
Using a transdisciplinary approach for environmental crisis research in History*

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Abstract

Although it is true that each local area or region possesses its own historiography – and for that matter its own environmental historiography – there should not be much difference in the research methodology, sources and pitfalls or drawbacks of doing environmental history research in labelled environmental crisis areas. This article presents a concise historiography on dealing with environmental crisis in literature is provided. This is followed by a proposed transdisciplinary (TD)-methodological structure that can serve as a guideline to specifically to environmental historians, and perhaps other disciplines in the humanities, that studying local or regional environmental crises. A local environment in South Africa, namely the Far West Rand, serves as an example for conducting TD research that features an environmental crisis.

The paper concludes by also, amongst others, suggesting that environmental historians and other environmental experts in a variety of fields and disciplines in South Africa and Africa should form an Environmental Studies Association to support one another, particularly in their efforts to work together in interdisciplinary and transdisciplinary ways with researchers from a broad range of academic fields. This paper therefore serves merely as a debate to open up discussions for refining the perspectives and existing methodologies of research in environmental history.

Keywords: Environmental History; Environmental Research Methodology; Transdisciplinary research; Far West Rand research; Environmental crisis research.

Disciplines: History, Environmental studies, Research Methodology.

Introduction

In the past two or three decades, historians in African environmental issues have been alerted to fresh subjects of investigation relating to the exploitation and conservation of natural resources

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as well as the effects of climate and specific geographies. They have also promoted thinking about new sources of evidence within histories of environmental crises. It has also been realised that such issues need to be seen within an international framework.¹ For example, although not much attention had been paid to historical research of the local environment in France by the early nineteen-eighties, local environmental research in Great Britain was flourishing, and the political history of conservation in the United States was already well established.

In 1983, Worster pointed out that the destruction of ecosystem cultures by marketplace ideas and institutions has been going on for roughly four hundred years. Worster continues, “The outcome of that research agenda would be, I believe, a revival of the local and regional historical inquiry along with an awakened global imagination.”² After 27 years has passed it can be confirmed that Worster’s beliefs indeed is correctly predicted, at least as far as it concerns South Africa.³ Environmental destructions happen to be world-wide within many local and regional areas. Environmental destructions also are more than often inextricably linked to economic motivators; politics of denial and a lack of coordination on community and professional levels to accentuate and contest⁴ the seriousness of an environmental crisis. Though it may be said that environmental history has retreated into the dominant historiographies of each region,⁵ it is also true that outcomes obtained from research on historical environmental crises concerning local issues may create the required insight to deal with similar issues nationally and internationally.

Though much can be written about the meaning “environmental crisis” and the libraries full examples of specific local and regional histories in which environmental crisis histories are recorded,⁶ the focus of this article is to mainly provide a concise literature discussion on environmental crisis, followed by a debate on the transdisciplinary approach to research in a local environmental crisis context. A local environment in South Africa, namely the Far West

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- 1 Donald Worster refers to Britain, France and the United States as the countries where environmental history has flourished impressively. See D Worster, “World without borders: The internationalizing of environmental history”, *Environmental Review*, 6(2), Autumn 1982, pp. 8-13.
 - 2 D Worster, “World without borders: The internationalizing of environmental history”, *Environmental Review*, 6(2), Autumn 1982, pp. 8, 11-12; D Worster (ed.), *The ends of the earth: Perspectives on modern environmental history* (Cambridge University Press, Cambridge Sydney, 1988).
 - 3 See J Carruthers, “Transnational and disciplinary aspects of the environmental history of Africa” (Keynote address, International conference, Humankind and nature at the intersection of culture, Kruger National Park, 4-6 Sept. 2006), p. 2.
 - 4 Compare the contesting of a crisis in F Buell, *From apocalypse to way of life: Environmental crisis in the America Century* (New York, Routledge, 2003), pp. 1-390.
 - 5 See J Carruthers, “Transnational and disciplinary aspects of the environmental history of Africa” (Keynote address, International conference, Humankind and nature at the intersection of culture, Kruger National Park, 4-6 Sept. 2006), p. 2.
 - 6 Compare the discussion of A Hornborg, “Introduction: Environmental history as political ecology”, as in A Hornborg, JR McNeill and JMartinez-Alier (Eds), *Rethinking environmental history. World-system history and global environmental change* (New York, Altamira Press, 2007), pp. 1-23; JJ Walmsley and RD Walmsley, The environmental science research infrastructure in South Africa. A discussion document (Foundation for Research (FRD) Programme Series, no. 7, December 1993), p. i.

Rand, serves as an exemplary area for conducting TD research that features an environmental crisis.⁷

Environmental crises: Aspects from the literature

“Slow” and “fast” environmental crises

In any environmental history labelled as a history in which a “crisis” occurred, human factors will and should always be directly or indirectly part of the “crisis”; they are not merely “spin-offs”.⁸ Environmental crises can be divided into “slow” and “fast” crises. “Slow” crises happen over time due to natural or man-made factors with which man is familiar or with which he has gradually become familiar and due to environmental constraints the course of which cannot necessarily be changed overnight. “Fast” environmental crises, on the contrary, can be a result of human interference or constraints or occur due to natural consequences occurring rapidly. Environmental historians mainly focus on researching, amongst others, “slow” environmental crises. However, some sometimes also get caught up in “fast” environmental crises that have happened in the immediate past because it may often happen that some “fast” crises have historical roots that make linkages and comparisons possible.

Some roots of transdisciplinary environmental crisis history research

Environmental crises are still mostly unsolved or insufficiently addressed in modern research and environmental remediation processes. In this regard, the following quote by McNeill from the writings of Machiavelli in 1513 is spot-on:

It happens then as it does to physicians in the treatment of consumption, which in the commencement is easy to cure and difficult to understand; but when it has neither been discovered in time nor treated upon a proper principle, it becomes easy to understand and difficult to cure. The same thing happens in state affairs; by foreseeing them at a distance, which is only done by men of talents, the evils which might arise from them are soon cured; but when, from want of foresight, they are suffered to increase to such a height that they are perceptible to everyone, there is no longer any remedy.

