

The hidden power of water in the Southern African irrigation furrow¹

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Water is one of the scarcest natural resources of southern Africa. The region is primarily arid to semi-arid. Its mean annual rainfall of about 500 mm³ is well below the 870 mm for the rest of the world.⁴ Whilst rainfall is considered to be one of the major limiting factors,⁵ southern Africa is at the same time a region of contrasts. In the north and north-eastern areas of southern Africa the annual rainfall reaches a maximum of 1500mm, while in the south-western parts of the Namib Desert it could be as low as 25mm.⁶

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 3. K Rowntree, "Geography of drainage basins: hydrology, geomorphology, and ecosystems management" in R Fox and K Rowntree (eds.), *The geography of South Africa in a changing world*, (Oxford University Press, Cape Town, 2000), p. 394.
 4. B Turner (ed.), *The statesman's yearbook: the politics, cultures and economies of the world 2002*, (Palgrave, Bath, 2001), p. 1443.
 5. J McCann, "Climate and causation in African history" in *The International Journal of African Historical Studies*, 32(2-3), 1999, p. 262.
 6. J Pallet (ed.), *Sharing water in southern Africa*, (Desert Research Foundation of Namibia, Windhoek, 1997), p. 1.



Figure 1. The Namib Desert after an exceptional raining season in the 1970s.⁷

The Namib is not only the oldest desert in the world, but after the Sahara, the largest desert on the African continent.



Figure 2. Aerial view of the Okavango swamps in the Northern Kalahari desert.⁸

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7. A Bannister and P Johnson, *Namibia: Africa's harsh paradise*, (C Struik Publishers, Cape Town, 1984).
 8. J. Pallett (ed.), *Sharing water in southern Africa*, (Desert Research Foundation of Namibia, National Book Printers, Goodwood, 1997), p. 31.

The Okavango, one of the largest floodplains in the world, is situated in one of the major semi-desert areas in southern Africa. And in the southern Cape there are some of the most impressive rainforests on the continent.



Figure 3. Fisherman on the Keurbooms River near Plettenberg Bay.⁹

It is then understandable that the people of southern Africa have a special relationship with water. Natural climatic phenomena are traditionally seen in larger contexts. The cultural dynamics of rain, lightning, drought and famine, are events that are deeply rooted in the cultural foundations of human interaction with nature.¹⁰

Activities of human industry and water in southern Africa date back to the Stone Age some 2 million years before the present.¹¹ The paleontological evidence suggests that without water there simply was no sustainable future. In the late transitional Stone Age we find marked traces of water technology in Africa. It was in Egypt where

9. Photograph: JWN Tempelhoff, 2005.04.01.

10. H Kuper, *The Swazi: a South African kingdom*, (Second edition [1963], Holt, Rinehart and Winston, New York, 1986), p. 64; SS Dornan, "The Tati Bushmen (Masarwas) and their language" in *The Journal of the Royal Anthropological Institute of Great Britain and Ireland*, 47, January-June, 1917, pp. 52, 86; PJ Schoeman, "The Swazi rain ceremony" in *Bantu Studies*, 9, 1935, pp. 273-280; HO Mönnig, *The Pedi*, ([1967], JL Van Schaik, Pretoria, 1983), p. 145; E Jensen Krige and JD Krige, *The realm of the rain-queen: a study of the pattern of Lovedu society*, ([1943], Juta & Co., Cape Town, Wetton, Johannesburg, 1980), p. 1; R MOFFAT, *Missionary labours and scenes in Southern Africa: twenty-three years an agent of the London Missionary Society in that continent*, (John Snow, Paternoster-Row, London, 1842), p. 306; CJ Andersson, *Lake Ngami or explorations and discovery during fur years of wandering in wilds of South-Western Africa* (Facsimile edition by C Struik, Cape Town, 1987, of the second edition, Hurst and Blackett, London, 1856), p. 458.

11. P. Mitchell, *The archaeology of Southern Africa* (Cambridge University Press, Cambridge, 2002), p. 54.

irrigation – one of the most advanced developments of water-related human industry – manifested itself, in no uncertain terms, some 4000 years ago.¹² Further south, in Aksum, about 1700 years ago, irrigation was also an important technological innovation in one of the major medieval empires on the continent.¹³

It then seems as if irrigation farming is a form of industry that has, historically played an important part in the history of Africa. Currently, more than 80 per cent of the available water in Africa is used for the continent's agricultural sector.¹⁴ Irrigation, in particular, uses about 66 per cent of all the fresh water available to the 300 million inhabitants on the continent. In southern Africa the estimates are that 69 per cent of the available water is used for irrigation.¹⁵

Given this contemporary information we have one major information shortfall. We know relatively little about irrigation in southern Africa before the arrival of people of European origin in the fifteenth century.

Outline

In this paper an attempt will be made to give an exposition of irrigation developments prior to the colonial era in southern Africa – specifically Zimbabwe and South Africa.

The objective will be to outline:

- a) Some reasons for the apparent historical blind spot, in giving recognition to indigenous irrigation technology.
- b) Provide some evidence of localities in southern Africa where there are historical references to indigenous irrigation industry
- c) Aspects of physical structures and agricultural practices that are related to irrigation, such as terrace constructions and aqueducts
- d) Consider some aspects of land tenure and state formation against the backdrop of Wittfogel's hydraulic theory

Irrigation in southern Africa: historical blind spots

The history of pre-colonial irrigation technology in southern Africa is a field that is noted for its paucity of comprehensive information. This is perhaps as a result of nineteenth century missionaries and explorers who maintained that the Bantu-

12. J Ki-Zerbo (ed.), *General history of Africa: I Methodology and African prehistory*, (UNESCO, James Currey, California, 1989), pp. 306-307.

13. S Munro-Hay, *Aksum: an African civilization of late antiquity*, (Revision edition 1991) at <http://users.vnet.net/alight/aksum/mhak1.html> Chapter 1-3.

14. S Chulze, J Meigh and M Horan, "Present and potential future vulnerability of eastern and southern Africa's hydrology and water resources" in *South African Journal of Science*, 97, March/April 2001, p. 150.

15. J Pallet (ed.), *Sharing water in southern Africa*, (Desert Research Foundation of Namibia, Windhoek, 1997), pp. 38-39.

speaking people were never known to ‘lead water’.¹⁶ It was a view that was influential in shaping the thinking of subsequent generations of researchers.¹⁷

Although archaeological research has been conducted, it appears as if it is particularly difficult to locate remains of comprehensive pre-colonial irrigation technology. Rivers flood and easily wash away all traces of human activities. Irrigation works, in particular, are subject to rapid decay when they are not maintained for a period of time. In many areas of pre-colonial irrigation activities much of the land had been acquired by farmers of European origin. In the process indigenous systems of irrigation were demolished in the process of establishing modern western-type irrigation technology. Furthermore, successive measures by colonial authorities to combat erosion and the ‘ineffective’ use of wetlands, led to the demise of indigenous cultural constructs of irrigation.¹⁸

The dominance of a pastoral tradition among the Iron Age people who moved into southern Africa two millennia ago is profound. It has literally overshadowed the historical discourse on human industry and development in the region.¹⁹ This is understandable, particularly in the case of the southern Nguni settlement where pastoralism dominated, much to the detriment of agriculture.²⁰

Environmental factors also downplayed the role of irrigation technology in the mainstream of the historical discourse. Southern Africa is not really suited for large-scale agricultural activities. This explains why most settlements of early Iron Age agripastoralists were primarily developed in the eastern parts of the subcontinent.²¹ The 200mm summer rainfall area on the great central plateau of southern Africa formed the western boundary of the region settled by the Bantu speaking peoples of the Iron Age. There was, for example, little incentive for them to settle in the drier

16. RN Hall, *Pre-historic Rhodesia: an examination of the historical, ethnological and archaeological evidences as to the origin and age of the rock mines and stone buildings, with a gazetteer of medieval South-East Africa, 915 A.D. to 1760 A.D. and the countries of Monomotapa, Manica, Sabia, Quiteve, Sofala and Mozambique*, (T Fisher Unwin, London, Leipzig, 1909), p. 200.

17. See for example H Kuper, *The Swazi: a South African kingdom*, (Second edition [1963], Holt, Rinehart and Winston, New York, 1986), p. 44.

18. R Whitlow, “Conservation status of wetlands in Zimbabwe: past and present” in *GeoJournal*, 20.3, March 1990, pp. 191-202.

19. AB Smith, *Pastoralism in Africa: origins and development ecology*, (Hurst and Company, Oio State University Press and Witwatersrand University Press, London, 1992).

