigger picture is usually more important

Geography in my research

Acknowledgement: contributions and collaboration of colleagues and students – not possible without them

1. EA and Geography
2. EIA effectiveness: EIA report quality
3. Social Impact Assessment and Disaster Risk Assessment
4. Geographies of festivals
5. EIA in Africa

1. Geography and Environmental Management: EA and GGF competences

1. Geography core competences:
   - holistic, interdisciplinary and spatial thinking.
   - emergence of EM - particularly EA - in recent decades, demonstrates how these competences underpin both practice and research in EA :
2. Significant Geography contributions to EA practice
   - extent of EA training in Geography curricula
   - uptake of Geography competences in EAP training
   - a body of skilled and dedicated environmental practitioners
3. Significant Geography contributions to EA research.
   - Telling part of peer-reviewed EA research in South Africa by Geographers or from Geography departments

Geography is the principal disciplinary home of EA : training **and** research.

2. Geography and EIA report quality (EIARQ)

Rationale for EIARQ, as a component of EIA effectiveness

1. Decisions for authorization based largely on content of the EIAR
2. Premise: Good decision (to enhance sustainability) more likely from a high-quality report.
   Not guaranteed – good report ⇒ bad decision
   Bad report ⇒ good decision;
   Likelihood for a good decision improves with quality of report

EIARQ is evaluated using review packages

- multi-tiered criteria, measured on A-F Likert scale
- review relevant aspects of EIA process for a project
- measure against best practice for a good EIA report
- Includes compliance to minimum requirements

Caveat: EIARQ is only ONE dimension of EIA effectiveness

2. Geography and EIA report quality (EIARQ)

		AQ	BP	BW	OH
Overall score		**C**	**B**	**B**	**C**
RA 1	**Description of development environment**	**D**	**C**	**B**	**C**
1.1	**Description of the development**	**C**	**C**	**B**	**C**
1.1.1	Purpose and objectives	A	C	B	B
1.1.2	Design and size	A	B	A	B
1.1.3	Presence and appearance of completed development	C	B	C	D
1.1.4	Nature of production processes	B	N	N	N
1.1.5	Nature & quantity of raw materials	C	C	B	E
1.1.6	Identification of applicant	A	A	A	A
1.1.7	Details of EAP	A	A	A	A
1.2	**Site description**	**E**	**D**	**B**	**D**
1.2.1	Area of development site	E	A	A	B
1.2.2	Demarcation of Land use areas	F	B	A	B
1.2.3	Duration of different phases	C	C	B	F
1.2.4	Estimated number of workers and/or visitors	E	D	F	F
1.2.5	Means of transporting raw materials, products and quantities	C	D	B	E
1.3	**Wastes**	**E**	**C**	**C**	**E**
1.3.1	Types and quantities of wastes	D	B	C	F
1.3.2	Treatment, disposal and routes	E	D	B	E
1.3.3	Methods of obtaining quantity of wastes	F	B	E	F
1.4	**Environment description**	**D**	**A**	**B**	**B**
1.4.1	Area to be affected	A	A	A	A
1.4.2	Effects occurring away from immediate affected environment	D	A	B	C
1.5	**Baseline conditions**	**B**	**B**	**B**	**B**
1.5.1	Important components of affected environment	A	B	B	B
1.5.2	Existing data sources	C	B	B	B
1.5.3	Local land use plans, policies consulted	A	N	B	B

		AQ	BP	BW	OH
RA 2	**Identification and evaluation of key impacts**	**C**	**C**	**B**	**C**
2.1	**Definition of impacts**	**C**	**B**	**B**	**C**
2.1.1	All possible effects on environment	C	B	B	C
2.1.2	Interaction of effects	C	A	B	A
2.1.3	Impacts from non-standard operating conditions	C	D	B	F
2.1.4	Impacts from deviation from baseline conditions	B	B	B	C
2.2	**Identification of impacts**	**C**	**C**	**D**	**D**
2.2.1	Impact identification methodology	C	C	D	C
2.2.2	Impacts identification method used	D	D	D	D
2.3	**Scoping**	**A**	**A**	**A**	**B**
2.3.1	Contact general public and special interest groups	A	A	A	A
2.3.2	Collect opinions and concerns of I&APs	A	A	A	B
2.3.3	Key impacts	B	A	A	B
2.4	**Prediction of impact magnitude**	**B**	**C**	**C**	**C**
2.4.1	Data to estimate magnitude of Main impacts	B	B	C	C
2.4.2	Methods used to predict impact magnitude	B	A	A	C
2.4.3	Predictions of impact in measureable quantities	B	C	C	D
2.5	**Assessment of impact significance**	**B**	**C**	**B**	**C**
2.5.1	Significance on affected community and society	C	B	A	B
2.5.2	Significance i.t.o. of national and international quality standards	B	B	B	C
2.5.3	Method of assessing significance	B	D	B	E
RA 3	**Alternatives and mitigation**	**B**	**B**	**B**	**B**
3.1	**Alternatives**	**B**	**C**	**B**	**D**
3.1.1	Description of alternative sites	B	A	B	B
3.1.2	Description of alternatives	C	B	B	E
3.1.3	Rejected alternative identified	B	D	D	N
3.1.4	Comparative alternatives assessment	B	C	B	C