Environmental crises made more frontline news after the turn of the millennium because of a more open government policy regarding previously embargoed environmental knowledge.⁹ In addition, the interdisciplinary (ID) and transdisciplinary (TD) ventures in doing research on

7 ES van Eeden, Impressions on conducting and reporting interdisciplinary and transdisciplinary environmental research in South Africa – a historian’s perspective (Inaugural lecture 07/2010, Platinum Press, NWU, Vaal Triangle Campus), March 2010, pp. 1-38.

8 See F Buell, *From apocalypse to way of life: Environmental crisis in the America Century*, (New York, Routledge, 2003), pp. 1-390; E LeRoy Ladurie, *The territory of the historian*, p. 143.

9 A Hornborg, “Introduction: Environmental history as political ecology”, as in A Hornborg, JR McNeill and JMartinez-Alier (Eds), *Rethinking environmental history. World-system history and global environmental change* (New York, Altamira Press, 2007), pp. 1-23; F Buell, *From apocalypse to way of life: Environmental crisis in the America Century* (New York, Routledge, 2003), pp. 143-176.

environmental crises by historians and among disciplines in the humanities, especially within “slow environmental crises” research, are in many ways absent¹⁰ or very limited.¹¹

Environmental research projects that involve academic researchers from unrelated disciplines as well as non-academic participants¹² (for example, user groups, land managers, governmental and non-governmental organisations, and the general public), as well as professional researchers operating as consultants outside academic-focused institutions, are defined in this discussion as being TD in its ultimate form.¹³ In TD research, academic research knowledge is ‘married’ to firsthand experience and knowledge of the research focus of study on the environment/an environmental theme such as industrial water pollution in area X or Y. Two key justifications for undertaking this kind of participatory research are:¹⁴

- that it is more relevant to society than disciplinary efforts; and
- that it provides for a more holistic perspective on problem solving of an environmental aspect, identified as an issue or problem, or that requires remediation and/or improvement.¹⁵

From a History angle towards a TD research scope, a three-phase methodology from the disciplinary (D), to the ID, and eventually the TD as phase three is suggested.¹⁶ The TD research approach as defined in this article should actually be quite familiar to historians (for example, in environmental, regional or local history research). A history of communities cannot be properly recorded if it is not involved in or contributes to memories and primary resource material not available elsewhere. However, if knowledgeable peoples outside a structured educational research context become actively involved in multidisciplinary forms of research

10 Traces of research cooperation on the environment between the humanities and the natural sciences and among the humanities themselves exist, but remains limited, especially the role of Historians in the research.

11 See A Hornborg, “Introduction: Environmental history as political ecology”, as in A Hornborg, JR McNeill and JMartinez-Alier (Eds), *Rethinking environmental history...*; JA Roberts and N Langston, Toxic bodies/toxic environments: an interdisciplinary forum, *Environmental History*, 13, October 2008, pp. 629-635.

12 G Tress, B Tress & G Fry, “Clarifying integrative research concepts in landscape ecology”, *Landscape Ecology*, 20, 2004, p. 487.

13 ES van Eeden, Impressions on conducting and reporting interdisciplinary and transdisciplinary environmental research in South Africa..., pp. 1-13.

14 Compare the ideas of the following authors: M Gibbons; C Limoges; H Nowotny; S Schwartzman; P. Scott & M Trow (1994), *The new production of knowledge: The dynamics of science and research in contemporary societies* (Sage, London, 1994); J Mittelstrass, “Unity and transdisciplinarity”, *Interdisciplinary Science Review*, 18 (2), pp. 153-157; J Moran, *Interdisciplinarity* (Routledge, London, 2002); JT Klein, “The discourse of transdisciplinarity: An expanding global field”, in JT Klein, W Grossenbacher-Mansuy, R Häberli, A Bill, RW Scholz & M Welti (eds.), *Transdisciplinarity: Joint problem solving among Science, Technology and Society* (Birkhäuser, Basel, 2001), pp. 35-44; ES van Eeden, “Die behoefte aan dinamiese tersiêre Geskiedenis-kurrikula tot voordeel van mededissiplines en gunstiger beroepsmoontlikhede”, *Koers*, 58 (2), 1993, pp. 195-210.

15 Compare Centre for Science Development (CSD), Human Sciences Research Council, Report, “Social Science research methodology teaching at South African tertiary institutions” (compiled by A Tohill and C Crothers), November 1997, p. 34.

16 ES van Eeden, Impressions on conducting and reporting interdisciplinary and transdisciplinary environmental research in South Africa..., pp. 1-13.

within an educational research context, then this research could be labelled as an all-inclusive TD research. Three possible levels of a TD research co-operation could be:

- Research information that communities/individuals/groups/research consultants and/or disciplinary knowledge by HET expertise share/exchange with regard to the environment and their experiences regarding the environment. The historian (or/and any other discipline in e.g. the Humanities) simply utilises this information according to the historical (or other discipline specific) research methodology and writing process. In a research report that embarks on an aspect of TD research, this form of information application will apply and contributors will only be acknowledged in the references section of a report;
- Research information that communities/individuals/groups/research consultants and/or disciplinary knowledge by HET expertise share/exchange and continue to help find in a research project as full partners in a research project. Together with the historian(s) or/and other disciplines in e.g. the Humanities, these contributors participate in the research and in the process of writing the report, based on research criteria and a methodology that those involved have found consensus on. They thus form part of the authorship of the report;
- Research information that communities/individuals/groups/research consultants or/and disciplinary knowledge by HET expertise share/exchange and continue to help find in a research project as full partners in a research project to write scientific articles/to share the podium at conferences/to provide student guidance within a specific focused training environment.

The need for dealing with environmental crisis research in multiple ways, and the continuous quest for “revamping” the environment by the means of *rehabilitation*; *remediation*; *recycling*; *re-using* and *re-development* models,¹⁷ with a future sustainable development and environment in South Africa in mind, is enough reason why TD research – also from a Humanities angle –, can be of immense value.¹⁸

From an historical angle, environmental crisis research implies that humankind is present, which in effect also requires and welcomes the input and research leadership of disciplines in the Human and Social Sciences.

