The Ovambo Paradox:

Challenging Paradigms of Environmental Change in Africa

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As inhabitants of the Ovambo floodplain in northern Namibia and southern Angola settled wilderness (ofuka) areas in and east of the floodplain between the 1910s and 1960s, they deforested land in order to construct farms, fields, and villages. As they managed their new environments, however, they propagated pre-existing and new woody vegetation, resulting in reforestation.[1] Descriptions of the late 1800s environment of the region are strikingly similar to those of the late 1900s: both depict settlements characterized by neighboring farms, with towering fruit trees and dense woody vegetation on the edges of the farms and between the villages. Yet, dramatic environmental changes occurred between the late 1800s and 1900s: many areas were heavily deforested and reforested, revealing multi-trajectory and contradictory environmental changes. Ambiguity in the record of environmental change is not rare; to the contrary. Ambiguity may be attributed to different valuations of what constitutes degradation, and what may be considered to be improvement. Moreover, interpretations of the significance of the process of environmental change and its outcome may differ.[2]

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[1] E. Kreike, "Hidden Fruits: A Social Ecology of Fruit Trees in Namibia and Angola, 1880s-1990s," W. Beinart and J. McGregor, eds., Social History and African Environments (Oxford: James Currey, 2003), pp. 27-42. For more detail see especially chapters 3, 6, and 7.

[2] H.L. Moore and M. Vaughan, Cutting down Trees: Gender, Nutrition, and Agricultural Change in the Northern Province of Zambia, 1890-1990 (Portsmouth, N.H.: Heinemann, 1994) and J. Fairhead and M. Leach, Misreading the African Landscape: Society and Ecology in a Forest-Savanna Mosaic (Cambridge: Cambridge University Press, 1996). Blaikie and Brookfield stress that a multidisciplinary approach and a sensitivity to multi-causality are required to environmental study but regard environmental change as mono-processual, see, P. Blaikie and H. Brookfield, Land Degradation and Society (London: Methuen,

Crummey and Winter-Nelson note that both afforestation and environmental decline can be observed in Wällo in Ethiopia.[3] Bassett, Kolo Bi, and Okatarra identified a decline in wildlife (unambiguous degradation) and a simultaneous increase of cropland and woodland (or afforestation) at the expense of open bush land in the Northern Ivory Coast between the 1950s through the 1980s and concluded that environmental change can occur in different directions at the same time.[4] A case study by Van der Haar of a former ranch in southern Chiapas in Mexico from the 1960s through the 1990s noted a

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1987), pp. 14-16. Meggers attributes the conflicting interpretations about environmental change in the Amazon to a lack of communication between scholars from different disciplinary backgrounds, B.J. Meggers, "Natural Versus Anthropogenic Sources of Amazonian Biodiversity: The Continuing Quest for El Dorado," G.A. Bradshaw and P.A. Marquet (eds.), How Landscapes Change: Human Disturbance and Ecosystem Fragmentation in the Americas (Berlin: Springer Verlag, 2003), pp. 89. See also V. Mazzucato and D. Niemeijer, Rethinking Soil and Water Conservation in a Changing Society: A Case Study in Eastern Burkina Faso (Wageningen: Wageningen University Tropical Resource Management Papers, 2000), pp. 114-116 and C.C. Gibson, M.A. McKean, and E. Ostrom, "Explaining Deforestation: The Role of Local Institutions," C.C. Gibson, M.A. McKean, and E. Ostrom, eds., People and Forests: Communities, Institutions, and Governance (Cambridge, Mass.: MIT Press, 2000), p. 2. Schama notes that the impact of humans on Nature is not an unmixed blessing but he stresses that the ways humans affect Nature does not constitute "unrelieved and predetermined calamity" either. See S. Schama, Landscape and Memory (New York: Alfred Knopf, 1995), pp. 9-10.

[3] D. Crummey and A. Winter-Nelson, "Farmer Tree Planting in Wällo, Ethiopia," T.J. Bassett and D. Crummey, eds., African Savannas: Global Narratives and Local Knowledge of Environmental Change (Oxford: James Currey, 2003), pp. 91-120, especially 119. See J. McCann, People of the Plow: An Agricultural History of Ethiopia, 1800-1990 (Madison: University of Wisconsin Press, 1995).

[4] T.J. Bassett, Z. Koli Bi, T. Okattara, "Fire in the Savanna: Environmental Change & Land Reform in Northern Co^te d'Ivoire," T.J. Bassett and D. Crummey, eds., African Savannas: Global Narratives and Local Knowledge of Environmental Change (Oxford: James Currey, 2003), pp. 53-71, especially 64. Kerkhof notes contradictions in his analysis of the 1980s Rural Afforestation Project in Zimbabwe. A 1985 baseline survey of 1800 households in the project area revealed that deforestation was strongly correlated with clearing land for crop cultivation but that the non-arable was not deforested and "may even have more woody biomass than 20 years ago," P. Kerkhof, Agroforestry in Africa: A Survey of Project Experience (London: The Panos Institute, 1990), pp. 69-73. A. Erkkilä notes both deforestation and regrowth in woody vegetation cover in some areas, A. Erkkilä, "Living on the Land: Change in Forest Cover in North-Central Namibia, 1943-1996" (Ph.D. Dissertation, University of Joensuu, 2001), pp. 73-75, 99-101. Gibson et al. attribute the disagreement that exists concerning the underlying causes of deforestation to the possibility that multiple processes are at work, to knowledge gaps, or both, C.C. Gibson, M.A. McKean, and E. Ostrom, "Explaining Deforestation: The Role of Local Institutions," C.C. Gibson, M.A. McKean, and E. Ostrom, eds., People and Forests: Communities, Institutions, and Governance (Cambridge, Mass.: MIT Press, 2000), p. 2.

"simultaneous recovery of degraded forest lands and intensification of maize cultivation."[5]

Van der Haar concludes, however, that her paradoxical findings of intensification of agriculture and afforestation may be partly an artifact of the relatively abstract scale of her analysis, explaining that although she could demonstrate who was in control of resources and their use, she did not have the data to illuminate the step by step processes of environmental change.[6] Van der Haar used the area of the former ranch as her spatial unit of analysis, construing it as a land use system. Scale of analysis is a critical variable for analyzing the process of environmental change and for evaluating its outcome. Larger scale outcomes average out outcomes at smaller scales. For example, on a global scale, the second half of the twentieth century witnessed severe deforestation, but the United States and Western Europe actually experienced reforestation.[7] Twentieth century Bangladeshi farmers planted trees on homestead mounds but at the same time cleared trees in the surrounding floodplain to make fields.[8] If the homestead mound gardens were the unit of analysis, the outcome of the process of environmental change would have been afforestation; if, on the other hand, the actual floodplain were the focus, the diagnosis would have been one of deforestation. If the Bangladeshi floodplain land use system as a whole was evaluated, the outcome would have depended on the amounts of afforestation on the mounds and the extent of deforestation in the plain. Thus, setting the

[5] G. van der Haar, "Peasant Control and the Greening of the Tojolabal Highlands, Mexico," K.F. Wiersum (ed.), Tropical Forest Resource Dynamics and Conservation: From Local to Global Issues (Wageningen: Wageningen Agricultural University, 2000), pp. 99-114, especially 110-112.
[6] G. van der Haar, "Peasant Control and the Greening of the Tojolabal Highlands, Mexico," K.F. Wiersum (ed.), Tropical Forest Resource Dynamics and Conservation: From Local to Global Issues (Wageningen: Wageningen Agricultural University, 2000), pp. 99-114, especially 110-112.
[7] M. Williams, Deforesting the Earth: From Prehistory to Global Crisis (Chicago: University of Chicago Press, 2003), pp. 412-431.
[8] W.A. Leuschner and K. Khaleque, "Homestead Agroforestry in Bangladesh," P.K.R. Nair, ed. Agroforestry Systems in the Tropics (Dordrecht: Kluwer, 1989), pp. 197-209.

scale of analysis may significantly influence its outcome. Multi-scale analysis may partially counter this problem; as Huxley notes, however, "research activities are nearly always confined to a single scale level."[9]

It is not only scale that is an issue, however, but also the focus on outcome. Huxley noted that "Ecologists often study the outcome of plant-plant interactions in terms of changes in species number. Unfortunately, because the processes involved are extremely complex, less is known about these in most cases."[10] Huxley's observation is equally relevant to the way environmental change as a whole is studied under the aegis of the modernization, declinist, and inclinist paradigms: the research emphasis is more on the outcome of Human-Nature interactions (degradation, stabilization, or improvement) than on the processes themselves.[11] For example, a comparison of two photographs or two sets of aerial photography/satellite images from different times can show differences in vegetation cover and allow an assessment to be made about, for example, deforestation or reforestation, but it provides no information about the process of change itself. And,