20. D Hammond-Tooke, *The roots of black South Africa*, (Jonathan Ball Publishers, Johannesburg, 1993), p. 12.

21. *Ibid.*, p. 14.

parts of the Orange River Basin, the main water artery in the arid parts of South Africa and Namibia.²²

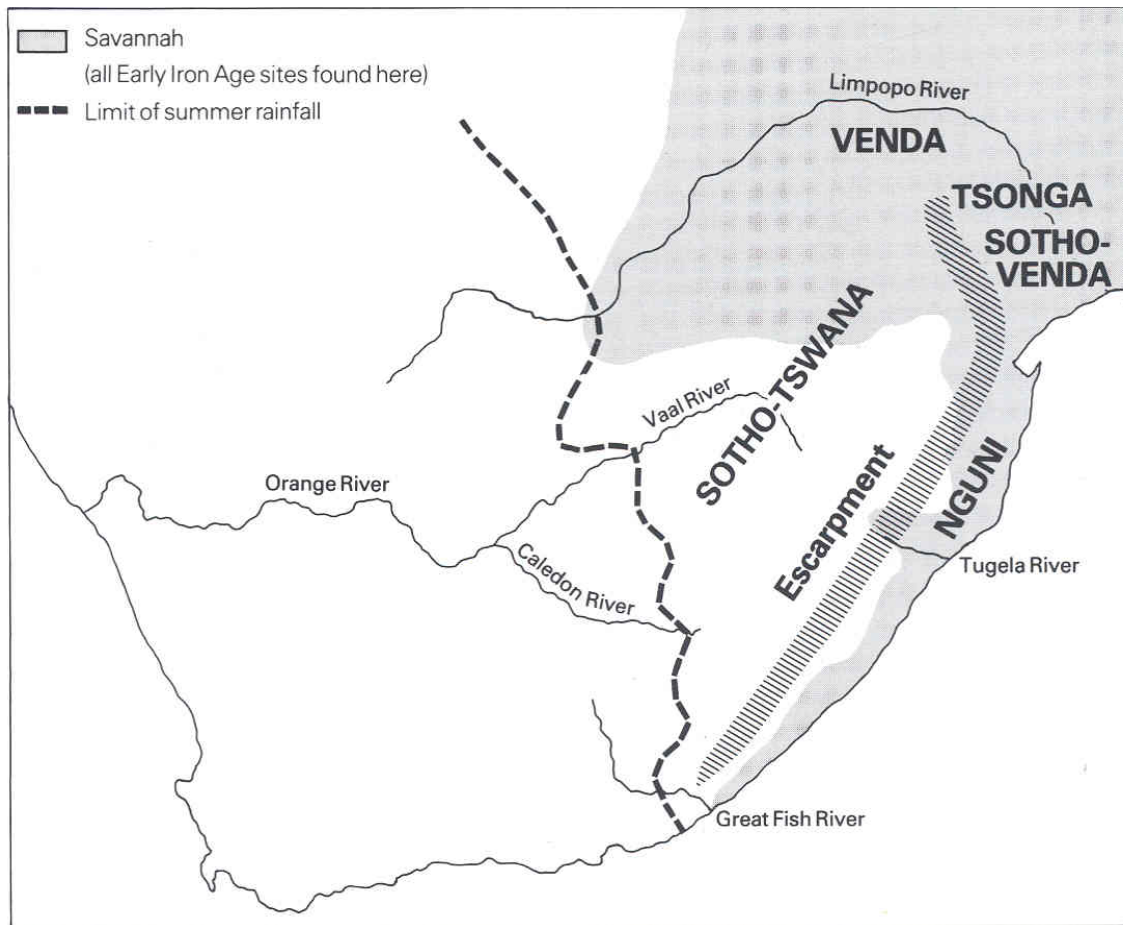


Figure 4. By the eighteenth century the Bantu settlement of southern Africa was in many respects the result of environmental factors. The early Iron Age people had settled in the savannah regions. They also tended to settle inside the summer rainfall region.²³

It was in the less arid parts of the subcontinent that potential irrigation industry offered the best prospects. Yet, it was also one of the regions most susceptible to natural environmental decline. The feeding habits of African antelopes and the unsuitability of the soil for agricultural purposes, in many parts of the subcontinent, militated against the idea of viable irrigation schemes.²⁴

22. AR Turton, R Meissner, PM Mampane and Sereme, A hydropolitical history of South Africa's international river basins. WRC Report No. 1220/1/04. (Water Research Commission, Pretoria, October 2004), p. 26.

23. D Hammond-Tooke, *The roots of black South Africa*, (Jonathan Ball Publishers, Johannesburg, 1993), p. 16.

24. See P Mitchell, *The archaeology of Southern Africa*, (Cambridge University Press, Cambridge, 2002), pp. 190-191.

Another factor is that, towards the end of the 19th century modern Western-styled irrigation technology was introduced, first in the Cape Colony and then progressively spread northwards in the wake of mining and advanced industrial development.²⁵ Although irrigation engineers and farming experts of the day were cynical about the prospects of a sound future of irrigation technology in southern Africa,²⁶ they tended to seek solutions in all parts of the world, such as, Egypt, India, the United States and in Europe. Irrigation then made remarkable progress.²⁷ In the process there was a definitive neglect of indigenous technologies of African society.

In the prevailing historical discourse on irrigation in southern Africa during the twentieth century, there was, at most recognition for the fact that traditionally the indigenous peoples chose to plant crops in the natural beds of rivers after floods had passed through. A popular argument was that colonial administration officials were amongst the first to teach the skills of irrigation to the Africans.²⁸ Irrigation, supposedly, only really became a trend amongst Africans once European settlement, and particularly missionary activities, started in the interior.²⁹ A few aspects of irrigation technology were ‘indigenised’ in the historical discourse, by stating that all the credit should not be given only to European missionaries. Instead, some African evangelists were responsible, in the 1840s, for teaching indigenous peoples the relevant technology.³⁰

Somehow, arguments of this nature contradict the historical logic of understanding how technology is transmitted over geographical space and time. Given the background of a North-eastern African tradition of irrigation on the River Nile and the Central and East African tradition of agricultural industry, it stands to reason that the transmission of technology would have taken place as an extension of human

25. C Dimond H Braine, “Notes on irrigation in South Africa” in *Transvaal Agricultural Journal*, 4(13), October 1905, pp. 8-21.

26. S Ransome, *The engineer in South Africa: a review of the industrial situation in South Africa after the war and a forecast of the possibilities of the country*, (Archibald Constable & Co. Whitehall Gardens, 1903), p. 306; O Thomas, *Agriculture and pastoral prospects of South Africa*, (Archibald Constable & Co Ltd, London, 1904), p. 6.

27. GR Backeberg and JA Groenewald, “Lessons from the economic history of irrigation development for smallholder settlement in South Africa” in *Agrekon*, 34(4), December 1994, pp. 167-171; Turton, AR, R Meissner, PM Mampane and Sereme, A hydrological history of South Africa’s international river basins. WRC Report No. 1220/1/04. (Water Research Commission, Pretoria, October 2004); C Scott Moncrieff, “Irrigation” in *Science (New Series)*, 22(567), 1905.11.10, pp. 577-590.

28. HO Mönning, *The Pedi*, (JL van Schaik, Pretoria) p. 158.

29. R Bate and R Tren, *The cost of free water: the global problem of water misallocation and the case of South Africa* (Free Market Foundation, Sandton, 2002), p. 97.

30. NJ Jacobs, *Environment, power, and justice: a South African History*, (Cambridge University Press, Cambridge, 2003), p. 66.

culture.³¹ Technology is more than merely material human culture. It is a social phenomenon in that it marries the material, the social and the symbolic in a complex web of associations.³²

Every technology is a human world, a form of humanised nature, that unifies virtually every aspect of human endeavour. To construct a technology is not merely to deploy materials and techniques; it is also to construct social and economic alliances, to invent new legal principles for social relations, and to provide powerful new vehicles for culturally-provided myths.³³

We have evidence of comprehensive Iron Age irrigation operations in the Agoro Hills of Uganda.³⁴ In Kenya an irrigation culture flourished for centuries in the Taita Hills,³⁵ the Elgeyo escarpment, and the Pokot Hills. Some of the best irrigation engineering in the region, according archaeologists, was to be found in the Endo division of Marakwet.³⁶ Also the highlands of Tanzania produced substantial evidence of irrigation activities.³⁷

The question that now arises is: were there not also irrigation activities further south, in southern Africa?