Environmental “crisis” research and history

By definition, a crisis implies and refers to an event that may occur on a personal or societal level. It may be a traumatic or stressful change in a person's life, or an unstable and dangerous

17 Compare CA Brebbia & U Mander, *Brownfields III. Prevention, Assessment, Rehabilitation and development of Brownfields* (Witpress, Southampton, Boston, 2006), pp. 3-260.

18 See an in-depth discussion on the concepts and methodology of transdisciplinary and interdisciplinary research in ES van Eeden, “Impressions on conducting and reporting interdisciplinary and transdisciplinary environmental research in South Africa – a historian’s perspective”, *Inaugural Lecture* no 7/2010, 5 March 2010 (NWU, Vaal Triangle Campus).

social situation in political, social, economic or military affairs, or a large-scale environmental event, especially one involving an impending, abrupt change. More loosely, it is a term meaning “a testing time” or “emergency event”.¹⁹ In environmental history, the thematic focus regarding a crisis can be, amongst others, public health, nature preservation, smoke abatement, municipal housekeeping, occupational disease, air pollution and water pollution. Researching these environmental crises by means of a historical environmental approach lacks the application of a generally accepted methodology of how to deal with research of this nature. The many voices, debates and differences in statistical data, together with the thinking and debating of intellectuals on environmental ethics, justice, human and legal rights, environmental crime, hydrosolidarity,²⁰ et cetera,²¹ can sometimes cause environmental research to be an “envirobusion”²² jungle. “Envirobusion”, as a newly created concept in dealing with environmental crisis history, mainly boils down to the fact that researchers/scientists tend to theorise some environmental trend, then call the same outcome by different names while offering different or no clear utility value or solutions.

In 1981, the environmental historian Ladorie gave the concept “crisis” and history some thought, though mainly in an economic and demographic sense. Some aspects of his explanation of the concept *crisis* also apply to an environmental crisis, namely:

*a negative...long-term trend or tendency. It may refer to...phenomena...slowdown, stagnation or collapse... The crisis...may be set in motion in several ways...it represents, in the most classic fashion, the outward and momentarily visible sign of the clash between mighty and invisible forces.*²³

Ladorie suggests an extension between the following different scales of “crises” in history:

- Crises over several centuries, such as epidemics spreading worldwide;
- Century-long crises, in which Ladorie also refers mainly to epidemics as examples;
- Medium-term crises;
- The “shortage” crisis after 1973.

Perhaps the next scale of crisis to be historically recorded from a present, early 21st-century human perspective should be called “how humans lived sustainably in unsustainable environments”.

19 Compare W Collins, *Collins English Dictionary* (Harper Collins, Glasgow, 2004), p.375; <http://en.wikipedia.org/wiki/Crisis> retrieved on 4 July 2008.

20 See ES van Eeden, “Conceptual ‘envirobusion’ in 21st century environmental issues in South Africa: Past practices abusing present thought”, *New Contree*, 55, May 2008.

21 L Buell, *The future of environmental criticism. Environmental crisis and literary imagination*, pp. 10-19.

22 Compare ES van Eeden, “Conceptual “envirobusion” in 21st century environmental issues in South Africa: past practices abusing present thought”, *New Contree*, 56, May, 2008.

23 EL Ladorie, *The mind and method of the Historian* (The Harvester Press, Sussex, 1981), pp. 270-271; 288-289.

In an environmental crisis, the environment and the public closest to an environmental crisis are affected most. McNeill remarked as follows:²⁴

While one cannot say with any confidence what forms an ecological crunch might take, when it might happen, or how severe it might be, it is easier to predict who will have the worst of it. The poor and powerless cannot shield themselves from ecological problems today, nor will they be able to in the future. The wealthy and powerful in the past have normally had the wherewithal to insulate themselves from the effects of pollution...

An environmental crisis can eventually stretch over centuries or at least be long-term and be very much related to effects on man's movements, his health and his future, not even to mention the long-term effects on the environment. In addition, those who are labelled as the major injurers in an environmental crisis are also affected in the crisis, although their production actions and/or their regulatory actions do not necessarily reflect a decline or improvement towards nature and man in the process of an environmental crisis. As in the case of an economic crisis, an environmental crisis may affect population numbers, threaten human health and life and cause irreversible destruction to the environment and even to the functioning of a regional or local economic entity.²⁵

Though not a historian, L Buell in 2005 correctly summed up present research trends regarding environmental crisis research in general internationally (his remarks below can also be stated as the 2008 scenario for research trends in South Africa):²⁶

Environmental issues, in turn, have become an increasing provocation both for artists and for academics, giving rise within colleges and universities to cross-disciplinary environmental studies programs often galvanized by student demand as much as by faculty research agendas. Though natural and social scientists have so far been the major players in such programs, considerable numbers of humanists have also been drawn in, many of them bringing pre-existing commitments of a citizenly kind to bear in environmentally directed teaching and scholarship. Indeed, many non-humanists would agree – often more readily than doubt-prone humanists do – that issues of vision, value, culture and imagination are keys to today's environmental crises at least as fundamental as scientific research, technological know-how and legislative regulation. If we feel tokenized as players in environmental dialogue, both within the university and without, that may be more because of our own internal disputes and uncertainties about role, method and voice than because of any stigma attached to the 'impracticality' of the humanities either within academe or the wider world.

Two years earlier than Lawrence Buell, his brother Frederick (an academic in English and Cultural Studies) also contributed to the environmental crisis debate by tracing the myriad ways

24 JR McNeill, *Something new under the sun...*, p. 359.

25 Personal impressions of the author based on studies done in the Far West Rand for several years. See also JR McNeill, *Something new under the sun...*, pp. 118-135.

26 L Buell, *The future of environmental criticism. Environmental crisis and literary imagination*, p. 5.

in which these crises have settled into the fabric of everyday life. Buell contends that the notion of crisis has shifted from the:²⁷

apocalyptic to the mundane over the past generation even as actual crises have increasingly intruded into the lives of growing numbers of people, particularly in the Third World. In the process of coping with degraded air or water sources, for example, these numbers or their governments engage in a range of postures: denial, rationalization, resignation, even enthusiastic acceptance in the face of current corporate spin control or popular cyber fiction or art.