		AQ	BP	BW	OH
3.2	Scope and effectiveness of mitigation measures	**B**	**A**	**B**	**C**
3.2.1	Consider mitigation of all significant adverse impacts	B	A	A	B
3.2.2	Mitigation measures	B	A	A	C
3.2.3	Extent of effectiveness of mitigation when implemented	B	A	C	C
3.3	**Commitment to mitigation**	**B**	**A**	**A**	**B**
3.3.1	Record of commitment to mitigation measures	B	A	A	A
3.3.2	Monitoring arrangements	B	A	B	B
RA 4	**Communication of results**	**B**	**B**	**C**	**B**
4.1	**Layout of the report**	**A**	**B**	**C**	**B**
4.1.1	Introduction	A	B	B	B
4.1.2	Information logically arranged	A	C	C	B
4.1.3	Chapter summaries for very short chapters	B	B	N	B
4.1.4	External sources acknowledged	A	A	C	B
4.2	**Presentation**	**A**	**A**	**A**	**C**
4.2.1	Presentation of information	A	A	A	B
4.2.2	Technical terms, acronyms, initials defined	A	A	A	C
4.2.3	Statement presented as an integrated whole	A	A	A	C
4.3	**Emphasis**	**C**	**A**	**B**	**B**
4.3.1	Emphasis to potentially severe impacts	B	A	C	B
4.3.2	Statement must be unbiased	C	A	A	B
4.3.3	Opinion as to whether activity should/should not be authorized	B	A	A	A
4.4	**Non-technical summary**	**A**	**B**	**D**	**B**
4.4.1	Non-technical summary of main findings & conclusions	A	B	D	B
4.4.2	Summary must cover all main issues	A	B	D	B

2. Geography and EIA report quality (EIARQ)

Available online at www.sciencedirect.com
ScienceDirect
Environmental Impact Assessment Review 28 (2008) 229–240
Environmental Impact Assessment Review
www.elsevier.com/locate/eiar

A review of EIA report quality in the North West province of South Africa

Luke A. Sandham [a,*], Hester M. Pretorius [b,1]

- Wetlands
- Mining
- Biological control
- Railway projects
- Improvement over time
- National parks
- Housing developments
- Quality of biodiversity inputs
- Projects affecting military activities

Findings:

- In line with international trends
- Mostly satisfactory in descriptive sections
- Weaker performance in analytic sections e.g. impact significance, mitigation and alternatives

- Body of competent EA practitioners

2. Geography and EIA: further spatialities

Why is EIARQ part of Geography?

1. Development project ⇒ location bound
2. Significance ⇒ includes size & spatial extent – local / regional / national / international
3. Fauna & flora ⇒ spatially distributed
4. Economic impact ⇒ location linked
5. Social impact ⇒ where are the people?
6. Visual impacts ⇒ location of viewer, i.e. no viewer ⇒ no impact
7. Heritage impacts ⇒ location bound. Some can be relocated e.g. graves

3. SIA & Disaster Risk Management

Series of papers investigated performance of Social Impact Assessment and integration with Disaster Risk Assessment