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[9] P. Huxley, Tropical Agroforestry (Oxford: Blackwell Science, 1999), p. 302. On multi-scale analysis, see C.C. Gibson, M.A. McKean, and E. Ostrom, "Explaining Deforestation: The Role of Local Institutions," C.C. Gibson, M.A. McKean, and E. Ostrom, eds., People and Forests: Communities, Institutions, and Governance (Cambridge, Mass.: MIT Press, 2000). Gibson et.al. note contradictions in environmental trends and the need to differentiate environmental change. G. Varughese, for example, studied 18 villages in the middle hills of Nepal and found radically different environmental trends: in seven villages, the forest was degrading, in six villages, it was improving and in five, the forest conditions were stable, G. Varughese, "Population and Forest Dynamics in the Hills of Nepal: Institutional Remedies by Rural Communities," C.C. Gibson, M.A. McKean, and E. Ostrom, eds., People and Forests: Communities, Institutions, and Governance (Cambridge, Mass.: MIT Press, 2000), pp. 193-226, especially p. 204, table 8.2. Gibson and Becker noted enormous variation in how individuals in Western Equador used their forest plots: some clear-cut their plots and others encouraged regrowth, C.C. Gibson and C.D. Becker, "A Lack of Institutional Demand: Why a Strong Local Community in West Equador Fails to Pretect Its Forest," C.C. Gibson, M.A. McKean, and E. Ostrom, eds., People and Forests: Communities, Institutions, and Governance (Cambridge, Mass.: MIT Press, 2000), pp. 135-161, especially pp. 135-136, 156 (where they stress that a community and a forest can not be seen as single entities).

[10] P. Huxley, Tropical Agroforestry (Oxford: Blackwell Science, 1999), p. 135.

[11] Williams emphasizes the high level of uncertainty about the when, how, and why of deforestation, M. Williams, Deforesting the Earth: From Prehistory to Global Crisis (Chicago: University of Chicago Press, 2003), p. 237.

even if no substantial change in vegetation cover can be detected between the two measuring points, the composition of the vegetation may still have changed.[12]

Such issues may be more acute in Africa than elsewhere, not only because deforestation data (and other statistics) for the continent are especially questionable, but also because more of the environmental change is caused by individuals and households for their own benefit than in Latin America, for example, or Southeast Asia.[13] In Latin America, especially in the Amazon, and in Southeast Asia, especially in Indonesia, the state and commercial interests play a much more direct role in encouraging deforestation through colonization schemes, timber exploitation, plantation agriculture, or ranching. State and commercial clearings are larger and more concentrated and therefore leave a much more distinct environmental footprint that can be easily detected in aerial photography and satellite images. In addition, state and commercial enterprises produce more information about their activities because they are often controversial. In Africa, forest settlement is more spontaneous, and small-scale individual clearings, even if they are numerous, are virtually impossible to detect on Landsat and SPOT satellite images and on regular scale aerial photography, especially since selected trees and bush are often spared when farms are cleared. Such images therefore, cannot identify pristine nature or

[12] V. Mazzucato and D. Niemeijer, Rethinking Soil and Water Conservation in a Changing Society: A Case Study in Eastern Burkina Faso (Wageningen: Wageningen University Tropical Resource Management Papers, 2000), pp. 125-127.

[13] Williams notes that regional level data, especially on Africa, is lacking. Although Africa between 1920 and 1950 lost millions of ha of forest, he adds that little is known about the process and that what we do know may be erroneous, M. Williams, Deforesting the Earth: From Prehistory to Global Crisis (Chicago: University of Chicago Press, 2003), pp. 401-406. See also Gibson et al. who emphasize that the aggregate levels of deforestation are well known but that the underlying causes of the process are disputed, C.C. Gibson, M.A. McKean, and E. Ostrom, "Explaining Deforestation: The Role of Local Institutions," C.C. Gibson, M.A. McKean, and E. Ostrom, eds., People and Forests: Communities, Institutions, and Governance (Cambridge, Mass.: MIT Press, 2000), pp. 1-26, especially pp. 1-2.

climax vegetation even if they existed; the images can not unambiguously distinguish rural cultural from natural landscapes.[14]

Deforestation in Ovamboland

Deforestation in Ovamboland from the 1920s through the 1950s in the ofuka-wilderness was real. As people fled south across the colonial border from the northern floodplain or fanned out from the heartlands of the occupied southern floodplain polities, they cut woody vegetation to construct homesteads and to clear fields. For example, the Native Commissioner for Ovamboland wrote in 1931:

> [t]he Ovambos, who are agriculturalists, when they established themselves in the first instance, cut away into the bush and cleared spaces to make room for their fields. The timber and scrub thus cut away is firstly used to build their pallisaded kraal and secondly to enclose the borders of their lands, etc.[15]

Officials and missionaries in the 1920s and 1930s especially witnessed a conjuncture of deforestation as thousands upon thousands of pioneer settlers streamed into the ofuka of Ovamboland. The specter must have been appeared similar to the massive forest clearing that threatens the forests of, for example the Amazon and Indonesia today. In Ovamboland's ofuka, settlers not only cut down large amounts of poles to construct huts,

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[14] Farmland with trees and fallows are mostly indistinguishable from forest or woodland. See J. Fairhead and M. Leach, Reframing Deforestation: Global Analysis and Local Realities: Studies in West Africa (London: Routledge, 1998), pp. 8-9; W. Balée, "Indigenous History and Amazonian Biodiversity," H.K. Steen and R.P. Tucker (eds.) Changing Tropical Forest: Historical Perspectives on Today's Challenges in Central and South America (n.p.: Forest History Society, 1992), p. 187-188; J. Vandermeer, "The Human Niche and Rain Forest Preservation in Southern Central America," L.E. Sponsel, , T.N. Headland, and R. Baily, eds., Tropical Deforestation: The Human Dimension (New York: Columbia University Press, 1996), pp. 216-229, especially p. 224; M. Williams, Deforesting the Earth: From Prehistory to Global Crisis (Chicago: University of Chicago Press, 2003), p. 477. On state-led forest colonization in Southeast Asia and Latin America versus spontaneous settlement in Africa, see M. Colchester, "Colonizing the Rainforests: The Agents and Causes of Deforestation," M. Colchester and L. Lohmann, eds., The Struggle for Land and the Fate of the Forests (Penang, Malaysia: the World Rainforest Movement, 1995 [second impression; first impression, 1993]), pp. 1-15, especially pp. 5-9.

[15] NAN, SWAA 3, f. A1/2 (I), NCO to SEC. SWA, Ondangwa, 20 April 1931.

palisades, kraals, and fences, but also obliterated most of the vegetation on their prospective farm plots. The Native Commissioner for Ovamboland observed "unless of course permanent clearings are made for new kraals or fields, the Ovambos usually see that the trees is [sic] not destroyed." Fire was the settlers' most deadly tool when clearing land for farms and fields. A concerned agricultural expert commented in 1924:

> Natives are very destructive of the natural bush & their method of clearing ground is not economical. The usual method is to put a fire around a tree until it falls, no effort being made to remove the stump…. The destruction of the bush, without any effort to replant in suitable places will mean at an early date the extension of the desert & it is a problem requiring immediate & careful attention.[16]

The Native Commissioner of Ovamboland engaged the chiefs and headmen to urge settlers not to burn the large trees on their farm plots, and he recommended severe punishment for the "unnecessary destruction or mutilation of trees." Moreover, trees that had to be removed were to be felled for use as timber, and the stumps were to be dug out for use as firewood. To facilitate felling rather than burning trees, in 1938, the administration entrusted the senior headmen of the Oukwanyama district of Ovamboland with large axes and saws.[17]

Assuming that the average farm size was between 0.5 to 2 ha, the approximately 18,000 households counted in the 1933 census meant that between 9,000 to 36,000 hectare had been cleared of woody vegetation at some point to make room for the

[16] NAN, NAO 26 f. 21, Report Ovamboland Cotton Prospects appendix to Alec Crosby to Bishop of Damaraland [Mss.], St. Mary's Mission, 11 January 1924. See also O/C NA Oshikango to NCO, Oshikango, 20 June 1938; NAO 10 f. 5/7/1, Assistant NC to NCO, 31 October 1940, and Hahn's handwritten notes on the letter "Also in regard to indiscriminate burning of Mopane trees in Ukuambi and Ukuanyama lands"; SWAA 3 f. Administration, Forestry: Indigenous Forests Ovambo A1/2 (I), NCO to CNC, Ondangwa, 2 June 1941; BAC 131 f. HN 8/17/4 (1955-1963), Agricultural Officer Ovamboland to Bantu Commissioners Ondangwa and Oshikango ,[Ondangwa?] 28 January 1957.