In multiple publications from various disciplines, reference is made to environmental crisis debates as first- and second-wave ecocriticism,²⁸ with revisionists in the forefront of having largely absorbed the sociocentric perspective related to a governmental practice of ecological problems such as health, sanitation, birth rate, race, longevity, etc.

Another reality is that scientists can research and critically assess environmental areas as hot-spot crisis areas, but that the “crisis” as identified will actually always be labelled as a crisis because of the effects of environmental destruction on man’s existence, health or future economic loss/transformation. A discussion of an environmental “crisis” barely receives attention without the human factor imprinted in, amongst others, the effects of the crisis on man’s health, man’s living conditions, etcetera. An environmental crisis is seldom discussed with the natural environment as prime focus in order to remediate for the sake of the environment.²⁹ Therefore, the point of L Buell³⁰ is taken that one can speak as an environmentalist (and I may add even as an environmental activist focussed on the effects of environmental constraints and destruction on humans), or one can speak a “word for nature, for absolute freedom and wildness”, but no human can speak “as the environment, as nature, as a nonhuman animal”. We can only go so far as to speak of environment and humans as being embedded ecologically or environmentally.³¹

F Buell has divided his discussion of environmental crisis in the USA in three parts, namely a “contesting crisis”, an “elaborating crisis” and an “imagining crisis”.³² In many ways any country’s environmental crisis can fit into these broad parts of Buell’s divisions. As historians in South Africa are progressively dealing with histories of environmental crisis, the next discussion focuses on aspects of a “contesting” an environmental crisis as a social crisis³³ through the means

27 F Buell, *From apocalypse to way of life: Environmental crisis in the America Century*, pp. 1-390.

28 Though L Buell critically debates the narrowness of “ecocriticism” as terminology on pp.12-13 and 16-19 in *The future of environmental criticism. Environmental crisis and literary imagination*, his view will not be debated as part of this article because Buell’s argument that the words “interdisciplinary studies” better fits the “actual mix” of research studies on the environment are currently accepted and even strengthened with research according to the “transdisciplinary” methodology.

29 Compare ES van Eeden, “Conceptual ‘envirobution’ in 21st century environmental issues in South Africa: Past practices abusing present thought”, *New Contree*, 55, May 2008.

30 L Buell, *The future of environmental criticism. Environmental crisis and literary imagination*, pp. 6-7.

31 See the remark by Aldo Leopold as in L Buell, *The future of environmental criticism. Environmental crisis and literary imagination*, p. 8.

32 F Buell, *From apocalypse to way of life: Environmental crisis in the America Century*, pp. 1-390.

33 Compare F Bell’s discussions in *From apocalypse to way of life: Environmental crisis in the America Century*, pp. 39-66;143-176.

of a transdisciplinary (TD) research discourse³⁴ in the Far West Rand (the present day Merafong area, formerly known as the Carletonville area). The intention is that this discussion should serve as an example of approaching TD research on an environmental crisis through a historian's perspective.

Contesting” an environmental crisis as a social crisis³⁵

From the literature

Most sober humans will agree that humans, by far, are the root of the environmental crises as experienced by most countries and communities all over the globe. Eco-Marxist, JB Foster so clearly put it that the chief causes of the environmental deterioration that faces man to contest in the 21st century:

are social and historical rooted in the productive relations, technological imperatives, and historically conditioned demographic trends that characterize the dominant social

*system*³⁶ So is population and economic growth, amongst others, “crude indices” (F Buell’s words)³⁷ of a rising environmental disequilibrium. A developing country like South Africa is forced to absorb a wide variety of environmental problems created by developed world economies that still continue heedlessly with their excesses as usual.³⁸ By mapping all the environmental footprints of humans, one realises that environments can’t be fooled as they are visible reflections of past and present activities. Though scientific research can’t turn back the clock in environmental crisis scenarios (not even to reverse their own in competencies and silences),³⁹ the scientific and informed communities can certainly support a variety of efforts to contest and be preventative towards a continuous environmental deterioration. One of many examples in Africa and South Africa that can be labelled as being a contested area in which an environmental crisis also evolved in a social crisis, is the Far West Rand (Merafong Municipal area and even wider).

34 ES van Eeden, Impressions on conducting and reporting interdisciplinary and transdisciplinary environmental research in South Africa – a historian’s perspective (Inaugural lecture 07/2010, Platinum Press, NWU, Vaal Triangle Campus), March 2010, pp. 1-38. See also the discussion of A Hornborg, “Introduction: Environmental history as political ecology”, as in A Hornborg, JR McNeill and JMartinez-Alier (Eds), Rethinking environmental history. World-system history and global environmental change, pp. 1-23.

35 Utilized from F Bell’s discussions in *From apocalypse to way of life: Environmental crisis in the America Century*, pp. 39-66;143-176.

36 JB Foster, *The vulnerable planet: A short economic history of the environment* (New York, Monthly Review Press, 1999), p. 12 as quoted by F Buell, *From apocalypse to way of life...*, p. 144.

37 F Buell, *From apocalypse to way of life...*, p. 150.

38 Compare F Buell, *From apocalypse to way of life...*, p. 169.

39 Compare ES van Eeden, EJ Nealer, M Liefferink, “Environmental management complexities and rumours impending the effective application of scientific research and results to address possible health risks in the West Rand Gold Mining Region of South Africa”, Conference proceedings, 5th International Conference, Impact of Environmental Factors on Health, September 2009.

The former Far West Rand through historical lenses

A unique characteristic of the former Far West Rand region and the widely known Wonderfontein Spruit Catchment (WFS) is that it is currently regarded as probably the most written about area in South Africa. Environmentally, it is in a most damaged state and is also probably the most dangerous environment in the country after a gold mining history of 75-years. Since the mid-thirties gold mining has formed the hub of human activity in the area, also known to be part of the West Wits Gold Line region. The Witwatersrand Group has yielded more than half of all the gold excavated in the history of humankind. One of the unexpected windfalls of mining this geological sequence was the discovery of uranium deposits in the same formations that yielded the gold.

