

Review by Doyle McKey (emeritus professor, University of Montpellier, France)

General comments : The manuscript analyzes the contribution of the Ecological Survey of Northern Rhodesia, carried out by Colin Trapnell and collaborators beginning in the 1930's. They focus on how his field observations led him to develop an integrated view of geomorphology, soil, plant communities, and agricultural potential. His work is still widely cited, and has been influential in developing our understanding of soils, vegetation, and agriculture in a part of Africa where soil fertility is often low (Bell 1982), but varies with geomorphology, with nutrient-poorer soils on uplands and nutrient-richer soils in bottomlands (Scholes 1990).

The manuscript argues that Trapnell's approach in fieldwork gave him particular insight into how soil conditions constrained agriculture, and on the adaptive value of traditional agricultural practices. The authors show that he analyzed not only how practices changed when farmers encountered environmental change, but also how they changed in response to social or economic change. They also show that he acknowledged the agency of African farmers, who made conscious decisions about which crops to grow, where, and when. His approach was thus more nuanced than that of what has been called « the ecological theory of development », a rather reductionist approach that some authors have considered to have been exemplified by his research. While the history of ideas about economic development, colonial legacies, and similar themes is rather far from my field of competence, these seem to be useful points. The detailed analysis and frequent citations of the survey's traverse records make for sometimes laborious reading, but they do help make the central points of the manuscript.

Specific comments : The authors argue that « close attention to Trapnell's experience could inform modern efforts to understand indigenous knowledge of African soils and their agricultural potential. » Modern work on soils and agricultural potential *has* been inspired and informed by Trapnell's work, and it would be useful to give some examples. There are many examples that can be cited. The examples I know are mostly from northwestern Zambia, where I have some field experience (I have no field experience in southern Zambia). The papers I know (e.g., Grogan et al. 2013 ; Mielke & Mielke 1982 ; Stromgaard 1984, 1985, 1986, 1989) thus cite Trapnell's later work in the northern part of present-day Zambia, from 1953 onwards (e.g., Trapnell 1953, 1959 ; Trapnell & Clothier 1957 ; Trapnell et al. 1976), rather than the early work in the survey in southern Zambia that is the subject of this paper. These papers analyze *chitemene* systems, described by Trapnell in 1953, and the *fundikila* and other mound-cultivation systems that seem to have been derived from *chitemene*. If the authors know of similar examples of modern work on soils and agricultural potential that were informed by the early work in the survey, in southern Zambia, these could be usefully cited and discussed.

References cited in this review :

Bell, R.H.V. (1982) The effect of soil nutrient availability on community structure in African ecosystems. *Ecology of tropical savannas* (ed. by B.J. Huntley and B.H. Walker), pp. 193-216. Ecological Studies; Springer, New York.

Mielke, H.W. and Mielke Jr, P.W., 1982. Termite mounds and chitemene agriculture: a statistical analysis of their association in southwestern Tanzania. *Journal of Biogeography*, 9(6) : 499-504.

Scholes, R.J., 1990. The influence of soil fertility on the ecology of southern African dry savannas. *Journal of Biogeography*, 17(4/5) : 415-419.

Stromgaard, P., 1984. The immediate effect of burning and ash-fertilization. *Plant and Soil*, 80 ; 307-320.

Stromgaard, P., 1985. A subsistence society under pressure: The Bemba of northern Zambia. *Africa*, 55(1) : 39-59.

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Stromgaard, P., 1989. Adaptive strategies in the breakdown of shifting cultivation: the case of Mambwe, Lamha, and Lala of northern Zambia. *Human Ecology*, 17 : 427-444.

Trapnell, C.G., 1953. The soils, vegetation and agriculture of north-eastern Rhodesia, Lusaka, Government Printer.

Trapnell, C.G., 1959. Ecological results of woodland burning experiments in Northern Rhodesia. *Journal of Ecology* 47: 129-168.

Trapnell, C. G., and Clothier, J. N. (1957). The Soils, Vegetation and Agricultural Systems of North Western Rhodesia. Report of the Ecological Survey. Government Printer, Lusaka, Northern Rhodesia.