[17] NAN, SWAA Native Affairs Vol. 456 f. A50/92 F, NCO to Senior Veterinary Surgeon, Windhoek, Odongua [Ondangwa] April 24, 1932; NAO 19 f. 11/1 (v-vi), Monthly Reports Ovamboland, November 1932 and June 1933; NAO 20 f. 11/1 (xiii), Monthly Reports Ovamboland, October & November and December 1940. O/C NA Oshikango to NCO, Oshikango, 20 June 1938.

homesteads, kraals, and crop fields. But, since much of the wood for the actual construction of the farms had been sourced elsewhere, the creation of 18,000 farms theoretically would have led to the deforestation of the 9,000-36,000 ha of farm plots, plus the 9-18,000 ha of mopane bush land required for construction materials, for a grand total of approximately 18-54,000 ha of bush land or "forest" that had been severely affected. Deforestation was most dramatic in Ovamboland's Oukwanyama district, which was located directly south of the Angolan border, where the approximately 6,000 new farms that were established consumed between 3-6,000 ha of mopane bush land and resulted in the further clearing of 3,000-12,000 ha of farm plots. Deforestation thus affected 6,000-18,000 ha in a 17-year period, for an average of 353-1,059 ha affected per year.[18] Moreover, most of this dramatic deforestation took place in a relatively small area in the middle floodplain. In the second half of the 1920s, the impact was especially concentrated in the area directly west, south and east of Oshikango along the border, i.e. right under the nose of the Assistant Native Commissioner of Ovamboland who was based there. The dramatic nature of deforestation was also heightened by the fact that all the new farms were located on the low ridges in between the watercourses, with farm plots cleared on the lower slopes and construction wood sourced from the upper slopes. The water courses themselves could not be used for habitation or cultivation because they flooded.[19]

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[18] On the wood consumption for constructing homesteads, see chapter 4.

[19] NAN, NAO 104 Anderson to Hahn, diary Jordan and A233, J. Chapman, 1903-1916, 1876[?], pp. 61-62; Kreike, Recreating Eden, ch. 2; Lima, A Campanha, pp. 132-14; AVEM, RMG 2518 [?] C/h 52, Speiker, Visitationsbericht, Namakunde 13-18 July 1906; AGCSSp, Duparquet, carnet #6, 1878, 1881, information from Carlston; Petrus Shanika Hipetwa, interview by author, Oshiteyatemo, 17 June 1993. NAN, KAB 1 (iii), W. Volkmann, 30 October 1928, "Report on the Agricultural and Political Conditions at The Angola Boundary." See also NAN, AHE (BAC) 1/346 f. (15)N8/19/4/4(I), Report of the SWA Planning Committee for Agricultural Training Centers, appendix to Chief Bantu Affairs Commissioner SWA to Bantu Affairs Commissioners Ondangwa, Runtu, and Oshikango, [Windhoek], 8 April 1965. This situation is also borne out by regular reports of flooded fields and destroyed crops. For example, in March-April 1925, fields in the districts of Oukwanyama and Uukwambi were destroyed by floodwater in the watercourses and even a number of homesteads in Oukwanyama were flooded, NAN, NAO 18 f. 11/1 (I), Monthly Reports

As the population of Ovamboland grew from 107,000 in 1933 to 126,000 in 1938, then to 197,000 in 1951, and 618,000 in 1991, the amount of land that was cleared for fields commensurately increased.[20] Based on a small survey sample, a 1991 report estimated the average farm size to range from two to five ha, with farms in eastern Ovamboland being larger on average than in the actual floodplain.[21] Thus, with 90,918 rural "traditional" homesteads having been counted in 1991, an estimated 181,836 to 454,590 ha of the total area of Ovamboland's 4,200,000 ha, i.e. from 4.3 to 10.8 percent, had been transformed into farm plots, compared to 9,000-36,000 ha or 0.21-0.86 percent in 1933. The colonial administration estimated aggregate farmlands in Ovamboland to be 27,606 ha in 1950, 71,961 ha in 1957, 59,968 ha in 1958, 88,400 ha in 1966, 94,000 ha in 1968, and 150,000 ha in 1978/1979. The figures for 1957 and upwards all seem to have been estimates of the actual surface area that was being cultivated, rather than the total available farm area.[22]

The rapid dissemination of the animal-drawn plow after the 1940s – the large majority of farmers used plows by the early 1990s - contributed to arable land scarcity because it facilitated and required the cultivation of larger fields at the expense of farm

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Ovamboland, March and April 1925. See also NAO 19 f. 11/1 (vii), Monthly Reports Ovamboland, February and June and July 1934, January and February 1937. In 1944, reportedly "[h]undreds of native kraals had to be removed as the ground upon which they stood became submerged," destroying crops, NAO 21, f. 11/1 (xvii), Quarterly Report Ovamboland, January-March 1944. Similar conditions prevailed in 1950, NAO 60, f. 12/1 (I), Quarterly Report Ovamboland, January-March 1950 and April-June 1950.

[20] NAN, OVA 53 f. 6/18/2-7 (iii), Sec. SWA to Sec. Agriculture Owambo, Windhoek, 24 June 1974, Appendices A-C.

[21] NEPRU [Namibian Economic Policy Research Unit], "Land related Issues in the Communal Areas, 1: Owambo" (Windhoek: Paper for the National Land Conference, 1991). The author's personal observations bear out the impression that especially in the far east, in villages such as, for example, Ehafo, Oshikuni, and Big and Little Olukula, farm plots were considerably larger than in the floodplain. The plots were usually fenced with wire or branches and there were very few trees in the fields, 19 February 1993.

[22] Figures provided in morgen are given in hectares. See NAN, NAO 103 f. 62/2, Census of Agriculture Ovamboland 1949/1950; BAC 133 f. HN 8/21/4/1, Agricultural Report Ovamboland 1956/1957 and Quarterly Report Agriculture Ovamboland for the Quarter ending 30 June 1958; AHE (BAC) 1/352 f. (14) N8/21/4, Annual Reports Agriculture Ovamboland, 1966 and 1968 [according to the transfer list this file is in storage unit 1/357]; OVA 6 f. 2/8/1, Annual Report Agriculture Ovamboland 1978/1980.

and village bush and forest lands. In addition, trees and tree remnants (trunks, roots) on fields hindered plowing and more than previously, trees may have come to be regarded as an obstacle to crop cultivation. The plow enabled larger fields to be prepared but, in combination with an increase in male absenteeism due to migrant labor, the use of the plow increased the weeding bottleneck because weeding continued to be done by hand. Weed competition decreased yields per hectare and in turn forced households to increase the area under cultivation at the expense of bush and grazing land.[23]

In 1946, Ovamboland contained an estimated one hundred plows. Four years later, the total number of plows reportedly had not increased. At the end of 1952, however, the number of plows had increased tenfold, to 1,073. Oukwanyama district accounted for over half of the plows and Ombalantu and Uukwambi each had approximately one fifth of the implements while only 39 were in use in Ondonga district.[24] According to a new agricultural officer, one reason for the upsurge in the use of plows by the early-1950s was that plow users had found a way to use the implement to make raised cultivation beds. He noted that only in some parts of eastern Oukwanyama had plowing resulted in the discontinuation of the use of raised cultivation beds.[25] A later agricultural report similarly noted that the plow saved a lot of labor when it was used to make raised cultivation beds, but added that bed cultivation could be replaced by better

[23] Lea Paulus, interview with author, Onandjaba, 17 June 1993; NAN, NAO 62 f. 12/5, Agricultural Report Ovamboland, 30 November 1953; BAC 132 f. HN 8/18/3/1/1, Agricultural Officer Ovamboland to NCO, Ondangwa, 1 March 1957; BAC 133 f. HN 8/21/4/1, Agricultural Report Ovamboland, 1956/1957; WWA 637, f. ww. 31/3/1 (ii), report appended Erasmus to Director Water Affairs, Otjiwarongo, 13 May 1970; OMITI A5.2.2. Richards emphasized that weeding was as much a bottleneck as plowing, see P. Richards, Indigenous Agricultural Revolution: Ecology and Food Production in West Africa (London: Hutchinson: Boulder, Colo.: Westview Press, 1985), p. 136.

[24] NAN, NAO 103 f. 62/2, Censii of Agriculture Ovamboland 1945/1946 and 1949/1950; NAO 103 f. 62/2, Assistant NCO to NCO, Oshikango, 30 December 1952, Chief Kambonde to NCO, Okaroko, 18 December 1953, Council of Headmen Ombalantu to NCO, 25 July 1952, Council of Headman Ukuambi to NCO, Ukuambi, 16 July 1952, Chief Ushona Shimi to NCO, Okakua, 7 July 1952, and Ikasha Nkandi and Ashimbanga Mupole to NCO, Onkolonkathi, 26 June 1952.