Active mining in the WFS area accelerated after 1934.⁴⁰ The establishment of the first three gold mines, Blyvooruitzicht (1937), West-Driefontein (1945) and Doornfontein (1947) raised entrepreneurial expectations.⁴¹ By the 1960s, four more gold mines had opened, of which the Western Deep Levels mine was the best known then, due to its depth.⁴² Because of the mining development, several towns were founded in the area, and for years were managed by the Peri-urban Areas Health Board. These were West Wits (1937), Oberholzer (1939), Bank (1940), Welverdiend (1942), Blybank (1947) and Carletonville (1948).⁴³ On 1 July 1959, the Local or West Wits Area Committee's dream was realised when Carletonville became an independent municipality.⁴⁴ The newly demarcated area comprised roughly 89 000 ha – and the length of the area from east to west was approximately 57 km, with an average width of 17 km from north to south.⁴⁵ After Carletonville had gained municipal independence, the mining sector gradually featured as the dominant role-player, land owner and exploiter of, amongst others, the WFS catchment.

Eventually, the gold mines also became uranium mines, and radon 238 is known to be a by-product of uranium that is presently causing concern regarding its radioactivity. Urbanisation increased in close conjunction with mining activities until people were living and working only

40 ES van Eeden, "Nederlandse emigrante op Wonderfontein, 1928-1969 – 'n Suksesvolle mislukking onder die vaandel van stamverwantskaps- en ekonomiese motiewe", *Historia*, 46(1), 2001, pp. 54-91.

41 Compare ES van Eeden, "Nederlandse emigrante op Wonderfontein 1928-1969 - 'n suksesvolle mislukking onder die vaandel van stamverwantskaps- en ekonomiese motiewe", *Historia*, 46(1), May 2001; ES van Eeden, "Die geskiedenis van die Gatsrand, van Voortrekkervestiging tot dorpsproklamering" (MA., PUVCHO, 1988); ES van Eeden, "Die invloed van grondverskuiwings en wateronttrekking op die landboubedryf in die Oberholzer-distrik (Carletonville-gebied), 1959-1972." *New Contree*, 39. Aug. 1996.

42 R Macnab, *Gold their touchstone: Gold Fields of South Africa, 1887-1987: A centenary story* (Jonathan Ball, Johannesburg, 1987), pp. 64-161; ES van Eeden, *Ekonomiese ontwikkeling en die invloed daarvan op Carletonville, 1948-1988: 'n Historiese studie*, PUV vir CHO. (PhD proefskrif, 1992), ch. 5.

43 Unie van Suid-Afrika, Dept. van Handel en Nywerheid, 1950, pp. 34-35; 1953, p. 19.

44 *Rand Daily Mail*, 1959-02-07, p. 6.

45 FJ Potgieter, "West Wits Line Project. Planning for the future", Institute for Regional Planning, Potchefstroom University, 1978, p. 4.

tens of metres away from mine dumps and slime dams – which have proved to be radioactive, amongst others, with the potential of further polluting water sources in the area.⁴⁶

Since the 1940s, dewatering of compartments has caused serious environmental and economical obstacles for local businesses, although mines were financially more able to continue their activities. Presently, the ground water from former springs, after being dewatered and dry for almost 60 years, has been rising gradually since the closing of some of the mines in the former Far West Rand. The difference is that not only is water decanting from these springs, but also acid mine drainage (AMD) is occurring, bearing a mixture of highly toxic and radioactive waste materials. A number of people from different populations and various economic sectors are said to be affected.

From this concise historical background of the Far West Rand as example of a slow environmental crisis, a discussion on practicable aspects from a TD research methodology can begin. In this area it all started for historians and students in History by utilising the historical research methodology (D) with which they are familiar in many facets of the research process. However, at some stage in the research process, it became difficult to provide a reasonable, clear account of specifically environmental issues and the environmental crisis scenario due to the multidisciplinary nature of the content one is dealing with (technicalities, methodology, scientific semantics and epistemology). The need for interdisciplinary (ID) and eventually TD interventions became non-negotiable research requirements. It was felt that ID and TD interventions may even be required in the initial stages of a project on an aspect of environmental crisis research or it may occur at a much later stage of a research process.

Practicable aspects of a TD methodology in environmental crisis research

In this section the last level option for doing TD research, as suggested earlier, will be discussed by referring to a case study in the Far West Rand (Merafong area) in South Africa that is well known as an environmental crisis area. This last level TD research option reads:

Research information that communities/individuals/groups/research consultants or/and disciplinary knowledge by HET expertise share/exchange and continue to help find in a research project as full partners in a research project to write scientific articles/to share the podium at conferences/to provide student guidance within a specific focused training environment.

A research theme/project usually accentuates the disciplines/fields of expertise that are required to do the research. Having said this, it still happens in interdisciplinary research environments that related subjects in either the Natural or the Social and Human Sciences commence with research without considering the human component (community voice and experience) or underscoring the natural component. Because of this most projects fail to provide an all inclusive view of a project theme where especially the Humanities aspect can't be ignored but is

46 Compare Water Research Commission (WRC), F Winde, "Impacts of gold-mining activities on water availability and quality in the Wonderfontein spruit catchment", in H Coetzee (ed.) *An Assessment of Current and Future Water-pollution Risk with Application to the Mooirivierloop (Wonderfontein spruit)*. Report K5/1214, Pretoria, 2005, pp. 14-38.

in fact ignored. Exploring with research by means of a defined level in the TD approach helps to overcome this negligence one often find in South African environmental related research, and the option to include more fields of expertise (whether they are from activist podiums, for example, or private consultancies). A few considerations to take note of in environmental crisis research theme from a TD angle could be listed as follows:

- Identify research fund options if the research is not initiated from the public and private sector;
- Identify other operational constraints;
- Identify the fields of expertise in the sciences; professionals as private consultants and expertise/experienced members of community/industry;
- Develop aims, purpose and solutions;
- Digest ethics, concepts and a methodology for doing research (and revisit these often to rephrase if required);
- Approach the research topic from various disciplinary angles as identified in the aims (all disciplines should be accommodated in low and high order aims to create scientific cohesion and understanding of a research theme);
- Share preliminary findings, among those involved in the project, in colloquia opportunities and refine results through a co-operation in explanation; analysis, evaluation and syntheses;
- Formal and community reporting with the TD team's approval.