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31. There are some authors who are of the opinion that irrigation in East and Southern Africa goes back less than 400 years. R Purcell, "Potential for small-scale irrigation in sub-Saharan Africa: the Kenyan example" at <http://www.fao.org/docrep/W7314E/w7314e07.htm>
 32. B Pfaffenberger, "Fetished and humanised nature: towards an anthropology of technology" in *Man*, New Series, 23(2), June 1988, p. 249.
 33. *Ibid.*, p. 249.
 34. JEG Sutton, *The archaeology of the Western Highlands of Kenya*, (Memoir number three of the British Institute of Eastern Africa. British Institute of Eastern Africa, Nairobi, 1973), pp. 72-73.
 35. J Finke, "Traditional music and cultures of Kenya: Taita – agriculture. At <http://www.bluegecko.org/kenya/tribes/taita/agriculture.htm>; J Mohamed-Katerere and P van der Zaag, *Untying the 'knot of silence': making water policy and law responsive to local normative systems*, (2003. At <http://web.africa.ufl.edu/asq/v5/v5i3a7.htm>), p. 24; P van der Zaag, "Water's vulnerable value in Africa." Paper presented at an international workshop, "Value of water – different approaches to transboundary water management, Koblenz, Germany, 2005.03.10-11, p. 14.
 36. JEG Sutton, *The archaeology of the Western Highlands of Kenya*, (Memoir number three of the British Institute of Eastern Africa. British Institute of Eastern Africa, Nairobi, 1973), pp. 70-71.
 37. *Ibid.*, pp. 72-73.

Locating places of pre-colonial irrigation activity in southern Africa

About 200AD Iron Age people, who were predominantly pastoralists, started drifting into southern Africa. They came from the north-east, where the rainfall is generally high. They then trekked across savannah lands where supplies of water were readily available. Between the third and fourth century they were making gardens in the region of the Lake St. Lucia estuary in Zululand.³⁸ There were successive waves of settlement and in subsequent centuries settlements started taking shape in the central eastern areas of southern Africa. Although pastoral industry tended to dominate human food production patterns in the era of the East African Iron Age, there is a sound theoretical base for the argument that the southward migrating peoples were capable of switching between pastoral and agricultural pursuits over the medium to long term.³⁹ Changing climatic conditions, such as drought and famine, the abstention of traditions of migration, and population growth in some regions had a definitive impact on agriculture. A spin-off would have been the use of irrigation technology to ensure sustainable growth in society.

In the Lowveld of South Africa's Mpumalanga and the Limpopo Province settlement patterns were primarily varied and dispersed.⁴⁰ Unlike KwaZulu-Natal, where primarily pastoralist communities were settled and state formation gradually became the order of the day as a result of environmental pressures and military organisation, the northern Lowveld and escarpment tended to favour relatively small communities that were dispersed in valleys, not too far from water supplies and arable soil.

Hammond-Tooke describes these settlements as follows:

In the well-watered East, occupied by Nguni and Tsongas, it was possible for people to spread out over the country in a fairly uniform manner. Each homestead had its own fields and cattle byre and homesteads were scattered at varying distances from one another, from a hundred (metres) to several (kilometres). The Nguni tended to build residential sites along the spurs and hills that characterise (KwaZulu-Natal) and the Transkei. These were often intersected by deep, bush-filled valleys, which provided fuel, building material and the all-important medicinal plants; fields were usually sited along the ridges, or preferably, on the rich soil of a stream or river bank. Higher ground, typically grass-covered, served as pasturage, so that the cattle were never far away and were herded nightly in the byres that formed the symbolic centre of each homestead.⁴¹

It was only in the late 18th and early 19th century that many of these communities were forced, presumably as a result of the threat of attack from outside, to start organising

38. M Hall, *The changing past: farmers, kings and traders in southern Africa, 200-1986*, (David Philip. Cape Town and Johannesburg, 1987), pp. 36-38.

39. R Mace, "Transitions between cultivation and pastoralism in Sub-Saharan Africa" in *Current Anthropology*, 34(4), August-October 1993, pp. 363-382.

40. D Hammond-Tooke, *The roots of black South Africa*, (Jonathan Ball Publishers, Johannesburg, 1993), p. 46.

41. *Ibid.*, p. 47.

themselves in more close-knit settlements. This tendency manifested itself in the southern parts of Zimbabwe and Mozambique, large areas of Swaziland and Lesotho, as well as the South African provinces of the Eastern Cape, Limpopo, Mpumalanga, Gauteng and North West Provinces. What has been described as the *Mfecane* or the *Difaqane*, had a marked effect on indigenous agriculture – particularly irrigation technology. The socio-political climate of violence and warfare had a negative impact on labour-intensive and long term agricultural activities in many communities in southern Africa. It also paved the way for white settlers moving into the interior to claim for themselves fertile lands in areas that had been depopulated.

Observations on some pre-colonial irrigation landscapes

Large-scale migrations, as a result of the formation of strong polities in southern Africa, as well as increasing development of international trade and colonial expansion, along with environmental changes of change and population growth, would then have asserted a marked influence on indigenous irrigation activities in the region.

Irrigation can be described as ‘the artificial application of water to land for the purposes of agriculture’.⁴² In the case of Iron Age southern Africa it was located in two very specific environmental localities. Sutton explains that the first has a bearing on irrigation in the fertile hills, where furrows would typically have been used to lengthen the cultivation season to support denser populations. The second type of irrigation was that found in valleys, where the rivers flow into the drier land and where planting is more specifically dependent on good furrows.⁴³ Elements of both these components are evident in the areas under discussion.

Some examples of specific irrigation sites highlight the point.

Nyanga

Perhaps the best regional example we have today of pre-colonial irrigation technology in southern Africa is to be found in the Nyanga District in the north-eastern parts of Zimbabwe. Over a surface area of some 6000 – 8000 km² the landscape is covered with terraces and stone-walled homestead complexes.⁴⁴ We have known about the site since the late 19th century, but our knowledge of the culture and its people has not substantially increased in the space of more than a century.⁴⁵ Summers, who had started with his investigations of the site at the end of the 1940s, was responsible for a

42. C Scott Montrieff, “Irrigation” in *Science*, New Series, 22(567), November 1905, p. 578.

43. JEG Sutton, *The archaeology of the Western Highlands of Kenya*, (Memoir number three of the British Institute of Eastern Africa. British Institute of Eastern Africa, Nairobi, 1973), p. 72.

44. *Ibid.*, p. 28.

45. S Chirawu, “Ancient terrace farming in north eastern Zimbabwe” (Paper presented at a symposium: The archaeology of farming communities at the World Archaeological Congress 4, University of Cape Town, 10-14th January 1999), pp. 1-2.

comprehensive report on Nyanga.⁴⁶ His conclusion was that it could be dated to between the 16th and 19th century.⁴⁷ He was convinced that the settlers were of the Iron Age. People of the 16th century Ziwa culture, an early Iron Age community, presumably also pastoralists with goats and sheep, were responsible for the first phase of development. They were the founders of the *Uplands culture* of the meta site.⁴⁸ The corresponding *Lowland culture* was a continuation of the Upland culture's architecture, but there was evidence of more refined activity in the form of pottery. It is presumed that this culture started flourishing in the 17th century.⁴⁹ The new settlers were people of a second phase in the Iron Age. They are said to have been cattle herders. Technologically they were also more advanced than their predecessors.



Figure 5. The remains of terraced farming activities in the Nyabongwe Valley Nyanga, Zimbabwe.⁵⁰

More important is the fact that, since the earliest research on the site, observations were made on how accurate the aqueducts of Nyanga had been constructed by people

46. R Summers, *Inyanga: prehistoric settlements in Southern Rhodesia*, (Cambridge University Press, for the Inyanga Research Fund, Cambridge, 1958).

47. *Ibid.*, pp. 467-468.

48. *Ibid.*, p. 467.

49. *Ibid.*, p. 468.

50. Photograph: KR Robinson (1951), in R Summers, R Summers, *Ancient ruins and vanished civilizations of southern Africa*, (TV Bulpin Publications, Cape Town, 1971), Plate 34, between pp. 98-99.

who must have had considerable skills in hydraulic engineering. In 1905 Hall explained:

One of the most extraordinary features of the Inyanga Range is the vast number of old aqueducts, some two miles (3,2 km) or more in length, running from artificial dams on the mountain streams, and crossing from hill to hill in a most remarkable manner... The hardest material pierced in their construction appears to have been shale or clay stone. They (the furrows) are all about 16 to 24 inches (40-60cm) wide, and are about 2 feet (60cm) in depth. They have no paving or built areas.⁵¹

It was in the second period of settlement that extensive terrace construction was the order of the day.⁵² Below attention will be given to terrace construction, but it is important to note that these are elements of proof that we have for what might be termed traces of a hydraulic culture. It spanned the period of the 17th to the mid-19th century.⁵³

As to who were responsible for the irrigation works, there is up to the present no certainty. At the start of the twentieth century, Hall maintained it must have been the work of 'Zaide of Magadoxo Arabs'.⁵⁴ These arguments were not refuted. The lack of conclusive evidence has persisted. In the 1950s, a debate on the famous Zimbabwe Ruins,⁵⁵ which once again opened up the issue of Nyanga, the theory still persisted that people of an Arabic culture, who extended their influence southward, from Abyssinia to Nyanga, were responsible for the settlement, and presumably also for the irrigation system. A new angle that was brought in, suggested that it might even have been pre-Islamic settlers.⁵⁶ There were also arguments that the glass beads⁵⁷ of Indian