[25] NAN, NAO 62 f. 12/5, Agricultural Report Ovamboland 1953.

methods.[26] Throughout the 1950s, most farmers in Ovamboland continued to rely on the hoe and raised cultivation beds. Moreover, hoes remained an essential tool for weeding.[27] Yet, by 1957, the plow was used on 20 percent of all fields according to the agricultural officer who identified a niche for the implement:

> [i]n Ovambo[land] the natives only use the plow on higher lands that do not flood so easily in years with exceptionally heavy rainfall. On such fields, the results to date have been quite satisfactory. It can be expected that plowed fields may do very badly if another very good rainy season is experienced. The reason that the Ovambos increasingly make use of the plow, however, is that it requires much less labor and time to cultivate a field with a plow than to raise cultivation beds in the same field. Because the plow is also much faster every plow owner can take care of a bigger plot… Therefore although plowed land produces less per field, the total production is higher because the farm plot can be increased.[28]

Despite evidence that plowing could cause soil salinization, the administration continued to promote the use of the plow, for example by renting out tractors and encouraging farmers to purchase them. In 1976, renting someone to plow a field with a tractor cost 10 Rand per hour. In 1980, an estimated 100 tractors were in private hands and 20,000 ha were cultivated with plows. In the early 1990s, the large majority of households surveyed relied on plow cultivation.[29]

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[26] NAN, BAC 133 f. HN 8/21/4/1, Agricultural Report Ovamboland 1955/1956.
[27] NAN, NAO 62 f. 12/5, Agricultural Report Ovamboland 1953 and BAC 133 f. HN 8/21/4/1, Agricultural Report Ovamboland 1956/1957.
[28] NAN, BAC 133 f. HN 8/21/4/1, Agricultural Report Ovamboland 1956/1957.
[29] NAN, OVA 50 f. 6/10/4-7 (I), Sec. Agriculture to Sec. Bantu Administration, Ondangwa, 2 April 1976 and J. Amutenya to Sec. Agriculture, Ombalantu, 30 August 1975 and 13 October 1976; OVA 6 f. 2/8/1 Annual Report Agriculture Ovamboland 1979/1980; WWA 637, f. 31/3/1 (ii), report appended Erasmus to Director Water Affairs, Otjiwarongo, 13 May 1970; OMITI A5.2.2. The Secretary for Agriculture for Ovamboland informed the Secretary for Bantu Administration in Pretoria in 1976 that he had been warned that tractor plowing could cause the saline subsoil to be mixed in with the thin topsoils of Ovamboland, OVA 50 f. 6/10/4-7 (I), Sec. Agriculture to Sec. Bantu Administration, Ondangwa, 2 April 1976. On the danger of salinization, see, for example, OVA 47 f. 6/8/3/1-7, Venn, Loxton & Associates, Mahanene Research Station Visit by Research Committee, 23-24 February 1976 (which reported a marked effect of salinity with deep tillage); WWA 644 f. 31/3/2/3 (iv), A. Trevor, ACE Planning, 11 July 1972; WWA 640 f. 31/3/2/1 (I), Report Ovamboland Pipelines, October 1977; OVA 49 f. L6/8/4/1 (I), Meeting Subcommittee Townplanning, 2 September 1970; OVA 93 f. 6/5/4, Sec. Agriculture, 13 September 1979.

The labor saving properties of plow cultivation were very attractive. Wage labor income also made plows more affordable. After the 1940s, male absenteeism in Ovamboland increased as more and more men signed up for repeated and longer labor contracts in South West Africa and South Africa, leading to a severe shortage of agricultural labor, although the labor crunch especially affected eastern Ovamboland, where settlers were in short supply. The plow thus appears to have been most readily embraced in eastern Oukwanyama during the 1940s and 1950s, and from there its use was disseminated back into the floodplain.[30]

Plowing directly and indirectly affected the use and availability of woody resources. The impact was direct because trees and tree stumps hindered plowing and it became more common to burn tree stumps out, especially when tractors were used, which, by 1993, was the case for 34% of survey respondents.[31] Moreover, the plow meant that treelings were more easily plowed under and the root systems of existing trees were damaged. Still, that the plowshares cut the roots in some cases may actually have encouraged vegetative regeneration, as occurred, for example, with the marula tree, because new trees developed from the cut roots.[32]

Indirectly, plowing and the entire social and agricultural complex within which the use of the plow became imbedded affected the on-farm and off-farm availability of

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[30] See Kreike, Recreating Eden, chapters 5 and 7.

[31] Lea Paulus, interview with author, Onandjaba, 17 June 1993. In 1924, an agricultural expert for the Anglican mission noted that tree stumps were not dug out when farmland was cleared and concluded that this would make plowing inefficient, NAO 26 f. 21, Report Ovamboland Cotton Prospects appendix to Alec Crosby to Bishop of Damaraland, St. Mary's Mission, 11 January 1924. In the early 1960s, trees were common in fields in the eastern side of the middle floodplain and the area directly to its east, BAC 131 f. HN 8/17/2, Deputy Secretary of Forestry,"Report of a visit by the Deputy Secretary of Forestry...17-29 April 1961," Pretoria, 10 May 1961. On the use of tractors, see OMITI A5.2.2. Tractor plowing greatly increased the possibility that tree trunks and roots would damage a plow blade, personal observations by author, 1991-1993.

[32] Interviews by author: Helemiah Hamutenya, Omuulu Weembaxu, 17 July 1993; Philippus Haidima, Odibo, 9 December 1992 and Pauline, Onenghali, 15 December 1992; Kreike, Recreating Eden, ch. 6.

woody vegetation in the villages. Off-farm, the expansion of arable land as a result of an increasing number of farms per village or the expansion of individual farm plots diminished the total surface of the commons that was under woody vegetation. A diminishing village commons reduced the local availability of forest products and forage, and the scarcity of the latter in turn forced cattle owners and herdsmen to herd the cattle to the cattle posts earlier and for longer periods of time, reducing the availability of manure and other cattle products. The agricultural report for 1955/1956 noted that the number of farm plots in all villages was on the increase and explained "[i]t is not rare to see a native who cuts out hundreds of mopane trees in the mopane forests and then just leaves the trees to rot while he does not even plant manna [millet] on the clearing area." The compiler of the report thought that the consequences in the long term might be environmentally disastrous. He feared that each new farm diminished a village's pastureland by 2 morgen and that leaving the trees to rot destroyed years' worth of potential firewood. Moreover, he continued "[b]ecause the kraal and the field is kept clean there is no possibility that the area in the future will produce new trees that could be used as firewood….The presence of the new kraal also means that there is an additional consumer of firewood in the ward." Finally, it was thought that the remaining pasturages would be overgrazed, preventing tree regeneration and it was feared that without trees, soil erosion would become a serious menace.[33]

The creation of new farms and fields led to heavy and often dramatic deforestation. Much of the construction materials required were drawn from the woodlands on top of the low ridges, while clearing woody vegetation for farms and fields

[33] NAN, BAC 133 f. HN 8/21/4/1, Agricultural Report Ovamboland 1955/1956. See also interviews by author: Joseph Kambangula, Omboloka, 25 February 1993; Nahango Hailonga, Onamahoka, 4 February 1993; Timotheus Nakale, Big Ekoka, 21 February 1993; and Moses Kakoto, Okongo, 17 February 1993.

took place on the middle and lower slopes of the ridges. On-farm deforestation was more destructive than sourcing construction wood off-farm because most woody vegetation was burned, a method of clearing that limited regrowth.

Agricultural productivity also suffered as a result of social changes. Increased tenure insecurity for women, which was related to headmen's attempts to subdivide the farms of the weaker villagers, and the decline in the practice of dividing the farm land between the husband and the wife and allocating fields to junior members of the household (which was related to various factors, including the dissemination of the plow) undermined control and access of women and children over land and crops. For example, in 1993, only 37% of a small sample of 54 women had a field of their own, although 59% emphasized that they had had their own field as an unmarried girl.[34] As a result, women, who had increasingly become the mainstay of agricultural labor because of male absenteeism due to migrant labor, had less incentive to invest additional labor in cultivation, for example, to do the extra weeding that plowing required, and, to some extent, adult female labor may have even been disinvested from crop cultivation from the 1950s onward.[35]

The above spatial and gender characteristics of environmental change in north central Namibia constituted double-edged swords. As women disinvested their labor from agriculture, they diverted some of it to nurturing fruit trees, a resource that was less

[34] Kreike, "Recreating Eden," ch. 6; OMITI A0.11 and 12 (N=54). In the early 1950s, Christian Hashitende divorced his wife but allowed her to continue to cultivate her field for the remainder of the agricultural season. He remarried and gave his new wife a field, NAN NAO 100 f. 42/11 (iv), NCO to Chief Kambonde, 24 January 1953, and Statement Christian Hashitenda of Oyovu (Ondonga), made at Ondangwa, 24 January 1954. In the same era, Nikodemus Amtenya's refusal to allocate half of the farm to his wife, Ruusa Mandungu, led to the involvement of the Native Commissioner, NAO 100 f. 42/11 (vi), subfile 42/11/519, Ruusa Amtenya (née Mandungu) against Nikodemus Amtenya, Statements Ruusa Amtenya and Nikodemus Amtenya, Ondangwa, 17 September 1954.

[35] See ch. 6 and Kreike, "Recreating Eden," ch. 5.

heavily contested in the 1930s and 1940s than land or crops. Moreover, at the same time that deforestation in the short and medium run was most severe on the farms and fields, in the long run, the farm plot proved to be the most secure sanctuary for individual trees and bush.