From this TD-suggested approach, some experiences are shared.

Scientific scope, themes and funds in environmental crisis research

Probably many historians (and scientists in other disciplines) believe that thinking beyond their academic comfort zones (or “out of the box”) is methodologically unacceptable, and a *modus operandi* not to be associated with fundamental sciences in the Humanities. In a changing world, however, where it is required that the wide spectrum of sciences dealing with aspects of humanity and nature should provide a more comprehensive view and way forward for a complex issue, the “out of the box” approach is inevitable but also very challenging.

The following general remarks on the TD research scope and funding requirements are based on personal experience in historical research dealing with the environmental crisis of water pollution in the Merafong/Far West Rand area:

- The research focus on an environmental crisis is seldom one that can be locked between two time frames, to be done and just forgotten about while the crisis is continuing and requiring more historical clarity. The environmental historian should be willing to explore/initiate the environmental crisis from its origins to its present status in order to provide a representative and more valuable, conclusive research report;

- Funds for doing the research can neither be accepted from the perceived polluters as the injurers, nor from the injured, because, regardless of the best efforts put into them, the credibility of the research outcomes will always be questioned. In this regard, independent academic institutions and national/international research foundations are the best resorts for funding research;
- It is necessary to bring together a network of professional and local people, as well as academic experts, and to retrieve data from a very wide variety of fields, archival storage systems and other sources. Historians dealing with research on environmental history are not always sufficiently skilled in the technical and contextual research methodology and conceptual semantics of other disciplines; therefore, a solo research process will not always be feasible if the idea is to obtain a broader scientific understanding of an environmental crisis. In many ways, a consolidation of research discussions and efforts proves to be more effective. With greater knowledge and understanding, the human and social scientist may even write reports on environmental history regarding issues that also concern the broader public that they would understand more easily but that have never been explained in plain language;
- A representative and consolidated view can be formed, but this requires that possible traces or relics are obtained from sources⁴⁷ from a variety of disciplines and academic/research institutions, associations, companies, consultants, government departments and local professional people as well as local communities. These sources vary in format, and the most valuable or useable sources on environmental crisis issues are not necessarily annual reports or minutes, but reports on investigations or/and research done by researchers or consultants after a reported local disaster. In the past, such reports and letters of correspondence between the injurers (for example the government and the mines) and those perceived as the injured in polluted areas were seldom made available to the public. Quite some effort is required to obtain them and not be put off by negative responses or closed doors; and
- The environmental history researcher mostly also has to deal with role-players perceived as being exposed to a crisis as the injured (eg. financially/ health wise). They may be, amongst others, low-income communities, so-called environmental fanatics, local businesses or environmental activists.

Undertaking research on an environmental crisis does not imply that the historian's focus should be a broad general history to explain the development or process of the crisis. Although this kind of information is important, other possible research themes or questions as aim(s) that can cover past to contemporary environmentally related content are of immense value. In the Far West Rand a TD-research approach to water pollution from a Humanities perspective, as an example, brought about the following research questions as aims:⁴⁸

47 Compare RG Collingwood, *The Idea of History*, (Oxford University Press, Oxford, 1946); RG Collingwood, *The Idea of Nature* (Clarendon Press, Oxford, 1945).

48 Not all of these questions as research aims have been addressed yet. A few examples of references are provided. In some research currently is in process.

- The role of the injurer(s) in creating or abusing environmental knowledge. (The injurer can vary. In the WFS context, the major polluters/injurers within a direct and/or indirect context are the mines and the government);⁴⁹
- The role of scientific knowledge and scientists/research consultants in correcting/endorsing environmental practices of the day;⁵⁰
- The role of the local authority in environmental practices and creating knowledge;
- Aspects of power play, ethics, environmental injustices/justice, human rights movements and environment, economic choices versus the environment, etcetera;⁵¹
- Determining of the application of past environmental ideology and laws in an area and to what extent it is possible to reverse thoughts in new acts after 1994;⁵²
- The environmental awareness/experience, and/or laxity, and/or ignorance of local/regional citizens regarding an environmental crisis or crises in their own area;
- The role of non-governmental organisations (NGOs) and environmental activists in activating i) environmental awareness; remediation and rehabilitation processes ii) enforcing the principle that the polluter pays;⁵³
- To take critical account of the thinking and actions behind the environmental remediation/preservation history and process;
- The local business community's dealings and future focus with the environmental crisis;⁵⁴

49 See for example: ES van Eeden, AB de Villiers, H Strydom & EJ Stoch, "Mines, people and sinkholes –an analysis of the Carletonville Municipal Area in South Africa as case study regarding politics of secrecy" *Historia*, 47(1), May 2003.

50 ES van Eeden, EJ Nealer, M Liefferink, "Environmental Management Complexities and Rumours Impending the Effective Application of Scientific Research and Results to Address Possible Health Risks in the West Rand Gold Mining Region of South Africa", Proceedings of the 5th International Conference on the Impact of Environmental Factors on Health, September 2009.

51 ES van Eeden, "Weaknesses in environmental action in South Africa: A historical glance on the West Rand (Gauteng Province)", *International Journal of Water Resources Development*, 24(3), September 2008; ES van Eeden, M Liefferink & E Tempelhoff, "Environmental ethics and crime in the water affairs of the Wonderfontein Spruit Catchment, Gauteng South Africa" , *The Journal for Transdisciplinary research in Southern Africa*, 4(1), July 2008.

52 JF Durand, ES van Eeden & M Liefferink, "Legal issues concerning mine closure and social responsibility on the West Rand", *The Journal for Transdisciplinary Research in Southern Africa*, 5(1), July 2009.