Trapnell, M.T. Friend, G.T. Chamberlain, & H.F. Birch. 1976. The effects of fire and termites on a Zambian woodland soil. *Journal of Ecology* 64: 577-588.

Trapnell, C.G. and Clothier, J.N., 1937. The soils, vegetation and agricultural systems of North Western Rhodesia. Report of the ecological survey. *The soils, vegetation and agricultural systems of North Western Rhodesia. Report of the ecological survey*. Cited 201 times (10 since 2020, 67 since 2000)

Technical corrections :

The text is in general very clearly written, but I have made a (large) number of (small) corrections. Line-by-line corrections are listed below. The corrections and remarks concern several different points.

Many of these concern the use of commas. For instance, in many places there was a comma before a parenthesis. If a punctuation mark is associated with a parenthetical statement, it should come after the second parenthesis, never before the first parenthesis. In some sentences, a comma was needed and I suggested inserting a comma. In other places, I suggested deleting a comma. Presence or absence of a comma sometimes changes the meaning of a sentence. For example, when two bears are sitting at a table with a human named Bob, and one says « Let's eat, Bob ! », that is a friendly remark. But when the bear says « Let's eat Bob ! », that is cause for concern. In the manuscript, I saw no places where presence or absence of a comma dramatically changed the meaning of a sentence, but precision in the use of commas makes for easier reading.

There are a few places where a word (or more) was missing. I noted these places and either suggested a correction or asked the authors to clarify. There were also a few places where a pronoun was used, but it was unclear to what noun it referred.

In a few places where a finding of the decades-old report was presented, the authors use the present tense. In these cases, past tense or past-perfect tense should be used. I noted these places and suggested corrections or asked the authors to clarify.

There were a few minor grammatical errors (e.g., disagreement in number between subject and verb) and misspellings. I corrected these.

Finally, one kind of « correction » I made is more a stylistic suggestion than a correction : the use of « which » and « that ». In American usage, The difference between « which » and « that » depends on

whether the clause is restrictive or nonrestrictive : « In a restrictive clause, use ‘that’ ; In a nonrestrictive clause, use ‘which’. (<https://www.grammarly.com/blog/which-vs-that/#:~:text=Which%20vs.%20that%3A%20What's%20the,a%20nonrestrictive%20clause%2C%20use%20which.>—see that site for the difference between these two types of clauses. However, in British usage, the two words appear to be used more interchangeably (https://www.reddit.com/r/grammar/comments/hwjlrp/that_vs_whicha_difference_in_british_english/).

Personally, I find the American usage more precise, and it seems to be catching on internationally.

Line 17 : remove the comma after « 1930s » (no punctuation just before a parenthesis)

Line 26 : WHAT « is focused on the East African Soil Map »—is the ‘side-note’ focused on this map, or is the ‘account of pedology’ focused on this map? I think you mean the latter. If so, the meaning would be clearer if you inserted a comma between « Africa » and « which ».

Line 80 : « was takes place » : Do you mean « was taking place » ? « took place » ? Or something else.

Line 83 : delete the comma after « scenery » (no punctuation just before a parenthesis)

Line 94 : « the first author was a missionary » : change to : « the first author of which was a missionary »

Line 95 : delete the comma after « work » (no punctuation just before a parenthesis)

Line 95 : insert a comma between « 4.2) » and « participated »

Line 110 : « has not been achieved, » : change to « had not been achieved, »

Line 111 : insert a comma between « officer » and « attributed »

Line 115 : insert a comma between « Moore » and « whose »

Line 117 : « In this context » : change to : « It was in this context »

Line 126 : delete the comma betwen « production » and « only »

Line 157 : delete the comma after « transcribed »

Line 158 : delete the comma after « assistance »

Line 272 : « Recall (section 3), that » : delete the comma

Line 273 : « has been an important factor » : change to : « had been an important factor »

Line 283 : delete the comma after « minute » (no punctuation just before a parenthesis)

Line 331 : « and landuse practices, » : change to : « and land-use practices, »

Line 337 : « wide ranging conversations » : change to : « wide-ranging conversations »