Reforestation in Ovamboland

Paradoxically, as deforestation of the wilderness areas of Ovamboland progressed from the 1920s through the 1940s, a process of reforestation followed in its wake. What is most striking about reforestation in Ovamboland is that the farms and fields that were the locus of the most destructive deforestation were simultaneously also the areas where the most spectacular reforestation occurred. In a matter of decades, majestic fruit trees towered over homesteads and crops. Moreover, reforestation was not confined to the farms or to fruit trees. Although wood harvesting had been especially severe when refugees and migrants streamed into the ofuka-wilderness in the 1920s and 1930s, clearing farm plots and constructing palisaded homesteads, deforestation in these areas had been somewhat less destructive: poles and branches had been removed without killing the plants and many woody vegetation species in Ovamboland had the ability to re-sprout. In addition, the original woodlands of a new village were partially retained as woodland, albeit in the form of a heavily managed bush coppice.

Although the striking presence of on-farm fruit trees and the ubiquitous off-farm mopane bush figure prominently in colonial and postcolonial descriptions of Ovamboland's vegetation, colonial officials and experts and their postcolonial successors found it difficult to imagine that the existence of the fruit trees and the coppiced bush

constituted reforestation.[36] Colonial officials and forestry experts perceived Ovamboland's on-farm fruit trees and the on- and off-farm coppice bush as being natural, that is, as constituting wild trees and bush; for local inhabitants, however, the very same environment marked the oshilongo. The western seed paradigm that is fixated on and that privileges seed-based sexual reproduction undervalued the importance of asexual vegetative reproduction even though paradoxically the latter is the more common and more effective method of propagation for many tropical (and non-tropical) plants. The very definition of domesticates has a clear bias in favor of sexual reproduction and evolution-as-progress. Domestic species are thus defined by two characteristics: they are dependent on human assistance for their reproduction; and their production has been improved (for example, they yield more and larger fruit) through selective breeding. Sexual reproduction facilitates human control, manipulation, and improvement (evolution). [37]

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[36] J. Fairhead, and M. Leach, Misreading the African Landscape: Society and Ecology in a Forest-Savanna Mosaic (Cambridge: Cambridge University Press, 1996).

[37] For examples of the strong emphasis on seed/sexual reproduction, see K.J. Frey, ed., Historical Perspectives in Plant Science (Ames: Iowa State University Press, 1994), for example chapter 7 by J.W. Dudley, "Plant Breeding – A Vital Part of Improvement in Crop Yields, Quality and Production Efficiency," pp. 163-177. Also see P.B. Tomlinson and M.H. Zimmermann (eds.), Tropical Trees as Living Systems (Cambridge: Cambridge University Press, 1978) for the seed focus of the section on reproduction (chapters 3-6). Piot stresses replanting with seeds. Piot and Le Houérou acknowledge the possibility of propagation by cuttings but they reject it as too costly and too complicated, J. Piot, "Management and Utilization Methods for Ligneous Forages: Natural Stands and Artificial Plantations," and H.N. Le Houérou, "Planting and Management Methods for Browse Trees and Shrubs," H.N. Le Houérou (ed.), Browse in Africa: The Current State of Knowledge (Addis Ababa: ICLA, 1980), p. 345 and pp. 351-359 (especially 353), respectively. In agroforestry projects, the emphasis was on seed nurseries and seedlings. Kerkhof, for example, hardly refers to vegetative propagation in his overview of agroforestry, P. Kerkhof, Agroforestry in Africa: A Survey of Project Experience (London: The Panos Institute, 1990). In Franzel et al. the overwhelming emphasis is also on seed propagation, see S. Franzel, P. Cooper, G.L. Denning, and D. Eade, eds., Development and Agroforestry: Scaling up the Impacts of Research (Oxford: Oxfam, 2002). In the southern African miombo woodlands, most regeneration is through coppice and root suckers, E. Chidumayo and P. Frost, "Population Biology of Miombo Trees," B. Campbell (ed.), The Miombo in Transition: Woodlands and Welfare in Africa (Bogor, Indonesia: CIFOR, 1996), pp. 64-71. Kajembe noted that in Central Tanzania, when local farmers planted trees, they did so mainly through cuttings, G.C. Kajembe, Indigenous Management Systems as a Basis for Community Forestry in Tanzania: A Case Study of the Dodoma Urban and Lushoto Districts (Wageningen: Wageningen Agricultural University Tropical Resource Management Papers, 1994), p. 110. In the medieval through the early 20th century, most

Western images of the wild non-West intersect with the seed paradigm. Vegetative propagation marks the fields of horticulture and microbiology and although some have identified it as cutting edge modern technology for forestry, non-western indigenous vegetative propagation– if it is even acknowledged – is seen as a hallmark of primitivism.[38] At best, the use of vegetative propagation qualifies the species involved as semi-domesticated, implying a preliminary stage of development on a unilinear path to domesticated status within the framework of a Nature (wild)-Culture (domesticated) dichotomy.[39] But, the state of domestication, for example, may not be an evolutionary end point: examples of domesticates gone wild abound. In Ovamboland, the "reforesting" species were chiefly indigenous fruit trees that colonial officials and experts considered to be "wild" species and trees from the "wilderness." Actually, they were neither. Moreover, the actual day-to-day details of the reforestation process and the who, why, and what have received little explicit attention.[40] This section discusses the dynamics of

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regeneration in British woodlands was through coppice and suckers and relatively rarely through seeds, O. Rackham, Trees and Woodland in the British Landscape (London: J.M. Dent 1993 [first revised paperback edition; first published 1976]), p. 8.

[38] J. Westoby, Introduction to World Forestry (Oxford and New York: Basil Blackwell , 1989), p. 13. A number of important plantation trees are vegetatively propagated, for example the rubber tree Herca brasiliensis. Banana (Musa spp.) vegetatively reproduces through lateral stolon stools, F. Hallé, R.A.A. Oldeman, P.B. Tomlinson, Tropical Trees and Forests: An Architectural Analysis (Berlin: Heidelberg and New York: Springer Verlag, 1978), pp. 25, 121-122, 124-125.

[39] J. Fairhead and M. Leach, Reframing Deforestation: Global Analysis and Local Realities: Studies in West Africa (London and New York: Routledge, 1998), p. 193, reject the usefulness of the domesticate/wild dichtomy. Alcorn rejects the dichotomy and points out that cultivated plant may not always be domesticated and domesticated plants may not always be that carefully cultivated, see J.B. Alcorn, "Huastec Noncrop Resource Management: Implications for Prehistoric Rain Forest Management," Human Ecology, 9, no. 4 (1981), pp. 400-401. Bonnéhin considers the cultivation of wild plants as a second stage of domestication and notes that genetic manipulation of plants (a third stage of domestication) may be too costly for farmers, L. Bonnéhin, "Domestication paysanne des arbres fruitiers forestiers: Cas de Caula edulis Baill. olacaceae, et de Tieghemella heckelii Pierre ex. A. Chev., sapotaceae, autour du Parc National de Tai, Côte d'Ivoire" (Wageningen Agricultural University: Ph.D. thesis, 2000), pp. 1-2, 16-17, 61, 67.

[40] On the paucity of research on the why of tree propagation and protection and how that changes over time, see J. Clarke, W. Cavendish, and C. Coote, "Rural Households and Miombo Woodlands: Use, Value, and Management" and B. Campbell and N. Byron," Miombo Woodlands and Rural Livelihoods: Options and Opportunities," B. Campbell (ed.), The Miombo in Transition: Woodlands and Welfare in Africa (Bogor, Indonesia: CIFOR, 1996), pp. 101-135 (especially 134) and pp. 101-135 (especially 223), respectively.

tree and bush management at several levels but especially the level of individual human actors and individual trees. People and trees are more than simply a product of genetics. As with the experience of individual humans, individual trees (and bushes) have a personal history because their interactions with specific environments make each tree unique.[41] Moreover, in Africa, most planted trees are planted by individuals, and they are planted tree by tree.[42] Tree propagation in Ovamboland displays a gendered pattern:

Crummey and Winter-Nelson provide selected narratives to show who planted what kind of trees but provide no details, for example, about how they were planted or where, D. Crummey and A. Winter-Nelson, "Farmer Tree Planting in Wa"llo, Ethiopia," T.J. Bassett and D. Crummey (eds.), African Savannas: Global Narratives and Local Knowledge of Environmental Change (Oxford: James Currey & Portsmouth, N.H.: Heinemann, 2003), pp. 110-114. Kajembe provides lists of which trees were planted and stresses that most were planted to demarcate plots of land, but does not specify who did the planting, G.C. Kajembe, Indigenous Management Systems as a Basis for Community Forestry in Tanzania: A Case Study of the Dodoma Urban and Lushoto Districts (Wageningen: Wageningen Agricultural University Tropical Resource Management Papers, 1994), pp. 99, 102-108.