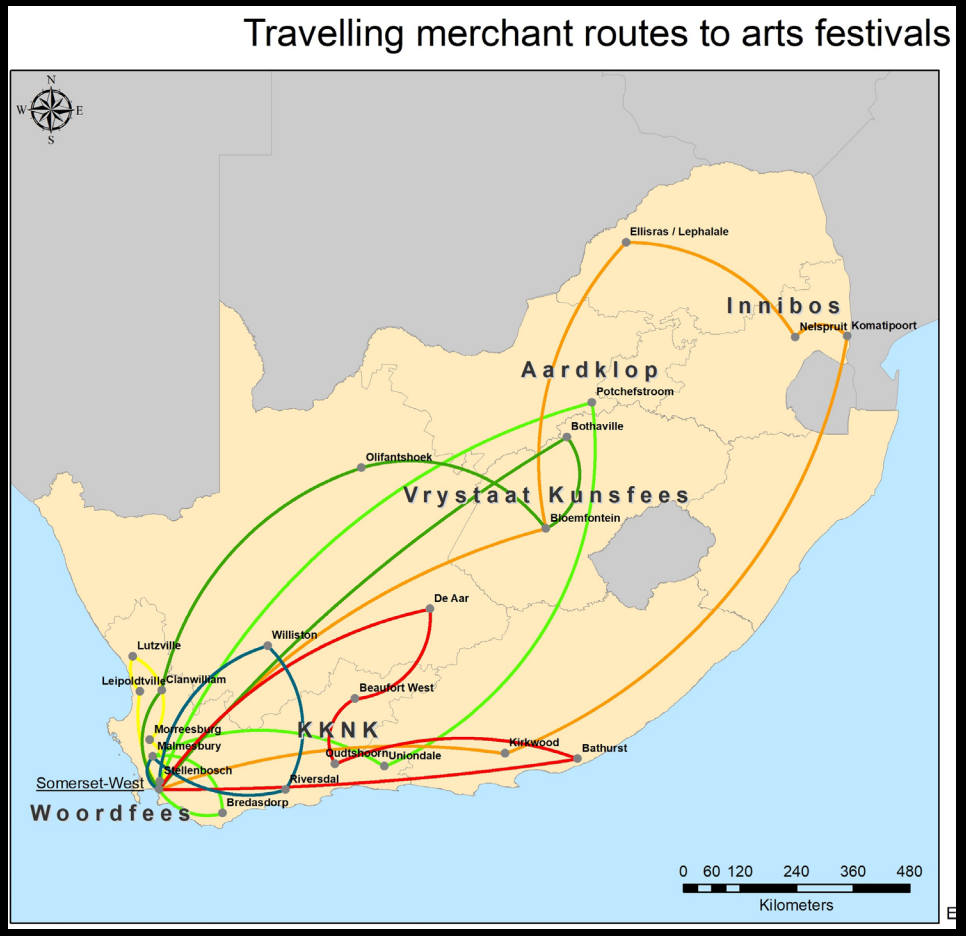
- Performance of SIA
- SIA report quality
- Practitioner perspectives of SIA
- Improved SIA by integration with DRA
- SIA and DRA integration for increased resilience
- Discourses in SIA and DRA practice

Conclusions: SIA neglected compared to biodiversity – Cape flats example. Good scope for improving SIA practice by integration with Disaster Risk Management

4. Geographies of arts festivals

1. Each festival strives for unique character
2. Local sense of place → major contributor to festival atmosphere and character
3. Influenced by locality – climate, landscape, local culture, etc.
4. Countered by shared role-players and duplication of content e.g. nomadic stall holders – same product at every festival