Line 381 : « field’, (Clarke, 1936) » : delete the comma after « field » (no punctuation just before a parenthesis)

Line 399 : « mother, (Jaspan, 2017). » : delete the comma after « mother » (no punctuation just before a parenthesis)

Line 402 : « 2017) shifts » : insert a comma after the parenthesis

Line 408 : « 566 – 567) where » : insert a comma after the parenthesis

Line 408 : insert a comma between « undertaken » and « it »

Line 414 : « with one or more interpreter. » : change « interpreter » to « interpreters »

Line 424 : insert a comma between « However » and « we »

Line 424 : « individuals and the education or experience » change to : « individuals or the education or experience »

Line 425 : « which equipped them » : change to : « that equipped them »

Line 428 : « This is Cikabanga, » : Unclear. Is 'Cikabanga' the name of the language in which the term 'meninge skellem mouti' appears ?

Line 456 : insert a comma between « mines » and « lies »

Line 469 : « in so far as this provide » : change « provide » to « provides »

Line 473 : « The information which Trapnell collected » : change « which » to « that »

Line 477 : « *B. flagristipulata* » : Spell out the name of the genus in full, as this species has not been mentioned previously in the manuscript.

Line 481 : « *Afrormosia spp*, » : First, « spp. » should not be in italics. Second, in the cited publication, was it « spp. » (plural, indicating more than one species) or « sp. » (singular, indicating one species)? It should be singular, as there is only one species. Third, « sp » should be followed by a period, not a comma. Fourth, while « *Afrormosia* » was used in the cited publication, it would be useful to add the current name, as follows : « (e.g. *Afrormosia spp*, [current recognized name *Pericopsis elata*, Fabaceae] and one ... »

Line 482 : « *Setaria sp*, » : First, « sp » should not be in italics. Second, « sp » should be followed first by a period, then by a comma : « *Setaria sp.*, »

Line 486 : « shifts, and rotations and » : change to : « shifts, rotations and »

Line 488 : « wild species which were eaten, » : change to : « wild species that were eaten, »

Line 500 : « *I. paniculata* » : Spell out the name of the genus in full, as this species has not been mentioned previously in the manuscript.

Line 512 : « *Compbretum* » : change to : « *Combretum* »

Line 520 : « The soil varies » : change to : « The soil varied » or to « The soil was observed to vary », because you are commenting on a report written in the past.

Line 533 : « Trapnell's observations on the around Kafushi » : a word appears to be missing. Do you mean « Trapnell's observations on the area around Kafushi » ?

Lines 543-544 : Spell out the generic name of these two species (or only the first one if they belong to the same genus). Also, put « *B. hockii* » in italics.

Line 546 : « gravel which is charateristic » : change « which » to « that » and change « charateristic » to « characteristic »

Line 548 : spell out the generic name of « *H. filipendula* »

Line 557 : « four year fallow » : change to « four-year fallow »

Line 557 : insert a comma between « site » and « which ». Also : « the community returned to the site, which was then abandoned. » : They returned for HOW LONG before the site was then abandoned?

Line 571 : « Nontheless » : change to : « Nonetheless »

Line 580 : « and others » : change to : « and at others »

Line 581 : « 1934) the demise » : insert a comma just after the parenthesis

Line 584 : It should be pointed out that when Trapnell refers to « anthills », these are in most (or all) cases termite mounds.

Line 588 : « technological change which was taking place » : change « which » to « that »

Line 590 : « but it was also associated » : What does « it » refer to here ? « the use of ploughing », or something else ?

Line 592 : « The traverse record, however, provide » : disagreement in number between subject and verb. Change to either : « The traverse records, however, provide » OR to : « The traverse record, however, provides »

Line 600 : « which notes » : change to : « that notes »

Line 643 : « contingencies which cause » : change to : « contingencies that cause »

Line 645 : « Western Report, Trapnell and Clothier (1937), he noted » : change to : « Western Report (Trapnell and Clothier, 1937), he noted »

Lines 655-656 : « Siegel (1989) shows that, for some, this was a deliberate ideological choice, the 'African Watchtower Movement', based among the Lamba, actively rejected urban life as a colonial innovation. » : This should be two sentences. E.g., "... Siegel (1989) shows that, for some, this was a deliberate ideological choice. The "African Watchtower Movement", based among the Lamba, actively..."