[41] On the importance of focusing on individual trees as the object of research, see P.B. Tomlinson and M.H. Zimmermann (eds.), Tropical Trees as Living Systems (Cambridge, etc.: CUP, 1978), Editorial Preface, p. xv. See also D.H. Janzen, "Seeding Patterns of Tropical Trees," P.B. Tomlinson and M.H. Zimmermann (eds.), Tropical Trees as Living Systems (Cambridge, etc.: CUP, 1978), pp. 83-128, who emphasizes that, for example, seeding patterns of tropical trees are individual and dependent upon constellations of conditions that can be unique for every individual in a species. On trees having histories, see P. Huxley, Tropical Agroforestry (Oxford: Blackwell Science, 1999), pp. 74, 174-197, 241-242. T.T. Kozlowski, P.J. Kramer, S.G. Pallardy, The Physiological Ecology of Woody Plants (San Diego: Academic Press, 1991), pp. xvii, 56, 81, 234 note that woody vegetation should be seen as individuals and that because woody vegetation builds up and stores reserves over the years, their reserve levels at any given time are a reflection of their historical experience (i.e. droughts, pests, herbivore browsing, etc.). See also F. Hallé, R.A.A. Oldeman, P.B. Tomlinson, Tropical Trees and Forests: An Architectural Analysis (Berlin: Heidelberg and New York: Springer Verlag, 1978), pp. viii-ix. Adaption to different ecological conditions may lead to great intra-species variation, for example in terms of the onset of flowering, see M. Grouzis and M. Sicot, "A Method for the Phenological Study of Browse Population in the Sahel: The Influence of Some Ecological Factors," H.N. Le Houérou (ed.), Browse in Africa: The Current State of Knowledge (Addis Ababa: ICLA, 1980), pp. 233-240. As a result, the palatibility of browse to herbivores may greatly differ from plant to plant within a single species, H.N. Le Houérou, "Browse in Northern Africa," H.N. Le Houérou (ed.), Browse in Africa: The Current State of Knowledge (Addis Ababa: ICLA, 1980), pp. 55-82, especially 61.

[42] Dejene found that farmers preferred to plant trees as individuals rather than through community projects, A. Dejene, Environment, Famine, and Politics in Ethiopia: A View from the Village (Boulder, Col.: Lynn Rienner, 1990), pp. 61-62. Crummey and Winter-Nelson highlight that tree planting was an individual undertaking, D. Crummey and A. Winter-Nelson, "Farmer Tree Planting in Wa"llo, Ethiopia," T.J. Bassett and D. Crummey (eds.), African Savannas: Global Narratives and Local Knowledge of Environmental Change (Oxford: James Currey & Portsmouth, N.H.: Heinemann, 2003), pp. 110-114. Although they provide little detail, Franzel et al. also emphasize the farmer as an individual, see S. Franzel, P. Cooper, G.L. Denning, and D. Eade, eds., Development and Agroforestry: Scaling up the Impacts of Research (Oxford: Oxfam, 2002), for example the chapter by G.L. Denning, "Realising the Potential of Agroforestry: Integrating Research and Development to Achieve Greater Impact," pp. 1-14. Tree ownership by the planter also underlines that trees should be regarded as individuals. Bonnéhin, for example, emphasized

women appear to have been more involved in on-farm fruit tree propagation and management while men were more heavily involved in the management of coppice bush on- and off-farm.[43]

The reasons that people propagated trees in Ovamboland were diverse: tree fruit, for example, was a source of food, forage, and alcohol. Alcoholic beverages constituted a source of income especially for women, and the beverages were also critical capital for creating and maintaining social networks, which in turn were essential for security and for gaining access to land, labor, and other services and resources. It is ironic that the colonial state's fixation on "the forest" failed to preserve the trees, while local people's focus on trees reforested Ovamboland and thus "saved" the "forest."

Despite noting that fruit trees occurred on farms and fields, that they were mostly absent from wilderness areas, and that they were contested as property, colonial officials do not seem to have been shaken in their belief that, for example, marula and birdplum were wilderness and wild trees. But marula and birdplum trees (and to a lesser extent palm trees) – with the exceptions noted above – by and large only began to appear in the middle floodplain ofuka wilderness after the area was settled during the 1920s.

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that the person who planted a tree remained its owner irrespective of the tree's location, L. Bonnéhin, "Domestication paysanne des arbres fruitiers forestiers: Cas de Caula edulis Baill. olacaceae, et de Tieghemella heckelii Pierre ex. A. Chev., sapotaceae, autour du Parc National de Tai, Côte d'Ivoire" (Wageningen Agricultural University: Ph.D. thesis, 2000), pp. 68-75.

[43] Nygren points out that forest clearing is often seen as a male activity, A. Nygren, "Development Discourses and Peasant-Forest Relations: Natural Resource Utilization as Social Process," M. Doornbos, A. South, and B. White (eds.), Forests: Nature, People, Power (Oxford, UK, Malden, USA: Blackwell, 2000), p. 25. Bonnéhin noted that both women and men planted trees but that men more commonly did so, L. Bonnéhin, "Domestication paysanne des arbres fruitiers forestiers: Cas de Caula edulis Baill. olacaceae, et de Tieghemella heckelii Pierre ex. A. Chev., sapotaceae, autour du Parc National de Tai, Côte d'Ivoire" (Wageningen Agricultural University: Ph.D. thesis, 2000), pp. 68-75. The gender dimension is considered of critical importance in agroforestry: men and women tended different trees and women typically were not integrated into agroforestry projects, see A. Böhringer, "Facilitating the Wider Use of Agroforestry for Development in Southern Africa," and M.D. Faminow, K.K. Klein, and Project Operating Unit," On-Farm Testing and Dissemination of Agroforestry among Slash and Burn Farmers in Nagaland, India," S. Franzel, P. Cooper, G.L. Denning, and D. Eade, eds., Development and Agroforestry: Scaling up the Impacts of Research (Oxford: Oxfam, 2002), pp. 35-55 and 84-106 respectively.

Moreover, although they did sometimes randomly occur, the phenomenon was confined to a highly specific and private space: farms and fields, where they were protected by palisades, fences and/or herdsmen from people, livestock and the elements.

Oral histories confirm that the introduction of marula and birdplum trees in the middle floodplain ofuka accompanied settlement. In the early 1930s Omupanda, marula trees were confined to only two of the eight existing farms, and one of the two was located on the farm of the first person who had settled there in around 1900.[44] Although, for example, the Ombalantu district had a good number of marula trees and even some birdplums in the late 1960s, and Uukwambi district also had those trees by the early 1990s, the trees had been brought by settlers when they established new villages in the large wilderness areas between the former Ovambo polities. The seeds themselves may have originated from further north.[45]

Fruit trees were not only associated with human settlement; human action also caused their southward expansion, although the extent to which people intervened in "natural" processes varied. Kulaumoni Haifeke, the 1930-born daughter of the first pioneers to settle Oshomukwiyu, saw her village change from ofuka-wilderness into an oshilongo rich in full-grown marula, birdplum, and palm trees and concluded: "only God makes them grow."[46] The health officer of Ovamboland noted in 1933 that the pits were often consumed along with the fruit of the birdplum. He counted 26 birdplum pits in a single stool of a small child and surmised that this was the reason that birdplum seedlings

[44] Interviews by author: Mateus Nangobe, Omupanda, 24 May 1993; Paulus Wanakashimba, Odimbo, 10 and 11 February 1993; Paulus Nandenga, Oshomukwiyu, 28 April 1993; Kulaumoni Haifeke, Oshomukwiyu, 11 May 1993.
[45] On Uukwambi, Personal Communication with Joseph Hailwa, Regional Forester Ovamboland, 24 March 1992. On the occurrence of marula and birdplum in late 1960s Ombalantu, see NAN, OVA 57, f. 7/2/1-7, Lueckhoff, Report on Visit to SWA, 3-15 November 1969, Appendix to Regional Forester to Chief Director Bantu Administration, Grootfontein, 3 April 1970.
[46] Kulaumoni Haifeke, interview by author, Oshomukwiyu, 11 May 1993.

could be observed everywhere around the homesteads.[47] Paulus Wanakashimba attributed the introduction of marula and birdplum trees in his village to the agency of the women who had collected the fruit in older villages further north; some of the pits that had been discarded after the fruit had been consumed had developed into seedlings. Paulus Nadenga, however, emphasized that careful human management facilitated the "natural" propagation of fruit trees: "[seedlings] only survived because during the dry season [they] lose their leaves and animals cannot eat them. During the rainy season, if they are located in the fields, people will till the soil and prevent the goats from entering."[48] Indeed, although Paulus Wanakashimba's village had few marula trees when he was a young boy during the early 1920s, by the mid 1930s, both his and a neighboring village boasted many marula and birdplum trees. After clearing his own farm in 1947, he fenced new seedlings with thorn bush to protect them from livestock and by the early 1990s, his farm contained birdplum, marula, and palm trees.[49] In a similar vein, Mathias Walaula stressed that in Onandjaba, fire was used to thin out the palm bushes because only a free standing palm bush could grow into a tree and Kanime Hamyela proudly recounted how he had shaped the dense bush into a fertile garden with stately trees: "[t]he plants are like grains. If you thin millet it will grow fast and properly. It is the same with the bushes – if you cut out some then the remaining will grow fast and healthy."[50] In 1993, the large and shady marula tree on Julius Abraham's Olupito farm produced enough fruit to brew a 30 liter (30 quarts) pot of marula wine that he used to entertain his friends and guests. His father – one of the pioneers to settle the Okalongo area – had