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51. RN Hall, "Stone fort and pits in the Inyanga Estate, Rhodesia" in *The Journal of the Anthropological Institute of Great Britain and Ireland*, 35, January-June 1905, p. 102.
 52. R Summers, "The Iron Age of Southern Rhodesia" in *Current Anthropology*, 7(4), September 1966, p. 468.
 53. D Seddon, "The origins and development of agriculture in East and Southern Africa" in *Current Anthropology*, 9(5) Part 2, December 1968, p. 493.
 54. RN Hall, *Pre-historic Rhodesia: an examination of the historical, ethnological and archaeological evidences as to the origin and age of the rock mines and stone buildings, with a gazetteer of medieval South-East Africa, 915 A.D. to 1760 A.D. and the countries of Monomotapa, Manica, Sabia, Quiteve, Sofala and Mozambique*, (T Fisher Unwin, London, Leipzig, 1909), p. 200.
 55. It started with an article by GA Wainwright, "The founders of the Zimbabwe civilization" in *Man*, 49, June 1949, pp. 62-66.
 56. AD E Jensen, "Correspondence: The founders of the Zimbabwe culture" in *Man*, 52, 1952, pp. 109-110; GA Wainwright, "The founders of the Zimbabwe civilization" in *Man*, 51, December 1951, p. 176.
 57. These beads have for many years been closely associated with rain-making activities. See C van Riet Lowe, "Beads of the water" in *Bantu Studies*, 11, 1937, pp. 367-372.

origin, found at Zimbabwe, could perhaps be linked to the cultures of Nyanga and even the Venda of South Africa.⁵⁸

Interestingly, already in the 1920s theories were circulated to the effect that people of Indonesian origin were responsible for the Nyanga culture.⁵⁹ Subsequently it was not disputed.⁶⁰ Up to the present there are elaborate and convincing arguments for this theory.⁶¹ A more realistic assessment is that of Summers who, in the 1970s suggested, on the evidence of structures in the Manicaland region of Zimbabwe, that the construction of irrigation furrows could have been the work of Portuguese trading settlements that operated in the hinterland of Mocambique.⁶²

Given this evidence and speculation, it would be sensible to postulate that there are indications of processes of cultural hybridisation.⁶³ Typically, it is then assumed that external cultural traditions were transmitted and integrated with indigenous patterns of human industry and governance in the case of Nyanga.

Beach, one of the leading historians of Zimbabwe, is of the opinion that the construction work was done by the local Unyama people.⁶⁴ Writing in the 1980s, he was the first author to deconstruct old discourses that the terraces were the work of a Sena-speaking Tonga group.⁶⁵ This dovetails with the observations of Roger Summers and Keith Robinson. In the 1950s they observed how local residents were familiar with the construction of irrigation canals and stonework.⁶⁶ The apparent clumsy operations in constructing a furrow and the opening up of a potential fountain, can be then ascribed to semi-coercion that these people had been subjected to in the framework of colonial governance.

58. JF Schofield, "Correspondence: The founders of Zimbabwe culture" in *Man*, 51, November 1951, pp. 162-163.

59. J Hornell, "Indonesian culture in East Africa" in *Man*, 28, June 1928, pp. 107-108.

60. D Seddon, "The origins and development of agriculture in East and Southern Africa" in *Current Anthropology*, 9(5), Part 2, p. 494.

61. R Dick-Read, *The phantom voyagers: evidence of Indonesian settlement in Africa in ancient times*, (Thurlton Publishers, Winchester, 2005).

62. R Summers, *Ancient ruins and vanished civilizations of southern Africa*, (TV Bulpin Publications, Cape Town, 1971), pp. 85-86.

63. See JWN Tempelhoff, "Environmental history and sustainable cultural dynamics" (Paper presented at "Historical studies, disciplines and discourses," an international conference on the History and Theory of Historical Studies, presented by Pasts Inc., at the Central European University (CEU), Budapest, 21-24 October 2004), pp. 1-3. For publication in 2006.

64. D Beach, *The Shona and their neighbours*, (Blackwell, Oxford, 1994), pp. 126-129.

65. S Chirawu, "Ancient terrace farming in north eastern Zimbabwe" (Paper presented at a symposium: The archaeology of farming communities at the World Archaeological Congress 4, University of Cape Town, 10-14th January 1999), p. 2.

66. R Summers, *Ancient ruins and vanished civilizations of southern Africa*, (TV Bulpin Publications, Cape Town, 1971), p. 174.

Some historians tend to be cynical about Nyanga, maintaining that it was primarily a settlement of ‘losers’.⁶⁷ However, if we assume that they were perhaps a relatively large population of hardworking people who tried to maintain a food producing system for community in a region where intermittent unrest and internecine warfare prevailed among communities, the historical picture is different. It would then have been a regional settlement of agricultural activity, well-organised and possibly also under a relatively ordered system of governance where an authoritarian system of governance prevailed. It was then a region of specialised agricultural production that formed part of a larger state where diverse forms of industry – mining, livestock farming and agriculture – were the pursuits of very specific communities.

The Limpopo region



Figure 6. The remains of a precolonial storage dam near Tshipise in the Limpopo Province of South Africa.⁶⁸

67. M Hall, *The changing past: farmers, kings and traders in southern Africa, 200-1986*, (David Philip. Cape Town and Johannesburg, 1987), p. 136.

68. JB de Vaal, “Pre-Europese Bantoe-besproeiingswerke in Soutpansberg” in *Tydskrif vir Wetenskap en Kuns*, New Series, 2(2), December 1941. Plate 2, between pp. 180-181.



Figure 7. A precolonial irrigation furrow on the farm Naus in the northern parts of the Limpopo Province of South Africa.⁶⁹

The northern border of South Africa's Limpopo Province is the Limpopo River – in the vernacular the *Vembe* River. It forms part of a region where the culture of the Venda people prevails. They are a branch of the Shona people of Zimbabwe, but they are also related to some of the ancient people, the Rozwi, who were reportedly responsible for the construction of the Zimbabwe Empire. Venda history has it that they originally came from the Central African Lake areas. One branch of the Venda people extends up to the Drakensberg range, near Duivelskloof, where the Lovedo are resident. They are the subjects of Modjadje, the enigmatic Rain Queen.⁷⁰ Although the Venda have livestock, they are also known to have had a long history of agriculture industry.⁷¹

In 1930, Trevor, a retired colonial official, who had considerable experience of the indigenous peoples of Zimbabwe and South Africa, noted that the Venda people were

69. *Ibid.*, pp. 180-181.

70. M Wilson, "The Sotho, Venda and Tsonga" in M Wilson and L Thompson (eds.), *A history of South Africa to 1870*, (Second impression [1982], David Philip, Cape Town and Johannesburg, 1985), pp. 168-169.

71. E Gottschling, "The Bawenda: a sketch of their history and customs" in *The Journal of the Anthropological Institute of Great Britain and Ireland*, 35, July-December 1905, p. 370.

familiar with irrigation technology.⁷² He mentioned a channel in the M'Tamba Valley that was about 3,2 km in length and reached a depth of 2,6 metres.⁷³ A decade later De Vaal reported on his survey of 13 sites in the Limpopo River area where there were clear indications of pre-colonial Bantu irrigation works. These sites were on the farms Windhoek, Naus, Prince's Hill and Mountain View, Waterpoort, Bluebell, as well as Melrose and Trojan. He was convinced that they were constructed by African people.⁷⁴ The local African population (primarily Venda) he had interviewed informed him that they were familiar with irrigation. He had also made some observations on how Venda agriculturalists irrigated their crops in the Nyelele Valley.⁷⁵

De Vaal was familiar with Nyanga and drew some comparisons.⁷⁶ He was convinced that Africans in southern Africa were familiar with irrigation technology. Moreover he had evidence that the Pedi (the major division of the seSotho-speaking people of the Limpopo Province) in the 19th century had a irrigation furrows in the royal village of Sekhukhune.⁷⁷

Mpumalanga

South Africa's Mpumalanga Province is noted for its natural splendour. It is also one of varied landscapes. The Kruger National Park is situated in the hot semi-arid Lowveld where perennial rivers from the Drakensberg escarpment flow towards the Indian Ocean in Mozambique. The valleys of the escarpment are noted for settlement areas of early Mapulana and Mpai settlers of the Iron Age. Traces of their settlements, along the Drakensberg range, are to be found up to Lesotho. Later settlers on the higher lying parts of the Lydenburg region (where similar terrace structure to that of Nyanga in Zimbabwe are found) were responsible for agricultural activities, away from the potential scourges of malaria as well as the dreaded tsetse fly that posed a fatal threat to livestock and humans.