Line 684 : « concerns, which might » : change « which » to « that »

Lines 693-694 : « context which is entirely consistent » : change « which » to « that »

Lines 698-699 : « *Aformosia* » : correct to « *Afrormosia* » (current recognized name is *Pericopsis elata*)

Line 710 : insert a comma between « *filipendula* » and « were »

Line 711 : « and vegetation and Sweet Dambo » : change to : « and vegetation. Sweet Dambo »

Line 712 : « depended on a range of » : change to : « depended on the range of »

Line 714 : insert a comma between « Similarly » and « Colluvial »

Line 718 : « access, otherwise maize » : change to : « access. Otherwise, maize »

Lines 779-780 : « In the account of the soil classes the recently published East African Soil Map (Milne, 1936) is treated as normative, the point » : change to : « In the account of the soil classes the (then) recently published East African Soil Map (Milne, 1936) is treated as normative : the point »

Lines 784-785 : « in a state of maturity, and those stability, » : ?? One or more words are missing in this phrase

Line 787 : « poorly-drained conditions which » : insert a comma between « conditions » and « which »

Line 789 : « than these of the Southern Plateau which » : change to : « than those of the Southern Plateau, which »

Line 792 : insert a comma between « ironstone » and « which »

Line 796 : « both with climate expressed in colour variation » : why "both"? What are the two things included in "both"? Also, explain the relation between climate and colour variation. Unclear.

Line 799 : « your soils » : Why « your » soils ? Meaning unclear.

Line 800 : « Theses soils are correlated with » : Do you mean : « These soils are compared with » ? « These soils are considered similar to » ?

Line 805 : « extending of » : Do you mean « extending from » ?

Line 808 : « As noted in section ?? Trapnell » : there is a problem with the symbol after the word « section ». Also, insert a comma between the number of the section and « Trapnell »

Line 817 : « their larger base saturation and content of phosphate and nitrogen » : change to : « their larger base saturation and higher contents of phosphate and nitrogen »

Line 821 : « Trapnell and Clothier (1937), did not » : delete the comma

Lines 821-822 : « did not attempt these as mapping units. » : change to : « did not attempt to display these as mapping units. »

Lines 824-825 : « The Thorn soils were mainly on colluvial sandy loam material, generally more coherent than the Transitional soils » : Meaning unclear. "more coherent" in what respect? Are you referring to some trait of the soil (e.g., structure)? Are you referring to the cohesion of soil? Or are you referring to the coherence of the classification (these soils formed a more coherent class, i.e., less variable)?

Line 836 : « of the plateau » : these words should not be in italics.

Lines 840-841 : « Dambo Heads and Sweet Dambo of the Plateau Bush where gardens were established where *A. campylacantha* was found along with tall *Hyparrhenia* grass. » : Do you mean « Do you mean "... where gardens were established and where *A. campylacantha*..."? OR do you mean "...where gardens were established in places where *A. campylacantha*..."?

In either case, you should insert a comma between « Bush » and « where ».

Line 846 : « topography (dense scrub » : The second parenthesis is missing.

Line 847 : « and the cultivation period extended beyond » : Do you mean « Do you mean "...and the cultivation period can be extended beyond..."? »

Lines 850-851 : « Sometimes followed by maize with or without sorghum. » : This is not a complete sentence (no subject or verb)

Line 858 : « the complexity which they observed » : change « which » to « that »

Line 866 : « the wood which was burned » : change « which » to « that »

Line 867 : « anthill, and where » : delete the « and ». Also, see my earlier comment about « anthill ».