[47] Paulus Wanakashimba, interview by author, Odimbo, 10-11 February 1993; NAN, NAO 36 f. 26/8 (I), Annual Health Report Ovamboland 1933.
[48] Paulus Nandenga, interview by author, Oshomukwiyu, 28 April 1993.
[49] Paulus Wanakashimba, interview by author, Odimbo, 10-11 February 1993.
[50] Interviews by author: Mathias Walaula, Onandjaba, 15 June 1993 and Paulus Wanakashimba, Odimbo, 10-11 February 1993; Kanime Hamyela,interview by author, Omutwewondjaba, 15 June 1993.

discovered the tree when it was a mere bush hemmed in by huge trees. After felling the trees around the bush, his father kept the surroundings free from weed. In addition, one of the older villagers, Joseph Kashinghola, had watered his birdplum treelings and they had developed into impressive full-grown trees.[51]

Beginning in the 1930s, the fruit tree frontier advanced beyond the Ovambo floodplain into eastern Ovamboland. Omundaunghilo, east of the floodplain, was already a fully fledged village with birdplum, marula and palm trees by 1923. But in most of the region, mature floodplain fruit trees appeared later because settlement only really took off during the early 1920s. A 1934 report on settlement in the east stated: "[t]he usual fruit trees are, of course, not as plentiful as in the actual tribal area but natives are being encouraged to plant them whenever possible."[52] Kalolina Naholo observed settlers in the east seeding marula, birdplum, and jackalberry. Marula could also be propagated by cutting off a green branch and planting it in moist soil.[53]

While the floodplain filled with farms, fields, and fruit trees during the 1950s-1990s, the fruit tree frontier advanced into far eastern Ovamboland, towards the border with Kavango.[54] In 1993, small birdplum trees could be found as far east as Olukula. Beyond Olukula, however, birdplum, marula, and palm trees, were rare.[55] Moses Kakoto settled in Okongo on an existing farm during the late 1960s. Although the birdplum trees

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[51] Julius Abraham, interview by author, Olupito, 16 June 1993.
[52] NAN, A450 vol. 7, f. 2/18, Annual Report 1935.
[53] Interviews by author: Kalolina Naholo, Ohamwaala , 26-27 January 1993; Paulus Nandenga, Oshomukwiyu, 28 April 1993; Franscina Herman, Odibo, 12 December 1992; cf. Helemiah Hamutenya, Omuulu Weembaxu, 17 July 1993. On eastern Ovamboland, see Kreike, Recreating Eden, ch. 9.
[54] Tree propagation in the older villages continued. See, for example, Philippus Haidima, interview by author, Odibo, 9 December 1992.
[55] Werner Nghionanye, interview by author, Olukula laKula, 18 February 1993 and personal observations, 20 February 1993. In a survey of 35 crop fields in the west of eastern Ovamboland, Erkkilä found that marula, birdplum and palm tree occurred with the highest frequency (respectively 27%, 14%, and 10%) and that these trees only occurred near or on crop fields, see A. Erkkilä, "Living on the Land: Change in Forest Cover in North-Central Namibia, 1943-1996" (Ph.D. Dissertation, University of Joensuu, 2001), pp. 96-97.

on his farm had grown "naturally," he had planted palm seeds from the floodplain in his first homestead.[56] Timotheus Nakale stressed that fruit trees were more numerous in fields in the west, i.e. the floodplain, because they grew "naturally;" in the east, however, people had had to plant the seeds. During the 1960s and 1980s, he had planted marula and birdplum seeds that he had brought from further west, and these grew into large trees. In 1992, when he moved his homestead to a new location, he successfully seeded more birdplum in addition to palm seeds; he had obtained the latter from Uukwambi. Some of the fruit trees, notably jackalberry, had not grown at all.[57]

Women especially valued fruit trees because the food source could be consumed fresh, or it could be dried and stored. In addition, alcoholic beverages that were fermented or distilled from fruit were critical means to maintaining social security and patronage networks. Finally, the sale of alcoholic beverages, distilled liquors in particular, was the sole means by which women could earn cash.[58] Although the colonial administration considered the practice of home distilling to be illegal, during the late 1920s and early 1930s economic crisis, which caused a severe decline in the demand for migrant laborers from Ovamboland, for many households, the sale of especially liquor distilled from birdplum fruit provided an alternative cash income.[59]

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[56] Interviews by author: Kalolina Naholo, Ohamwaala, 26 and 27 January 1993; Kaulikalelwa Oshitina Muhonghwo, Ondaanya, 2 February 1993; Moses Kakoto, Okongo, 17 February 1993.
[57] Timotheus Nakale, interview by author, Ekoka laKula, 21 February 1993.
[58] A 1957 report detailed the use of various fruits as food and for making alcoholic beverages, NAN, BAC 133 f. HN 8/21/4/1, Agricultural Report Ovamboland 1956/1957.
[59] NAN, NAO 18 f. 11/1 (I), Monthly Report December 1928. NAO 11, f. 6/1/1 (I), FMS to NAO, Olukonda, 12 November 1928 and NAO to FMS, Ondangwa 25 November 1928 and interviews by author: Mwulifundja Haiyaka, Omhedi, 8 March 1993; Franscina Herman, Odibo, 12 December 1992; and Philippus Haidima, Odibo, 9 December 1992.

Ovamboland's Oukwanyama and northern Ondonga, as well as the Lower Kunene province of Angola were the principal production centers of liquor.[60] The importance of liquor distilling is underlined by the long and ultimately failed crusades that Native Commissioners Hahn and his successor Eedes waged against the practice from the 1930s to 1950s. Although the colonial staff destroyed over 400 stills in Ovamboland in 1947, 1948, and 1949, 42% of the respondents to the the 1993 OMITI survey reported that they sold homemade liquor. As an income generating enterprise, the commodity was topped only by the sale of Ovambo basketry.[61]

Indigenous and fruit trees were closely associated with human agency. They were located on-farm, where they were protected by people, palisades, and fences. Respondents to the 1993 OMITI survey emphasized the intense management of fruit trees. According to the survey, marula and birdplum were by far the most seeded local trees. Marula was also actively propagated by cuttings (18%). By far the most common management practice involved protecting seedlings: 39% and 48% of respondents reported that they protected marula and birdplum treelings respectively (see Table 1).

[60] NAN, NAO 18 f. 11/1 (I), Monthly Report December 1928. NAO 11, f. 6/1/1 (I), FMS to NAO, Olukonda, 12 November 1928 and NAO to FMS, Ondangwa 25 November 1928 and interviews by author: Mwulifundja Haiyaka, Omhedi, 8 March 1993; Franscina Herman, Odibo, 12 December 1992; and Philippus Haidima, Odibo, 9 December 1992.

[61] NAN, A450, vol. 12 f. 3/21/5, SWA Commission, vol. 12, pp. 671-72; NAO 71 f. 32/3, NCO to ANC, Ondangwa, 12 May 1947; NCO, [Ondangwa], 29 August 1947; NCO to CNC, Ondangwa, 14 September 1947; ANC to NCO, Oshikango, 13 November 1947; NAO 71 f. 32/3, NCO to Chief Kambonde, Ondangwa, 28 December 1948 and to CNC, Ondangwa, 20 February 1949; BAC 133 f. HN 8/21/4/1, Agricultural Report Ovamboland 1956/1957; OMITI 7.2.

Table 1: Fruit Tree Management [62]

	Seeding (N=141)	Cutting (N=120)	(Trans)planting treeling (N=105)	Protecting "natural" tree(ling)s (N=163)	Coppicing (N=62)	Pruning (N=166)
marula	15%	18%	9%	39%	31%	20%
birdplum	15%	7%	9%	48%	13%	20%
palm	6%			9%	16%	19%
fig	4%	5%	3%	9%	5%	4%
jackalberry	0.7%			10%	5%	7%
baobab	1%		1%	2%		0.6%
manghetti				1%	2%	1%
monkey orange (omuuni)				4%		2%
papaya	40%	8%	19%	8%	5%	
citrus	3%		6%	1%	5%	
guava	8%		15%	0.6%		0.6%
mango	2%		2%			

Respondents to the 1993 OMITI survey ranked indigenous fruits as the most important trees in their villages. Birdplum and marula were mentioned by respectively 64% and 63%, of respondents, palm by 48%, jackalberry by 31%, fig by 16%, omuuni by 3%, and baobab by 2%. Mopane, the most frequently included non-fruit tree, was mentioned by 16% of respondents.[63]

Farms and Fields: Tree Nurseries

To colonial officials, the location of fruit trees in the landscape appeared random, and that impression in turn reinforced colonial officials' misperception that indigenous fruit trees were "wild" and "wilderness" trees. In his report for 1956-1957, the agricultural officer stated that the abundant indigenous "natural fruit tree species…grow without any care and succeed well in meeting the needs of the population….they really

[62] OMITI 4.4.4, 4.4.8, 4.4.12, 4.4.17, 4.4.20, 4.4.22.
[63] OMITI 4.4.29 (N=353).

occur everywhere in the forested areas of the region."[64] The "forested areas" to which the agricultural officer referred were located in the oshilongo, however, and not in the ofuka-wilderness, and the fruit trees were located inside the villages, on farms and fields and not in the bush on the margins of the villages or between farms.