72. TG Trevor, "Some observations on the relics of pre-European culture in Rhodesia and South Africa" in *The Journal of the Royal Anthropological Institute of Great Britain and Ireland*, 60, July-December 1930, p. 392.

73. *Ibid.*, p. 392.

74. JB de Vaal, "Pre-Europese Bantoe-besproeiingswerke in Soutpansberg" in *Tydskrif vir Geesteswetenskappe*, New Series, 2(2), December 1941, pp. 179-181.

75. *Ibid.*, p. 182.

76. *Ibid.*, p. 182.

77. *Ibid.*, p. 182.

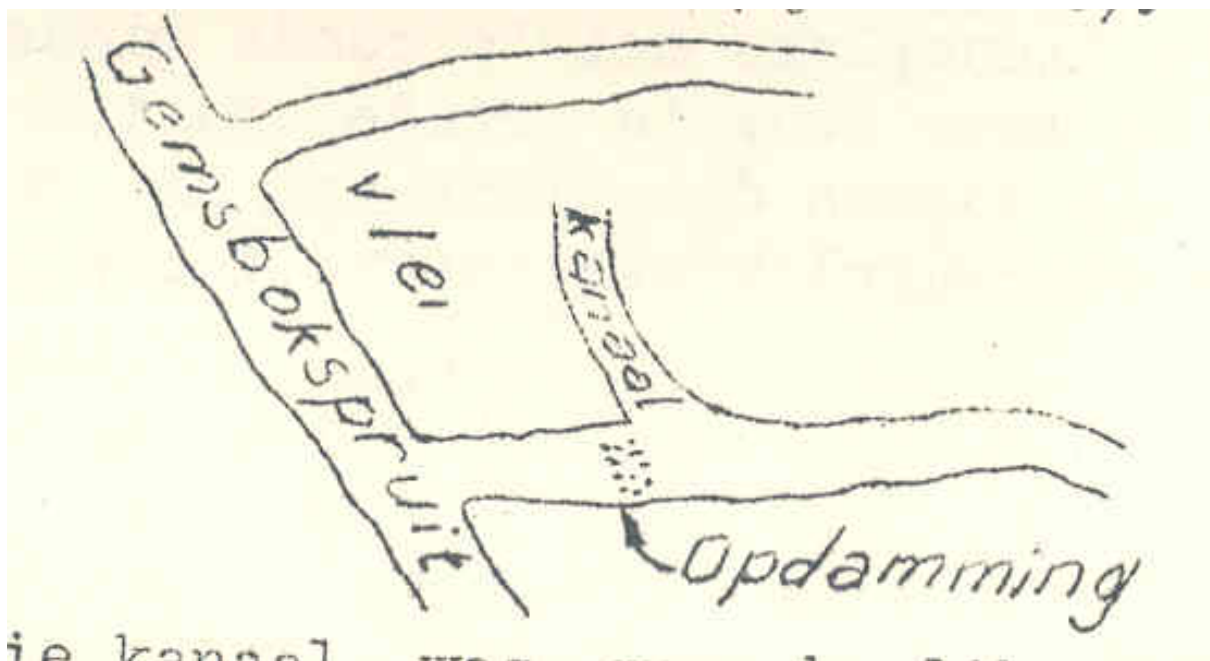


Figure 8 Sketch of an irrigation system in the former Carolina District (Currently the Albert Luthuli Municipal district) of Mpumalanga⁷⁸

Further south, in Carolina (currently the Albert Luthuli district), and also near the Lowveld town of Barberton there are indications of irrigation. In 1956 the anthropologist, AC Myburgh, reported on what was presumed to have been a precolonial irrigation system on the farm Rietfontein 95. There were a number of canals on a fairly level tract of land. A dam of sorts had been built to take water from the Gemsbokspruit. Consequently a floodplain was formed and water could siphon through on the lands. Myburgh noted that the canals obviously were made for the purposes of irrigation because there were no direct indications of a settlement in the vicinity of what must have been a patch of agricultural land. Another canal on the same farm was presumably used to provide water to the local community who had been resident on the land.⁷⁹

Between January and April 2006 the author visited Suikerboschfontein in the Albert Luthuli Municipal District. It is a private nature reserve and hiking trail that has become famous for its Chariot temple of the Dying Sun that was described by the historian CA Hromnik.⁸⁰

In the valley, opposite Hromnik's temple site the ruin of an old (presumably a livestock byre) and combined rectangular and circular structure, of a more recent date was visible. The summer rains had not yet reached its peak and it was evident that

78. AC Myburgh, *Die stamme van die distrik Carolina*, (Government Printer, Pretoria, 1956), p. 44.

79. *Ibid.*, p. 44.

80. CA Hromnik, "Ancient Indian religious astronomy in the stone ruins of Komatiland, South Africa" in *MNASSA*, 55, nos. 5 and 6, June 1996, pp. 69-77.

most of the green grass was located, close to an artesian fountain. Below and adjacent to the fountain were traces of what used to be agricultural lands.



Figure 9. Fountain between the ruins and traces of agricultural activity on Suikerbosfontein, 2006.01.07. (Photograph JWN Tempelhoff)

By April 2006, on the occasion of a second visit there had been substantial rains. The grass was considerably longer and a closer inspection of the fountain, adjacent to what presumably was a dwelling of people of Swazi descent, was more evident.



Figure 10. Mixed rectangular and circular structure, presumably a cross-over form of Swazi architecture over an earlier Proto-Sotho settlement site.⁸¹

81. Photograph: JWN Tempelhoff, Suikerbosfontein, 2006.04.10.

It appears as if the fountain provided water to the small domestic settlement. Adjacent to the dwelling there is a small dam from which clay was mined, presumably for manufacturing pottery, but also for plastering the dwelling.



Figure 11. Clay from the dam site, suitable for making pottery.⁸²



Figure 12. Small dam adjacent to dwelling, Suikervoschfontein.⁸³

82. Photograph: JWN Tempelhoff, Suikerboschfontein, 2006.04.10.

83. Photograph JWN Tempelhoff, Suikerboschfontein, 2006.04.10.



Figure 13. Moss-covered plastered remains on the wall of the dwelling.⁸⁴

In recent years the owner of the nature reserve, Dr OT van Niekerk, had been working closely with the South African Department of Water Affairs and Forestry (DAAF) in clearing out the invader wattle plantations that had proliferated on the banks of the *spruit* in the valley. The *spruit* (which by April 2006 resembled a river as a result of the rains) is a tributary of the Nkomati River, one of the major rivers in Mpumalanga passing through Swaziland, before flowing into the sea in Mozambique.



Figure 14. Spruit on Suikerboschfontein. This was an ideal site for irrigated (dambo) lands, prior to the invasion of exotic trees (Wattle).⁸⁵

84. Photograph: JWN Tempelhoff, Suikerboschfontein, 2006.04.10.

85. Photograph: JWN Tempelhoff, Suikerboschfontein, 2006.04.10.

The site inspection suggested that the banks of the *spruit* had been used for irrigating land. There was sufficient space on the embankments for *dambo*-type agriculture on both sides of the stream. According to the landowner remains had been found by earlier researchers of lookout points from which the local residents guarded their lands against trespassing livestock and wild animals.



Figure 15. Typical rock outcrop, close to the *spruit*, where the irrigation farmers could have guarded their crops against herbivores.⁸⁶

Furthermore, down the stream there is a natural wetland, on a slightly higher elevation, with high grasses. This undoubtedly would have been a further site of irrigated lands. Against the surrounding hillsides, on several places, there still are signs of terraces and stone walled-structures, that had been made, presumably by what could have been Mapulana agriculturalists after the seventeenth century.