53 E.S van Eeden & I Brink, "Factors that determine the facilitation of stakeholders in environmental management – some philosophical-historical thoughts with the Merafong area as example", *Koers*, 3, 2007; ES van Eeden, "An historical assessment of NGO efficiency in progressing towards a sustainable environmental heritage focus with as case study the Wonderfontein Spruit catchment, Gauteng, *New Contree*, 53, May 2007, pp. 55-78; M Liefferink & ES van Eeden, Paper, "Proactive environmental activism to promote the remediation of mined land and acid mine drainage: a success story from the South African goldfields", IWM Conference, Canada, 7-9 September 2010.

- The effect of, for example, chemical pollution on water resources used by the local agricultural sector;
- A history of the effect of an environmental crisis such as water pollution on the health status of local communities and how it may impact on future sustainability;⁵⁵ and
- The effect of an environmental crisis on communication facilities, roads, the local economy, political rivalry; education; religion, etc.⁵⁶

To the local/regional research historian, some examples of the themes above will be familiar, with the only distinction being that the content is reflected from an environmental crisis perspective, which in itself is a rearrangement of knowledge to create new knowledge and insights.

Operational constraints in researching environmental crisis history

The human factor

In doing research on the environmental crisis in the Far West Rand, the human factors and agendas were the most important constraints.

It was found that not all experts/disciplines would want to work together in the research process and/or exchange their ideas and findings. There are many reasons for attitudes of this nature, of which the following cannot be excluded: money from the injurer/polluter or even the injured resulting in a variety of personal agendas; research and academic selfishness; and/or insuperable methodological differences in research. Carruthers refers to this constraint by saying that

*(A)ll historians have become more sensitive to the tropes and requirements of the natural sciences.*⁵⁷

In environmental history, the application of internal criticism to opposing views (as applicable to written sources to determine authenticity) and external criticism (that deals with confirming authenticity or otherwise labelling source material as fake or forgery) can be a very time-

54 ES van Eeden, "So long gold mines - long live industries. Carletonville's battle for economic survival", *South African Economic History Journal*, 12(1-2), September 1997, pp.103-127.

55 ES van Eeden, EJ Nealer, M Liefferink, "Environmental Management Complexities and Rumours Impending the Effective Application of Scientific Research and Results to Address Possible Health Risks in the West Rand Gold Mining Region of South Africa", Proceedings of the 5th International Conference on the Impact of Environmental Factors on Health, September 2009; ES van Eeden, EJ Nealer & M Liefferink, "A historiography on past scientific research and references to environmental health concerns in the Merafong gold mining region of South Africa", *New Contree*, 58, November, 2009.

56 ES van Eeden, "Ekonomiese ontwikkeling en die invloed daarvan op Carletonville, 1948-1988: 'n Historiese studie" (PhD, PU vir CHO/NWU), 1992).

57 J Carruthers, "Transnational and disciplinary aspects of the environmental history of Africa" (Keynote address, International conference, Humankind and nature at the intersection of culture, Kruger National Park, 4-6 Sept. 2006), p. 3.

consuming process. Even then, one is left with no clear-cut findings, solutions and academic remedies of how to be absolutely sure about environmental report findings. A reason for this problem is the difference in approaching a research problem within specific research methodologies used by researchers in the natural sciences.

Then a TD-focussed cooperation between role-players sharing the same environment as the so-called injurer and the injured was and remains a difficult constraint in dealing with research into an environmental crisis. It not only affects the availability of potential knowledge that might unlock difficult reports or discussions on unavailable data, but also leads to complete lack of cooperation if a role-player becomes aware of one's liaison with the so-called "enemy" that "blows the whistle" or holds different or "inaccurate" views. Environmental historians willing to be exposed to a team and a research theme who have different environmental views and perhaps agendas regarding a local environmental crisis need to develop communication skills that are built on continuous confidentiality, trust and respect. Historians dealing with an environmental crisis have the daunting task of living up to the fundamental methodology of history and to avoid "choosing sides" before the information collection has been finalised and critically assessed according to the historical methods and holistically according to the TD team's accepted methodology.

If a research report with a modest focus that will add to a holistic understanding and addressing of a crisis within a 21st-century environmental ideology must be compiled, then ways of working (researching and reporting) together have to be found.