The actual homestead, consisting of living quarters, kitchens, and storage huts and surrounded by a palisade (omiti), was the perfect nursery for the active and passive propagation of fruit trees. Fruit was prepared and eaten within the omiti (palisaded homestead); pits and used water were discarded around the huts or on adjacent household middens. Under favorable conditions, pits sprouted and developed into treelings. According to the 1993 OMITI survey, 41% of the households surveyed had engaged in seeding trees, mostly since the mid-1950s; 90% had planted the seeds within the homestead; and all of the households had seeded the trees on-farm. Tree propagation in other forms also centered on the homestead. Cuttings were planted in the homestead by 86% of respondents; 89% of respondents reported (re)planting treelings in the homestead; and in all other cases, treelings were propagated on-farm. According to 54% of OMITI survey respondents, naturally occurring trees were protected within the homestead, and, according to 53% of respondents, within the farm fence. Although three percent of respondents mentioned protecting naturally occurring trees off-farm, in all cases, the trees were located just outside of the farm fence. The omiti palisade offered saplings protection from livestock and from the seasonal ravages of the burning sun, merciless winds, and frost. The entire palisaded homestead generally was relocated within the farm every 3-5

[64] NAN, BAC 133 f. HN 8/21/4/1, Agricultural Report Ovamboland 1956/1957. See also NAO 17 f. 10/3 (ii), ANC to NCO, Oshikango, 25 January 1942; BAC 123 f. HN 7/8/2/2, Famine Relief Schemes Oshikango vol. 2, Bantu Affairs Commissioner Oshikango to Chief Bantu Affairs Commissioner, Oshikango, 15 November 1961.

years; by then, treelings were much better prepared to face the elements and livestock. Full grown fruit trees therefore often marked former locations of the omiti-enclosed homestead.[65]

Indeed, colonial officials' observations indirectly confirm that the most important fruit trees, for example, palm, marula, birdplum, fig, and baobab, were located in the inhabited parts of Ovamboland, as they were often explicitly described as being associated with habitation and homesteads. A manuscript written by the Native Commissioner during the 1920s or 1930s stated: "[i]n the inhabited areas are to be found various wild fruit trees…." In a 1942 letter, the Native Commissioner emphasized that "wild fruits" were part of the diet but that these sources of food were located near the homesteads and "[were], however, not available when working in the bush." In 1953,

[65] Interviews by author: Kaulikalelwa Oshitina Muhonghwo, Ondaanya, 2 February 1993; Moses Kakoto, Okongo, 17 February 1993; Timotheus Nakale, Ekoka laKula, 21 February 1993; Helemiah Hamutenya, Omuulu Weebaxu, 17 July 1993; Philippus Haidima, Odibo, 9 December 1992; Paulus Wanakashimba, Odimbo, 10-11 February 1993; OMITI 4.4.1-3, 4.4.7, 4.4.11, 4.4.16. In his overview of agroforestry projects in Africa, Kerkhof noted that few projects conducted initial surveys but stresses that in the cases where project staff did undertake research, they were surprised to learn that farmers commonly planted trees, P. Kerkhof, Agroforestry in Africa: A Survey of Project Experience (London: The Panos Institute, 1990), pp. 52-60, 81, 115, 143-148, 168. Kessy noted that some trees had been domesticated on-farm in East Usambara. He surveyed 18 home gardens to identify "domesticated species" but provides no details concerning how and the extent to which these trees had been domesticated, J.F. Kessy, Conservation and Utilization of Natural Resources in the East Usambara Forest Reserve: Conventional Views and Local Perspectives (Wageningen: Wageningen Agricultural University, 1998), pp. 88, 104-106. Kajembe observed that indigenous trees were disappearing from crop fields and that they were concentrated in home gardens or used to mark plot boundaries, see G.C. Kajembe, Indigenous Management Systems as a Basis for Community Forestry in Tanzania: A Case Study of the Dodoma Urban and Lushoto Districts (Wageningen: Wageningen Agricultural University Tropical Resource Management Papers, 1994), pp. 99, 113. Bonnéhin stressed that the Tieghemella heckelii that began to be domesticated in the late 1960s was often found around the locations of old settlements or camps, L. Bonnéhin, "Domestication paysanne des arbres fruitiers forestiers: Cas de Caula edulis Baill. olacaceae, et de Tieghemella heckelii Pierre ex. A. Chev., sapotaceae, autour du Parc National de Tai, Côte d'Ivoire" (Wageningen Agricultural University: Ph.D. thesis, 2000), pp. 68-69. In his study area in the western part of eastern Ovamboland, Erkkilä observed that the fruit trees that were located in the center of the fields had the highest crown density and surmised that the center of the field indicated the oldest cultivated section. It is as probable, however, that the location marked the location of the original palisaded homestead. In addition, Erkkilä points to a farmer in the Omusati region (in the floodplain) who stressed that he had moved his homestead because marula trees had begun to grow in it and Erkkilä also identifies the fig tree as an introduced tree in Ondobe. See A. Erkkilä, "Living on the Land: Change in Forest Cover in North-Central Namibia, 1943-1996" (Ph.D. Dissertation, University of Joensuu, 2001), pp. 92, 97-98.

elephants damaged a large number of "home-trees [emphasis mine] especially…marura [marula] and palm trees –necessary trees which supply people with nutritive food." In 1957, the agricultural officer for Ovamboland wrote that "[t]ree species that carry fruit such as Maroela [marula], Wildevy [fig], Jakkalvrug [jackalberry]…usually are not eradicated because of their economic and food value. The Makalanie palm is also protected because of its fruits." In 1961, the Deputy Secretary for Forestry of the Union of South Africa followed the border road from the Kavango region in the east to Oshikango in the west and noted that the landscape changed from a more or less closed forest from the Kavango region to 20-25 miles east of Oshikango, to a much more open landscape west of this point, with beautiful marula, jackalberry, and fig trees scattered in the Ovambos' fields.[66] The 1963 Odendaal Commission reported: "Westwards towards the oshana region of Ovamboland [i.e. the Ovambo floodplain] the bush becomes sparser and the ana tree (Faidherbia albida), mopane and palm ... make their appearance. Marula and manketi [mangetti], as well as wild fig and other kinds of trees such as omwaandi [jackalberry] also occur here…. In the southern region of Ovamboland the palm belt merges into extensive grassy plains."[67] Another 1960s description reads, "[t]he first impression of Ovamboland is trees, trees, and more trees. Makalani palms, Mangetti, Maroella [marula] trees and the wild Fig tree and many others."[68] Despite the evidence that the bulk of the fruit trees occurred inside the villages, colonial officials did not revisit

[66] NAN, A450 vol. 10, f. 2/40, "Tribal Affairs"; NAO 17 f. 10/3 (ii) ANC to NCO, Oshikango, 25 January 1942; NAO 67 f. 24/14, Tribal Secretary Uukwaluthi to NCO, Uukwaluuthi, 22 September 1953; BAC 131 f. HN 8/17/4), Agricultural Officer Ovamboland to Bantu Commissioners Ondangwa and Oshikango, 28 January 1957 and BAC 131 f. HN 8/17/2, Deputy Secretary of Forestry,"Report of a visit by the Deputy Secretary of Forestry to South West Africa: 17-29 April 1961," Pretoria, 10 May 1961.
[67] Report of the Commission of Enquiry into SWA Affairs 1962-1963, 12 December 1963, p. 9.
[68] NAN, WAT 3 f. 17 (ii), S. Davis, Tour of Northern Territories – Some Random Observations, Comments, and Thoughts [approximately 1960]."

the overlapping assumptions that the fruit trees were “wild,” and that they were the sole relics of a previous “natural” forest cover.

Conclusion

The modernization, declinist, and inclinist paradigms frame change in terms of a singular process with a singular outcome: either environmental degradation or improvement. In the Ovamboland case study, however, environmental change can be characterized by a process of environmental degradation in the form of deforestation that is simultaneously accompanied by a process of environmental recovery in the form of reforestation, creating a paradox. The existence of the Ovambo paradox highlights considerable challenges in conceptualizing and analyzing environmental change.