86. Photograph: JWN Tempelhoff, Suikerboschfontein, 2006.04.10.



Figure 16. Stone walls on Suikerboschfontein. Above these there are traces of terraced lands. The *spruit* is below.⁸⁷



Figure 17. Terraced agricultural lands on an adjacent nature reserve, close to the site on Suikerboschfontein. A major tributary of the Nkomati River passes by within 200 m of this site.⁸⁸

87. Photograph: JWN Tempelhoff, Doornkloof, 2006.04.10.

88. Photograph: JWN Tempelhoff, Suikerboschfontein, 2006.04.10.

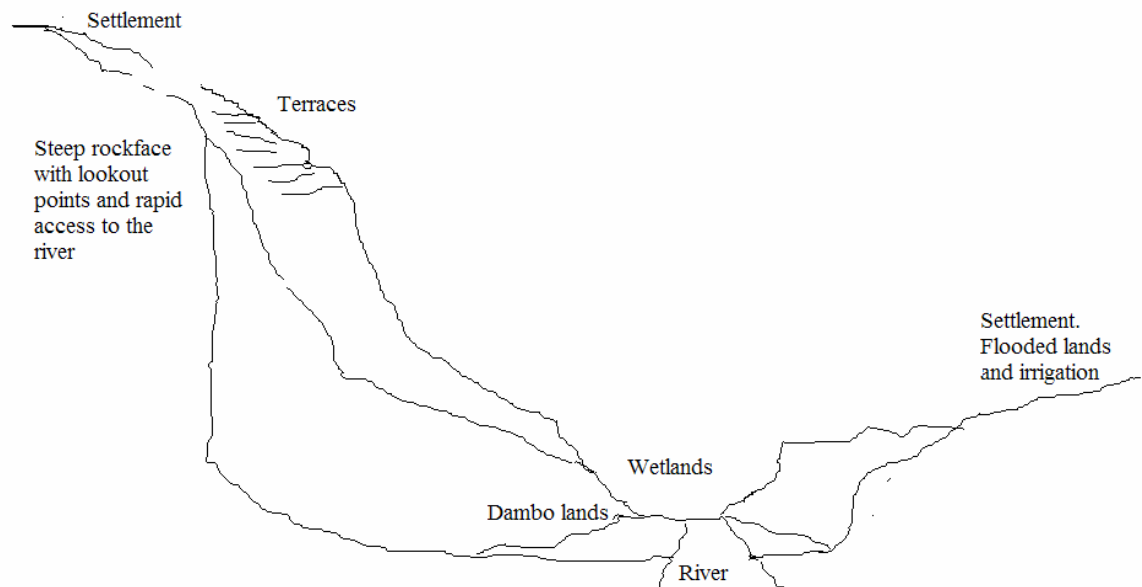


Figure 18. Sketch of the *spruit* area on Suikerboschfontein.⁸⁹

Suikerboschfontein also suggests that the population of communities, resident on the land, both sides of the stream, was not large. They were relatively isolated.⁹⁰ There are indications that they kept livestock and must have resided on the land for an extended period of time. The site of the Swazi-type settlement was vacated by the farmer in the 1950s. The Van Niekerks, who have owned the farm since the 1910s, knew the Swazi farmer and his family. ‘Gys’, as he was called, was familiar with white farming techniques. That explains why he cultivated his lands without stone terraces. The Swazi people, as a result of the *Difaqane/Mfecane*, had moved into the area, most probably after the 1840s. Before them, Sotho-speaking people had been resident on the land. The Swazi merely settled on, or at least close to a site, where the former settlers had been resident. Although they must have made use of the riverine lands of their predecessors, the new settlers did not make use of the terraces. This tradition was no longer in use, after the technology of ploughing with oxen had been introduced in Swazi culture.

89. Landscape sketch: JWN Tempelhoff, 2006.04.14.

90. Significant traces of a larger and more densely populated settlement were found on and adjacent private nature reserve. This site is situated close to the Nkomati River. Fieldwork JWN Tempelhoff, 2006.04.10. The smaller settlements further up, in the tributaries of the Nkomati River, were presumably agricultural outposts of this settlement.

Southern Highveld sites

Further south, as the Drakensberg mountain range stretches on to the Highveld towards Lesotho there are similar patterns of agricultural activity. In the first half of the twentieth century, Ashton working among the Basuto of Lesotho, noted that they had used irrigation in some form or another since the earliest times. He reported seeing traces of Tlokoa irrigation in the vicinity of Bethal, near Phamong, where there was a good strong water supply.⁹¹ Maggs in his comprehensive study of the Iron Age on the southern Highveld of South Africa reported in the 1970s that sorghum, cowpea and cucurbit were planted by the agriculturalists.⁹² By the 1830s these communities were also cultivating maize. Few remains of gardens could be found during archaeological and aerial investigations. Oral information suggested that lands, in the vicinity of Heilbron in the Free State, were cleared by making small heaps of the stones in valleys and then planting lands. Maggs was confident that there were no traces of terraces, similar to those in the Lydenburg and Carolina districts of Mpumalanga.⁹³

He also observed:

(S)ettlements were not usually located beside arable land; the immediate factors for location seem to have been the desire to be on high ground above the valleys and near suitable stone for building.⁹⁴

He then interprets Cassalis who observed in the mid-19th century that the Sotho people deliberately kept their gardens and settlements apart to prevent the livestock in the enclosures from trespassing.⁹⁵ Maggs is also right in his assumption that the southern limit of the Type V settlements should be in the vicinity of Bethal and Ermelo.⁹⁶

91. H Ashton, *The Basuto: a social study of traditional and modern Lesotho*, ([1952], Second edition, Oxford University Press, London, New York and Toronto, 1967), p. 127.

92. TM O'C Maggs, *Iron Age communities of the southern Highveld*, (Council of the Natal Museum, Pietermaritzburg, 1976), p. 319.

93. *Ibid.*, p. 319.

94. *Ibid.*, p. 319.

95. *Ibid.*, p. 319.

96. *Ibid.*, p. 319.

Physical features of agricultural practices related to irrigation

Terraces

For our understanding of an Iron Age irrigation culture it is important to take note of terraces. The construction of these structures on hillsides is a prolific tradition in West and East Africa.⁹⁷ They have also been found on the island of Madagascar.⁹⁸ These structures were built, primarily for the purposes of agricultural activity. They tended to be slanted downwards. It ensured a natural form of irrigation that reached different levels along hillsides.

It was a popular form of land-use in southern Africa, up to the end of the nineteenth century. Elements of Nyanga-type terracing have also been found in Angola and it has been suggested that there was a westward transmission of certain elements of terracing construction styles.⁹⁹

A number of observations by researchers on the terrace cultures of southern Africa can be summarised as follows:

1. There must have been a prodigious supply of labour available for the construction of the terraces.¹⁰⁰
2. Once they were made the terraces were practically indestructible. They stand out as features on the landscape for centuries.¹⁰¹

97. R McC. Netting, "Agrarian ecology" in *Annual Review of Anthropology*, 3, 1974, p. 36; R Summers, *Ancient ruins and vanished civilizations of southern Africa*, (TV Bulpin Publications, Cape Town, 1971), p; Also see M Tagseth, "The expansion of traditional irrigation in Kilimanjaro, Tanzania" (Publication forthcoming under editorship of P Juuti, University of Tampere, Finland).

98. R Dick-Read, *The phantom voyagers: evidence of Indonesian settlement in Africa in ancient times*, (Thurlton Publishers, Winchester, 2005), p. 102.

99. R Summers, *Ancient ruins and vanished civilizations of southern Africa*, (TV Bulpin Publications, Cape Town, 1971), pp. 183-184.

100. RN Hall, *Pre-historic Rhodesia: an examination of the historical, ethnological and archaeological evidences as to the origin and age of the rock mines and stone buildings, with a gazetteer of medieval South-East Africa, 915 A.D. to 1760 A.D. and the countries of Monomotapa, Manica, Sabia, Quiteve, Sofala and Mozambique*, (T Fisher Unwin, London, Leipzig, 1909), p. 202; S Chirawu, "Ancient terrace farming in north eastern Zimbabwe" (Paper presented at a symposium: The archaeology of farming communities at the World Archaeological Congress 4, University of Cape Town, 10-14th January 1999), p. 2.

101. TG Trevor, "Some observations on the relics of pre-European culture in Rhodesia and South Africa" in *The Journal of the Royal Anthropological Institute of Great Britain and Ireland*, 60, July-December 1930, p. 391; R Summers, "The Iron Age of Southern Rhodesia" in *Current Anthropology*, 7(4), September 1966, pp. 467-468.

3. They are fairly commonplace on escarpments such as those in the eastern parts of Zimbabwe,¹⁰² where at Nyanga alone, terracing covers a surface area of 22 000 ha.¹⁰³
4. Further south, in South Africa terraces are common in the Soutpansberg mountain range and further south along the Drakensberg escarpment into the Mpumalanga Lowveld at Barberton, Waterval Onder and Elandshoek.¹⁰⁴ Elements of terracing have also been studied in the southern Highveld region of Mpumalanga, and the Free State Province, although the somewhat colder climatic conditions tended to prevent agriculturalists from investing too much labour in their construction.
5. The retaining walls of terraces were seldom more than 2 feet and were built from stones that had been cleared when the lands were prepared.¹⁰⁵ In the case of Nyanga the terraces were built about 1,5 to 3 m in width.¹⁰⁶
6. As a rule terraces were not used exclusively for irrigation purposes. However, as in the case of Zimbabwe's Nyanga,¹⁰⁷ their construction style suggests that many were intended to irrigate lands below.¹⁰⁸
7. In discussions with agriculturalists, at a terrace site in the Mathlapitsi Valley of South Africa's Limpopo Province at the start of the twentieth century, Trevor, was told that they made use of the terraces for planting

102. TG Trevor, "Some observations on the relics of pre-European culture in Rhodesia and South Africa" in *The Journal of the Royal Anthropological Institute of Great Britain and Ireland*, 60, July-December 1930, p. 391.