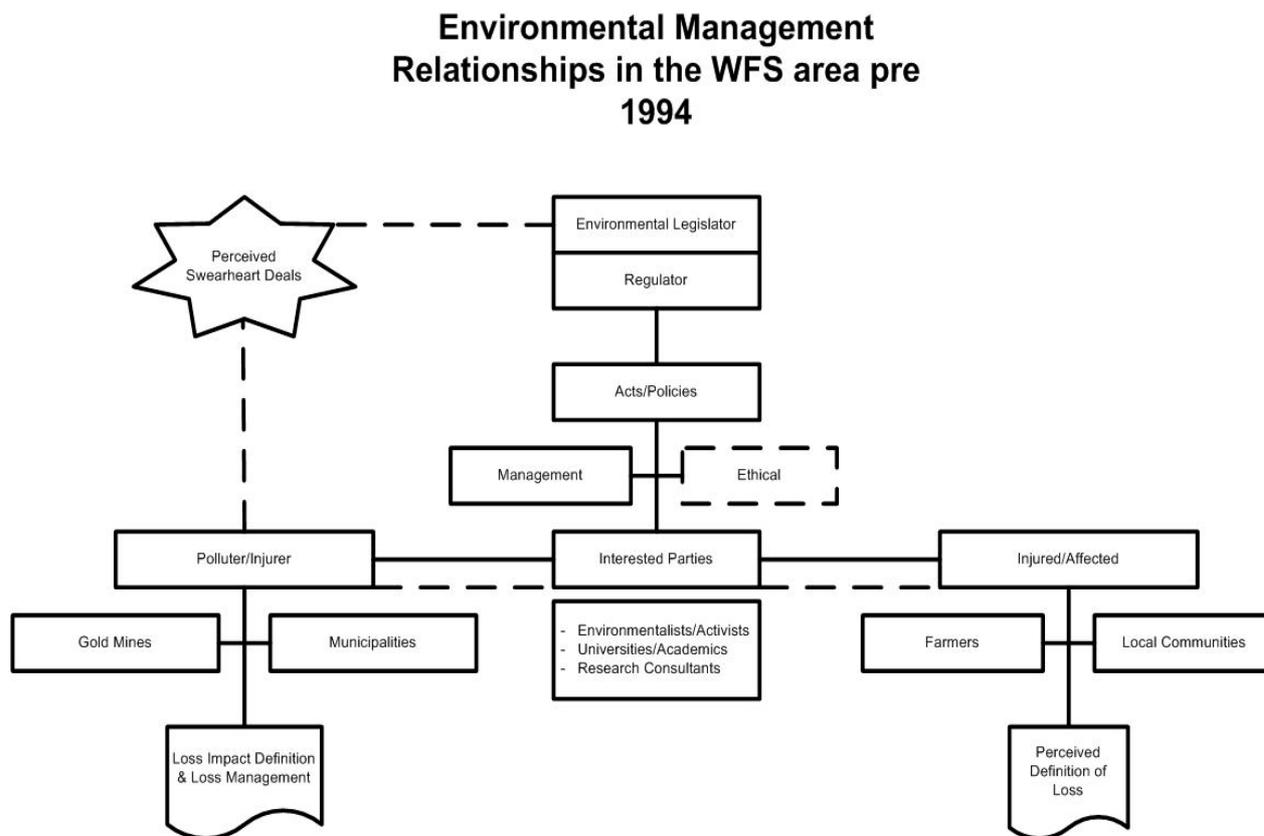
Source access

The most valuable past and currently developed documentary sources in understanding decisions that may have led to an environmental crisis are often not accessible due to their scattered or disordered nature (especially in corporate companies and government departments), or they are marked as "strictly confidential" and therefore not available. Sometimes, corporate companies and government departments also lack human capacity and knowledge, because those who know most about a crisis and have the information that was developed to address or manage the crisis have usually resigned or "moved". In many cases, these people leave only the not so important information "leftovers" to their followers to fill the gap of information amnesia.

Information amnesia and a lack in intellectual capacity among government officials is a concern when dealing with environmental history in South Africa. If the government is serious about implementing its model environmental acts based on representative environmental history reports, then its record management systems (which are currently perceived as being in a very poor state), should be sharpened, in line with to the country's model constitution. However, to overcome information amnesia in one department or institution, it is sometimes possible to identify a list of the role-players involved and to explore the document database of another department or institution also involved in dealing with managing the same crisis.⁵⁸ In the Far

58 Compare ES van Eeden, "Is die regering omgewingsgroen of 'n boelie? 'n Beknopte perspektief op omgewingsbewing in die eertydse Verre Wesrand (tans Gauteng), *Word & Action/Woord & Daad*, 401/402, Spring/Summer 2007; ES van Eeden, "Whose environment? whose nature? – a trans-disciplinary discussion on some inhumane actions in the destruction and construction in nature – case study, the Merafong municipal region", *The Journal for Transdisciplinary research in Southern Africa*, 2, Nov. 2006; Interview E Swart (former Director GTT)/ES van Eeden, March 2008.

West Rand (Wonderfonteinspruit Area or WFS) for example, the list of involvement and relationships in 1994 was plotted as follows:⁵⁹



Conclusion

In the discussion, the key focus was to provide ideas on how to deal with research in environmental crisis history within the framework of a transdisciplinary (TD) research approach. Apart from a concise historiographic view on environmental crisis history, some important aspects in the research were also highlighted. It seems inevitable that historians will have to undertake research ventures in the field of environmental research that require thinking “out of the box”. So, entering into a broader repertoire of knowledge and research associations with capable experts from a variety of disciplines will become more possible, and theoretically as well as methodologically more approachable. Information amnesia, as perceived especially in research on historical environmental crises, may be addressed more effectively if research experts dealing with the same locality can cooperate more efficiently.

There should be no doubt that a well-documented, multi-faceted, historical account of a specific environment will most certainly be put to use in many ways within the practical focus of, for example, government, corporate bodies and consultants who deal with a variety of role-players in a destructive environment where solutions are the remedial focus. New questions arrive from a

59 E.S van Eeden & I Brink, “Factors that determine the facilitation of stakeholders in environmental management – some philosophical-historical thoughts with the Merafong area as example”, *Koers*, 3, 2007.

broader focus, and these can be considered in further research. For example, environmental ethical issues and man's ability to utilise global experiences to prevent crises or to find solutions are examples of themes that could be more fully explored.⁶⁰

Whatever the situation, the point is that, although history may be regarded as a fundamental discipline in recording the human past when dealing with environmental history, the historian cannot and will never be able to fully master the conceptual and methodological approaches employed by natural scientists. It is also not necessary, because no researcher has ever been required to be familiar with or to master all disciplines. The very old idea of interdisciplinary focussed research, and recently the additional reference to transdisciplinary research methodology as ways to accommodate research by multiple disciplines, should be strengthened in the 21st century, especially if academics want to play a meaningful role in contributing to a better understanding of present-day environmental crises contexts and provide support in creating sustainable environments.

South Africa and Africa cannot afford environmental history researchers who cuddle themselves so deeply in the past and avoid outspoken assessments of present-day concerns against the past environmental heritage. This article is a humble effort to help environmental historians who deal mostly with environmental crisis research in specific local/regional areas to step out of their comfort zones and to debate possibilities in the development of TD as a methodological approach to perhaps accommodate the multitude of disciplines and community/private experts and professionals involved in environmental crisis research. Perhaps the time has also come for environmental historians and other environmental experts in a variety of fields and disciplines in South Africa and Africa to form an Environmental Studies Association to support one another, particularly in their efforts to work together in interdisciplinary and transdisciplinary ways with researchers from a broad range of academic fields. This paper therefore serves merely as a debate to open up discussions for refining the perspectives and existing methodologies of research in environmental released history.

60 See J Carruthers, "Transnational and disciplinary aspects of the environmental history of Africa" (Keynote address, International conference, Humankind and nature at the intersection of culture, Kruger National Park, 4-6 Sept. 2006), p. 12.