Exploring these spatialities



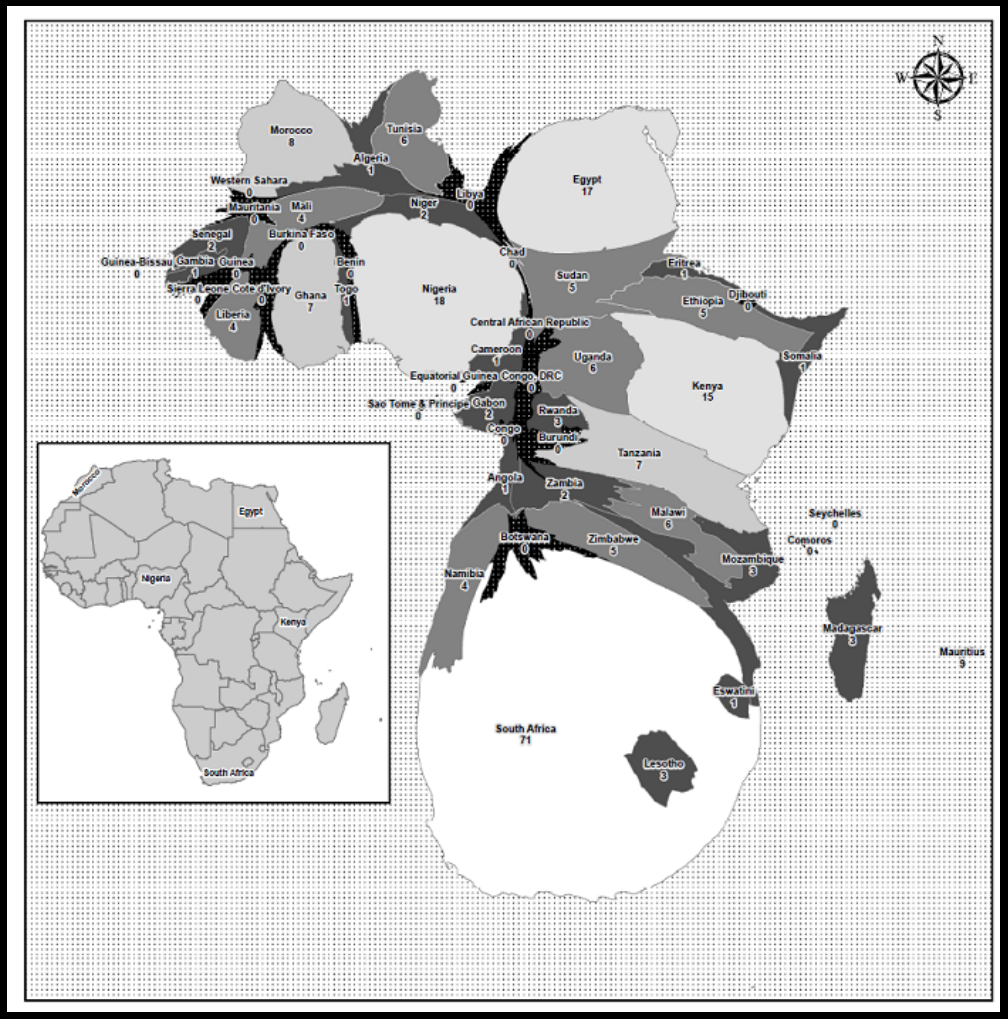
5. EIA in Africa

Status of EIA practice in Africa - By comparison of published research to IAIA international principles for best practice. Scopus search ⇒ 246 peer reviewed papers on EIA in Africa

Several themes emerged from analysis of papers

- Origin of papers shows spatial variation
- Most research from English language countries

- Need to recognize <u>unique local context</u> – spatial



Relevance of Geography today: Covid 19

Covid 19 spatiality

- track & trace
- pathways & hotspots
- containment measures
- movement of virus modulated by lockdown
- social distance

Epidemiology- essentially spatial
Inextricably connected to origin – destination concept

- Spatial perspective vital for understanding

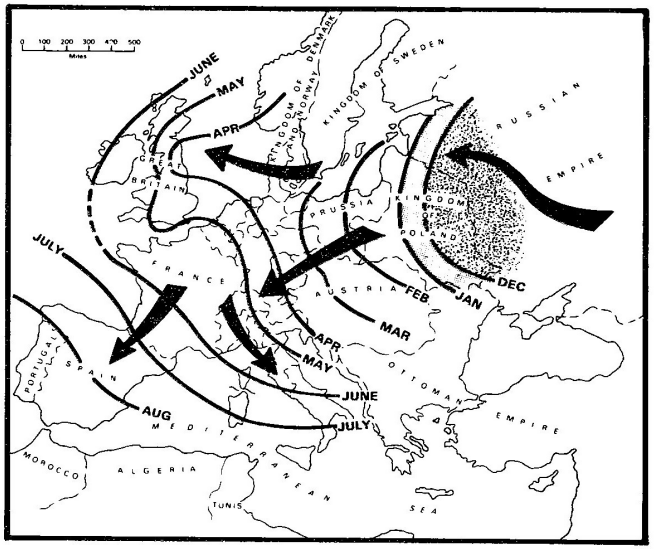


Figure 19.4: The diffusion of influenza in Europe during the 1781–82 pandemic. Arriving from the Russian Empire, it took nearly eight months to spread to the Iberian Peninsula.