103. R Soper, "The agricultural landscape of the Nyanga area of Zimbabwe." (Paper presented at a symposium: The archaeology of farming communities at the World Archaeological Congress 4, University of Cape Town, 10-14th January 1999), p. 2.

104. TG Trevor, "Some observations on the relics of pre-European culture in Rhodesia and South Africa" in *The Journal of the Royal Anthropological Institute of Great Britain and Ireland*, 60, July-December 1930, p. 391.

105. *Ibid.*, p. 391.

106. R Soper, "The agricultural landscape of the Nyanga area of Zimbabwe." (Paper presented at a symposium: The archaeology of farming communities at the World Archaeological Congress 4, University of Cape Town, 10-14th January 1999), p. 2.

107. RN Hall, *Pre-historic Rhodesia: an examination of the historical, ethnological and archaeological evidences as to the origin and age of the rock mines and stone buildings, with a gazetteer of medieval South-East Africa, 915 A.D. to 1760 A.D. and the countries of Monomotapa, Manica, Sabia, Quiteve, Sofala and Mozambique*, (T Fisher Unwin, London, Leipzig, 1909), p. 202.

108. R Soper, "The agricultural landscape of the Nyanga area of Zimbabwe." (Paper presented at a symposium: The archaeology of farming communities at the World Archaeological Congress 4, University of Cape Town, 10-14th January 1999), p. 4.

crops in very wet seasons when the low-lying agricultural lands were swampy.¹⁰⁹

8. The terrace farmers who started it all moved into the area, with the awareness that the mountainous region was unsuitable for agricultural activities. Consequently they started meticulously constructing terraces for agricultural purposes.¹¹⁰
9. Terracing fell out of favour with agriculturalists in the nineteenth century. It was partly as a result of the introduction of the ox-drawn ploughs a revolutionary technological innovation, introduced by European settlers.¹¹¹ This form of land preparation required wider areas of operations.¹¹²

Shifting agriculture

Prior to European colonisation African farmers practiced shifting agriculture in southern Africa.¹¹³ Land would be worked for a season or two and then the farmer would shift activities to another piece of land and let the formerly worked land lie fallow. Most Bantu-speaking people in southern Africa traditionally tried to shift to new lands every year.¹¹⁴ As settlement patterns became denser, farmers were forced to work the same lands for two or more seasons. Simultaneously there would have been a demand for the more intense use of the land. Under these conditions the construction of terraces, wherever it was possible, and the construction of irrigation systems would have been a viable proposition for farmers, primarily concentrating on a subsistence economy.

109. TG Trevor, "Some observations on the relics of pre-European culture in Rhodesia and South Africa" in *The Journal of the Royal Anthropological Institute of Great Britain and Ireland*, 60, July-December 1930, p. 391.

110. S Chirawu, "Ancient terrace farming in north eastern Zimbabwe" (Paper presented at a symposium: The archaeology of farming communities at the World Archaeological Congress 4, University of Cape Town, 10-14th January 1999), p. 2.

111. H Kuper, *The Swazi: a South African kingdom*, (Second edition [1963], Holt, Rinehart and Winston, New York, 1986), p. 44; R Whitlow, "Conservation status of wetlands in Zimbabwe: past and present" in *GeoJournal*, 20(3) March 1990, p. 197.

112. S Chirawu, "Ancient terrace farming in north eastern Zimbabwe" (Paper presented at a symposium: The archaeology of farming communities at the World Archaeological Congress 4, University of Cape Town, 10-14th January 1999), p. 3.

113. R Whitlow, "Conservation status of wetlands in Zimbabwe: past and present" in *GeoJournal*, 20(3) March 1990, p. 196.

114. M Shaw, "Material culture" in WD Hammond-Tooke (ed.), *The Bantu-speaking peoples of southern Africa*, (Second edition [1937], Routledge and Kegan Paul, London and Boston, 1974), p. 92.

Wetland farming/Dambos



Figure 19. A contemporary wetland irrigation scheme, the Mugabi dambo, in Zambia.¹¹⁵

Wetland farming was an integral part of farming life in southern Africa in pre-colonial times. The system of agriculture goes by different names in the region, such as *dambos*, *mapani*, *matoro*, *amaxhapozi*, and *vleis*). They are primarily situated in wetland environments that retain water close to the surface for the greater part of the year. Consequently it supports the vigorous growth of grasses and sedges, as well as high plant and animal diversity during the dry season. Traditionally Bantu-speaking peoples in southern Africa exclusively planted sorghum (*Andropogon sorghum* Brot.), pumpkins and a variety of gourds.¹¹⁶ This was increasingly replaced in later times by the cultivation of maize.¹¹⁷ The gourds, and or calabashes that they produced were used as containers for water and beer.¹¹⁸ In the case of well-flooded dambos rice crops were produced. Water was near the surface and this meant that shallow wells could be used to water gardens with vegetables at all times of the year.¹¹⁹ There are indications that in the case of Zimbabwe agriculturalists had used the central watershed plateau in

115. Photograph: AE Daka, in AE Daka, Development of a technological package for sustainable use of dambos by small-scale farmers, (PhD in Natural and Agricultural Sciences, University of Pretoria, Pretoria, 2001), p. ii.

116. M Shaw, "Material culture" in WD Hammond-Tooke (ed.), *The Bantu-speaking peoples of southern Africa*, (Second edition [1937], Routledge and Kegan Paul, London and Boston, 1974), p. 92.

117. *Ibid.*, p. 92.

118. M Shaw, "Material culture" in WD Hammond-Tooke (ed.), *The Bantu-speaking peoples of southern Africa*, (Second edition [1937], Routledge and Kegan Paul, London and Boston, 1974), p. 120.

119. R Whitlow, "Conservation status of wetlands in Zimbabwe: past and present" in *GeoJournal*, 20(3) March 1990, p. 197.

the country extensive by mid-nineteenth century.¹²⁰ In Zimbabwe along some 1,3 million hectares of land had been identified as *dambo* in the late 1990s.¹²¹

This form of agriculture came to an end in the twentieth century. In an effort to combat erosion the colonial authorities of Zimbabwe in the 1939 stepped in and halted African farmers from making lands in wetlands. It was said that these activities promoted erosion.¹²²

What had in fact happened since the end of the nineteenth century was that African farmers, who had made use of *dambo* agricultural activities had started exploiting the technology of ploughs drawn by oxen. Larger portions of land could now be ploughed. They also found a ready market for their produce, especially green mealies (maize on the cob) and fresh vegetables in the white urban centres where the mining industry was growing rapidly. African farmers were in fact capitalising on their ability of cropping on *dambos*.¹²³

It is reasonable to assume that this form of agriculture persisted in many isolated parts of southern Africa deep into the twentieth century.

Political systems of governance and irrigation

In the case of Iron Age southern Africa, it is difficult, with the exception, perhaps of Nyanga to make any comprehensive statement on a strong centralised system of governance in irrigation culture. Considered against the backdrop of other settlements of significance in Zimbabwe it could be argued that Nyanga possibly could be linked to the Leopard's Koppie settlement, not far from the confluence of the Shasi and the Limpopo River. There was then a shift to Mapungubwe in the period 900 - 1100 AD. From there the accent shifted to Mapungubwe that flourished up to about 1460. Then came Nyanga. High population densities, causing environmental degradation, and perhaps even water-related contagious diseases, might have been factors that contributed to the settlements being vacated.

Communities of people were organised in a fairly systematic and orderly manner. There were the agriculturalists, the pastoralists some minor domestic industries such as pottery manufacture, salt mining and the production of leather goods. Major industrial activities could have been related to mining. In the case of the Mapungubwe we have evidence of gold artefacts that had been in circulation. Later, in the same region, copper mining by the early Venda residents was commonplace.

120. *Ibid.*, p. 197.

121. FF Shoniwa, The effects of land-use history on plant species diversity and abundance in dambo wetlands of Zimbabwe, (M. Sc. West Virginia University, Morgantown, 1998), p. 6.

122. R Whitlow, "Conservation status of wetlands in Zimbabwe: past and present" in *GeoJournal*, 20(3) March 1990, p. 197.

123. *Ibid.*, p. 197.

Could it be that these industrious communities were responsible for extensive mining and trading activities? It, most probably was a society of specialist, resident over a fairly large region. It could have been that at Nyanga, which was presumably not in the vicinity of a highly mined area, transhumance agriculture was the order of the day, during the planting and harvesting season. The resident population would then have been fairly substantial. Some residents could also have resided permanently at Nyanga.

The idea of a coerced society, being forced to perform acts of labour, such as constructing terraces and irrigating crops on what could have been some soils that were not highly fertile, are all factors that could have contributed to people being forced to perform hard and painstaking labour. On the other hand, they could willingly have performed the labour. As unrest in the region of Nyanga started increasing, as a result of the Matebele settlers that crossed the Limpopo River into Zimbabwe in the 1840s, the rural tranquillity of a labour-intensive society had to be adjusted to one of defence to protect residents against intermittent violence. There are indications of fortification at Nyanga. This means the additional labour must have caused a greater burden on the available human resources. Consequently, the viability of continuing with irrigation-related agriculture no longer made sense.