Line 868 : « we sown » : change to : « were sown »

Line 871 : « The Ecological Survey Reports, (Trapnell and Clothier, 1937; Trapnell, 1943) » : delete the comma after « Reports » (no punctuation just before a parenthesis)

Line 872 : « the traditional systems which had been » : change « which » to « that »

Line 875 : insert a comma between « systems » and « which »

Lines 875-877 : « In the case of the Upper Valley System, however, they observe that, in the vicinity of the rail line the main priority is remediation in the light of rapid change which has already occurred. » : Verb tenses are tricky when you are describing a report that was published a long time ago. I suggest changing this sentence as follows : « In the case of the Upper Valley System, however, they observed that, in the vicinity of the rail line the main priority was remediation in the light of rapid change that had already occurred. »

Line 879 : insert a comma between « composts » and « could »

Lines 886-887 : « Three primary factors are identified, to which soils owe their characteristics. These are climate (past and present), parent material and the age of the land surface and nature of the changes that have taken place in relief. » : Where does the second factor end (after "parent material" or after "age of the land surface") and the third factor begin? I BELIEVE that the second factor ends after « age of the land surface ». If so, insert a comma after « surface ». Then change « and nature of the changes » to : « and the nature of the changes. »

Line 888 : « The latter is key » : « latter » is used when speaking of the second of TWO things. "last" is used when speaking of the last of three or more things, as here ("three primary factors"). Change « latter » to « last ».

Line 889 : « says Trapnell (1943) cut » : insert a comma after « (1943) »

Line 896 : « environments where intense evaporation and soil moisture deficit results in » : change « results » to « result », as the subject of this verb is plural (« evaporation » and « deficit »).

Line 897 : « red earth soils correlated with those of » : Do you mean « red earth soils that are similar to those of » OR « red earth soils that correspond to those of » ?

Lines 906-907 : « As in the previous report, Trapnell explains the use of a *regional physiographic basis* for classification on the paucity of soil analytical data. » : "explains...on": unclear. I suggest writing something like: "As in the previous report, Trapnell explains that a *regional physiographic basis* was used for classification owing to the paucity of soil analytical data."

Line 907 : « he states that, when » : delete the comma.

Line 913 : « The notion of climatic sequences cutting across physiographic differences, » : Above (line 889), the structure is the inverse: physiographic differences "*cut across the broad zonal arrangement of climatic soil types.*"

Line 917 : « those formed in the most wettest conditions » : delete « most »

Line 920 : « representing, respectively tropical and more temperate » : either insert a comma after « respectively » or delete the comma after « representing »

Lines 929-930 : « The earlier correlation with Non-calcareous Plains Soils » : « correlation » is not quite the right word. I suggest writing : « The earlier correspondence of these soils to the Non-calcareous Plains Soils »

Line 931 : « Trapnell et al. (1947) notes » : change « notes » to « note » (there was more than one author).

Line 944 : « variation, and » : delete the comma.

Line 947 : « the characteristics of which vary » : Ambiguous. I suppose that "which" refers to the parent material provided by the Kalahari Sand, but from the sentence structure it could also refer to the underlying bedrock. Please clarify.

Line 950 : insert a comma between « 1930) » and « were »

Line 965 : « with A.P.G.Michelmore who » : change to : « with A.P.G.Michelmore, who »

Line 967 : « bush, (Michelmore, 1934). » : delete the comma after « bush ».

Line 971 : « field observations, (Milne, 1947), were made : delete the comma before and after the parentheses.

Lines 971-972 : « conceptual model in the field which allowed » : change « which » to « that »

Line 978 : « reports, meant » : delete the comma

Line 991 : « based on process understanding » : Unclear. Do you mean "based on the understanding of process" ?

Line 1001 : « it was not irredeemable, (Trapnell, 1934a) and » : move the comma to read as follows : « it was not irredeemable (Trapnell, 1934a), and »

Lines 1008-1009 : « such as the Lamba (?) who » : What should replace the question mark ?

Line 1010 : « this overlooks » : change to : « this view overlooks »

Line 1011 : « factors which may influence » : change « which » to « that »

Lines 1011-1012 : « This underlines » : change to : « This consideration underlines »

Line 1012 : « soil and landuse which » : change to : « soil and land use that »

Line 1014 : insert a comma between « linguists » and « as »

Line 1020 : insert a comma between « conditiosn » and « certainly »

Line 1026 : « concerns which » : change « which » to « that »

Line 1027 : « offers » : change to « offer » (the subject of this verb is « strategies », plural)