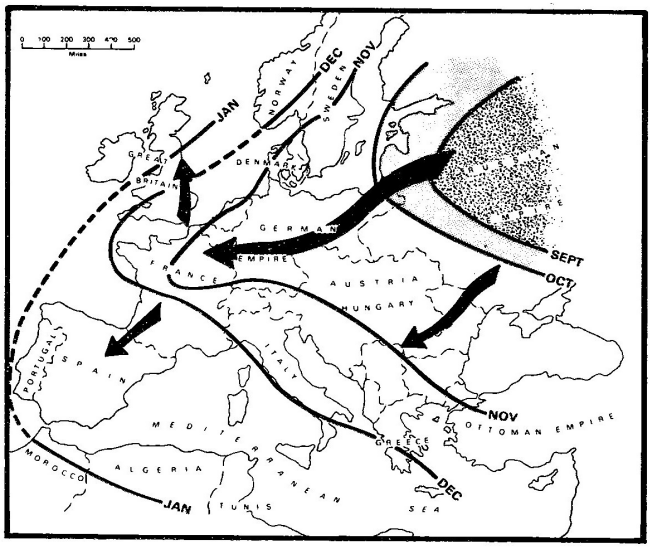


Figure 19.5: The diffusion of influenza in Europe during the 1889–90 pandemic. With a greatly lowered friction of distance one hundred years later, it took only four months to sweep through the continent.

Relevance of Geography today: Covid 19

In 2001, Peter Haggett, writing on the global burden of disease, listed Geographers' five challenges to disease control:

1. Disease control likely less dependent on spatial barriers
2. Rapid reporting and surveillance increasingly critical
3. Ever-widening list of communicable diseases and high cost of surveillance make sampling essential
4. Geographic models will increasingly supplement other epidemiological tools in global control
5. Disease control and socio-economic development more closely tied together

WHO: Disease code Z59.0:
World's most ruthless killer = Extreme poverty

Relevance of Geography today: Covid 19

Peter Haggett (2001) :

- Each century, public health has had to fight disease with the tools available and the constraints imposed at the time.
- The 21st century will be no exception as it prepares to fight both old diseases causing old problems, old diseases causing new problems (e.g. drug resistance),
- as well as **wholly new** diseases

Over the last two years we have seen how prophetic this has been.

It does not seem that the lessons have been learned in South Africa

Relevance of Geography today: Afghanistan

Not the first time a would be conqueror has departed job not done

Relevance of Geography today: Afghanistan

1. **Darius the Great**: 6th century BC, absorbed into Persian empire - constant uprisings -Persians never established effective control
2. **Alexander the Great**: 3rd century BC - Invaded - harsh, mountainous terrain, brutal weather, Afghans formidable - Constant revolts
3. **Genghis Khan:** In 1220, Central Asia overrun by Mongols - failed to destroy strength of Islam by the end of 13th century, his descendants were themselves Muslims.
4. **Britain:** 3 major interventions 1838 to 1919 All ultimately failed.
5. **Soviet Union:** 1979 –115,000 troops - extended guerrilla war.
   1989 - Soviets withdrew
6. **USA:** invaded 2001 – withdrew 2021

Why is it so difficult?

Afghanistan

Afghanistan August 2021: Geography perspectives

- Dry & mountainous terrain
- Landlocked, with 7 neighbours
- Ethnicity – Pashtun, Tajiks & 7 others
- Interplay of human and physical environment

Complex situation which cannot be properly understood without a geographical perspective.

Acknowledgements - my own journey

- My creator who gave us this wonderful world to explore
- My parents who stimulated us to think and to explore
- High school Geography teachers –
- Mr ABJ Kruger, Mr JC Swanepoel, Mr S Kruger



- Products of Geography at Potchefstroom – students of Prof Jan van der Merwe, founder of Geography at Potchefstroom
- Very apposite for me to become a professor where my Geography grandfather established it
- All my university lecturers, mentors and colleagues

Acknowledgements - my own journey

Our generation:

- Johan Nel who introduced me to EM and suggested the topic of EIARQ which has become a niche for me.
- Kobus van der Walt who laboured with me during tough times for Geography.
- Francois Retief who has opened many insightful perspectives for me and is a wonderful co-author.
- All my other colleagues from whom I have learned so much – Stuart, Dirk, Roelof, Theuns, Carli, Dewald, Leandri, Livhu, Christo, Manna, Claudine and Reece. What a wonderful group of people to keep Geography and Environmental management relevant

- My wife Eleanor for constant support, encouragement, and excellent map reading when we explore new places.