The problem is that we do not know for certain what the state of affairs was. It may be that Portuguese traders, or perhaps even entrepreneurial people from the north could have participated with the local residents in local farming operations, until the external forces of destruction were too overpowering.

Further south, in the vicinity of the Limpopo River, it would be sensible to opt for the point of departure of horticulture (*Gartenbau*) that is synonymous with early irrigation and fertilising methods being pursued by settlers.¹²⁴ This could have developed into a significant industrial pursuit in a region that boasted relatively diversified and specialised industrial activities.

At a later point in time, small settlements of individual pioneering families preceded larger settlements in valleys along the Drakensberg escarpment in South Africa. It would then imply that household systems of labour and a hierarchical order determined the manner in which irrigation was conducted. Along with shifting lands, systems of individual tenure also evolved.¹²⁵ In riverine regions – such as the Limpopo River at the time of early Venda settlement – where metalworking activities coincided with regional trade, irrigation would have been part of a culture of diversification under a relatively strong central authority. However, in the Lowveld

124. R McC. Netting, “Agrarian ecology” in *Annual Review of Anthropology*, 3, 1974, p. 22.

125. *Ibid.*, p. 41; H Bartle Frere, “On systems of land tenure among aboriginal tribes in South Africa” in *The Journal of the Anthropological Institute of Great Britain and Ireland*, 12, 1883, p. 263.

there was a reliance on settlers, willing to open up lands for agriculture, with the understanding that the land where they lived would be worked by the family unit.¹²⁶

As a rule the relatively small and isolated nature of irrigation sites, along with terraces suggests that large communities did not form before the late 18th century. The settlements were primarily intended for subsistence economic activities. In the face of the threat of the *Mfecane/Difaqane*, communities increased in size. Again the relative fertility of the soil, diminishing grazing opportunities, and the consequences of contagious water-based diseases, along with malaria and tsetse fly, could have prevented the growth of large populations. There is also the issue of an erratic climatic history of the environment. Huffman’s research, based on the perspectives of Tyson and Lindesay, shows there were notable phases of drought.¹²⁷

Table 1 Climatic conditions in southern Africa between 100 and 1810 AD.¹²⁸

AD	Conditions	Calibrated ¹²⁹
100-200	Cool	No data
250-600	Warm/wet	500-700
600-900	Cool	Na data
900-1300	Warm/wet	900-1290
1300-1500	Cool/dry	1290-1425
1500-1675	Warm/wet	1425-1675
1675-1780	Cool	Same
1790-1810	Warm/wet	Same

It is safe to assume that under these circumstances the availability of water resources would have been inconsistent. Agricultural and irrigation activities were influenced by these changes.

The absence of large riverine watercourses in a primarily arid to semi-arid subcontinent was not conducive to societal formations on the scale as that of Egypt,

126. JD Krige, “Traditional origins and tribal relations of the Sotho of ther Northern Transvaal” in *Bantu Studies*, 11, 1937, pp. 335-339.

127 .TN Huffman, “Archaeological evidence of climatic change during the last 2000 years in southern Africa” in *Quaternary International*, 33, 1996, pp. 55-60; PD Tyson and JA Lindesay, “The climate of the last 2000 years in southern Africa” in *The Holocene*, 2, 1992, pp. 271-278;

128. Huffman, TN, “Archaeological evidence of climatic change during the last 2000 years in southern Africa” in *Quaternary International*, 33, 1996, p. 59.

129. In some of the calculations the data was refined by using the available radiocarbon dates.

Aksum the Euphrates or China. The relative population densities and availability of food resources from the natural environment prevented coercive systems of governance from developing on a macro level. In particular the availability of substantial water supplies was absent.¹³⁰

By the mid-19th century white settlers from the south started penetrating many parts of Mpumalanga and the Highveld. This would have acted as a disincentive for continuing with terrace-type agriculture. Wetland irrigation systems would however have persisted until the African farmers were subjected to losing their land in the face of white settlement.

Conclusion

There is a remarkable hidden power of water in the history of southern Africa. This is particularly the case when we consider the development of early irrigation technologies of Iron Age agriculturalists. The small irrigation furrow of the subsistence farmer was just as important to an insular community of Bantu speaking people in southern Africa in precolonial times, as is the major sophisticated irrigation technology used on many irrigation projects in a highly sophisticated industrial society in present-day South Africa. There are indications of a cultural dynamic: that of human skills, contemplating the landscape and making use of the natural resources to secure a sustainable living. This forms part of the intellectual power of humans in securing for themselves survival under adverse conditions on a landscape that has a certain aesthetic and potential cultural attraction. It has for thousands of years been present in many parts of Africa. We in southern Africa are privileged to have remnants of that valuable heritage of humankind in our region.

The Food and Agricultural Organisation (FAO) of the United Nations (UN) and agricultural experts in sub-Sahara Africa have been actively propagating integrated traditional farming technologies in the region for a number of years.¹³¹ There are

130. For an anthropological exposition of Wittfogel's theory applied *inter alia* to parts of Africa, see RC and E Hunt, *Current Anthropology*, 17(3), September 1987, pp. 389-398.

131. See FS Shoniwa, The effects of land-use history on plant species diversity and abundance in dambo wetlands of Zimbabwe, (MSc in Biology, Eberly College of Arts and Sciences, Morgantown West Virginia, 1998); van der Zaag, "Water's vulnerable value in Africa." Paper presented at an international workshop, "Value of water – different approaches to transboundary water management, Koblenz, Germany, 2005.03.10-11; J Mohamed-Katerere and P van der Zaag, *Untying the 'knot of silence': making water policy and law responsive to local normative systems*, (2003. At <http://web.africa.ufl.edu/asq/v5/v5i3a7.htm>); H Virji, C Fleming A Freise and M Sobti (eds.), *Climate variability, water resources and agricultural productivity: food security in tropical sub-Saharan Africa*, (WCRP, START, SCOWAR, Web publication, 1999); AE Daka, Development of a technological package for sustainable use of dambos by small-scale farmers, (PhD in Natural and Agricultural Sciences, University of Pretoria, Pretoria, 2001); JE FitzGibbon (ed), *Advances in planning and management of watersheds and wetlands in Eastern and Southern Africa*, University of Guelph and Weaver Press, Harare, 1999).

indications that traditional technologies, together with a number of practical modern innovations can be used with good effect. They are also constantly being monitored.¹³² Perhaps the major advantage of these strategies is that they are environmentally friendly and commensurate with the objectives of sustainable development. Moreover, these strategies are environmentally friendly.

There are two problem areas that constantly need to be contemplated, whilst focusing in on the use of traditional technologies in irrigation farming. The first is that it is important, despite an ever-increasing demand for food, to be responsible in respect of the conservation of wetlands in southern Africa. They are an important element in the natural environment.¹³³ Secondly, as the demand for food intensifies and the attraction of modern technologies increase, the farmers who are traditionally innovative in their strategies, could decide on moving away from the old and opting for the new. These innovations come at a cost. They could be potentially harmful to the environment over the long term.¹³⁴ The historical record suggests that market-orientated agricultural production in environmentally sensitive regions could be harmful. In the case of Lesotho, research increasingly suggests that colonial attempts at trying to combat erosion, caused by modernist agricultural technologies, caused great harm. This was primarily as a result of an inability on the side of colonial officials on the one hand, and indigenous agriculturalists, on the other hand, to reach mutual understanding on how indigenous strategies could be employed in addressing some problems (e.g. of erosion) led to greater environmental degradation.¹³⁵ It is hoped that the advice and support given to southern Africa's agriculturalists would not be at the cost of losing some remarkable cultural traditions that have been part of Africa's agricultural history for many centuries.

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132. See H Bendsen and T Meyer, "The dynamics of the land use systems and Ngamiland, Botswana: changing livelihood options and strategies"; and DL Kgathi, G Mmoppelwa and K Mosepele, "Assessing natural resource scarcity in the Okavango Delta: case studies of key resources". Papers presented at an international conference on wetlands, held at the Okavango Swamps, December 2002. (Accessed, 2006.02.27.) See. <http://www.globalwetlands.org/contents.htm>.

133. See South African National Parks, Working for wetlands in SANparks (c 2001).

134. RB Jackson, SR Carpenter, CN Dahm, DM McKnight, RJ Naiman, SL Postel and SW Running, "Water in a changing world" in *Ecological Applications*, 11(4), August 2001, pp. 1027-1045.

135. KB Showers, "Soil erosion in the Kingdom of Lesotho and development of historical environmental impact assessment" in *Ecological Applications*, 6(2), May 1996, pp. 653-664.