

Title page from French botanist André Aubréville's *Climats, forêts et désertification de l'Afrique tropicale* (1949). This publication marks the first known printed presentation of the term desertification.

Photograph by Michelle Arevalos Franco

## DESERTIFICATION AND THE RISE OF DEFENSE ECOLOGY

*Historical investigation of a single term reveals the political, social, economic, and ecological ramifications of trying to save the planet.*

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The intimate intercourse between two or more fields of knowledge often bears interesting and valuable fruit. Vegetation maps are such fruit, resulting in the union between botany and geography.<sup>1</sup>

The scope of geography does not lend itself to the micro-character of botany, despite an impressive history of attempts. While cartography is often regarded as the basis for landscape classification, the detail that can be depicted generates a generalized and superficial view of the land. The efforts of geographer August Köchler might have successfully grouped plants for their location and association but neglected to take into account their individual attributes, offering an orderly, oversimplified version of actual landscape processes.<sup>2</sup> Rather than building on specific and local attributes, vegetation mapping synthesized plants as a community that was easily grouped and recorded. The tension between the fields of geography and botany is exemplified in the application of mapping techniques that label or

categorize treeless, or so-called barren, lands. Since vegetation maps reduce complex landscapes to the average density of leaf foliage, also referred to as coverage, forest types dominate the representation of mapping endeavors, as canopy is translated into a consistent hatching pattern whose edges are defined by clear, dashed strokes. The result is that the dozens of plant species that constitute the forest strata are indistinguishable from one another. In itself, the undertaking of recording nature establishes a distinct authority, as order is constructed from apparent disorder, translating complexity into convenient and manageable units.<sup>3</sup> When plant life is cataloged in this way – for its physical presence alone – a reduced summary emerges in service of economic pursuits such as silviculture or agriculture and more contemporary agendas such as conservation. This representation of vegetation further suggests a hierarchy of value; ecological regions such as savannas or deserts have less value because they offer less coverage, and thus such hackneyed concepts as the “naked” desert arise.

1. A. W. Köchler, *Vegetation Mapping* (New York: Ronald Press, 1967), iii. 2. Köchler developed the concept of the plant association, a classification that has also become known in ecology as a *community*. These communities, also called *patches* or *mosaics*, were applied in developing geographic information systems (GIS). 3. See James Scott, *Seeing like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven, CT: Yale University Press, 1998); and Donald Worster, *Nature's Economy: A History of Ecological Ideas* (Cambridge: Cambridge University Press, 1995).



Pages from French botanist André Aubréville's study *Climats, forêts et désertification de l'Afrique tropicale*, which characterizes the use of profiles or elevations to depict ground-level ecological conditions with significant details such as seed dispersal agents (such as birds), climbing vegetation, and wind direction.

Photograph by Michelle Arevalos Franco

Thick, dense hatching celebrates the verdant forest, and scattered points scorn the barren desert. This assessment of the latter has been construed as a measure of deficiency. On a vegetation map of the planet, there is no life where there is no hatching. In this way, verdant forests suggest potential harvest and profit, while the deserts almost beg to be filled in. This legacy of assumptions can set in motion a wholesale belief in biotechnology that deserves to be problematized.

All vegetation maps at the very small scale have this in common: they have been compiled from source maps; they are not based directly on field work.<sup>4</sup>

The incompatibility of geography and botany offers fertile ground for approaching a term heavily used and misused in contemporary ecological discourse: *desertification*. Through the consideration of vegetation maps constructed as authoritative representations, the argument outlined in the following pages will chart how national and international political agencies have escalated the original meaning of desertification, manipulating the term into a widespread global condition. In short, these agencies now vie with one another to define the term, and their misappropriation is exemplified in the fears that control the rubric around the term. Beyond its meaning, the level of influence the term holds is epitomized by territorial planting initiatives that garner funds to plant trees as the solution to restrain and repress the so-called uncontrolled sprawl of the desert. Using mapping as a device,

and *desertification* as a label, projects such as Africa's Great Green Wall are being broadcast as anti-desertification initiatives and justifying a cross-continental planting of trees in the sub-Saharan desert.

Authoritative maps that divide and separate plants into convenient units have been extremely useful in supporting the goals of various international development projects, invoked by postcolonial governments and the nongovernmental agencies that financially and politically support them. Further, the fear associated with the apparent spread of the desert happens to justify an equally significant response that suggests tree-planting schemes as an indubitable act of environmentalism or conservation that will counteract the desert's advance. This form of human-induced environmental modification can be traced to particular methods developed and pursued during the European colonization of parts of Africa.<sup>5</sup> The first part of this essay will explore the influence of the French botanist who coined the term in subtropical Africa, and the final section considers how this lineage of thinking has been applied to supranational scales, using the Great Green Wall project in Africa's Sahel and Sahara regions to epitomize the trend.<sup>6</sup>

### Dealing with the Dry

When a deteriorated environment is framed as a threat, trees most often emerge as an obvious remedy, a cure to heal degraded land. Since the health of the land is attributed to its level of coverage, this includes true deserts and grasslands. Not to be confused with

4. A. W. Küchler, *Vegetation Mapping* (New York: Ronald Press, 1967), iii. 5. See G. A. Barton, *Empire Forestry and the Origins of Environmentalism* (Cambridge: Cambridge University Press, 2002). 6. Also called L'Africaine Initiative – Grande Muraille Verte. See [www.grandemurailleverte.org](http://www.grandemurailleverte.org).

## “Verdant forests suggest potential harvest and profit, while the deserts almost beg to be filled in.”

reforestation, *afforestation* is the term used to describe the deliberate planting of trees in an otherwise treeless environment. Afforestation refers to the deliberate conversion of non-forest land to forestland by means of tree-planting initiatives. The success of any afforestation project is measured in quick-value statistics: planting one tree is fine, but planting millions is better. This simplistic outlook masks an inability to acknowledge much more complex ecological conditions; instead, what results is a synthetic incentive, one possibly more likely to satisfy peripheral agendas than local ones.

It is a vast simplification to assume that the problems of the desert can be solved with water, or more specifically by altering the local climate by increasing moisture through transpiration. Drylands are highly variable, and their plant cover is dependent on a particular relationship between aridity and climate. Desert terrain is especially misunderstood in the context of vegetation mapping, called out by descriptions such as “barren,” “very sparse,” “barely present,” or “almost absent.” This representation of a biome weakened in status by the absence of cover is only exacerbated in media representations – both factual and fictional – wherein desolation and isolation are challenges to survival and must be overcome. The encroaching desert is interpreted as an uncontrollable condition.

The environmental narrative of defense that ensues is deeply rooted in early representations of desert terrain charted through aerial analysis and mapping by the authority of French colonial ambitions, especially forestry practices in French West Africa.<sup>7</sup> Their work is exemplified by practices that developed in West Africa, where tree planting was proposed as a means to secure profit through resource extraction. Profit potential was at first threatened but then cleverly improved through the application of a new term: *desertification*. Once in possession of large tracts of land, French colonial oversight created two systems for administering that land: classifying land type through simplification and adopting specific language for labeling unproductive conditions. The term *desertification* exemplifies both of these responses, engendering Africa’s perceived environmental decline and the rise of environmental authority.<sup>8</sup>

You do not have to be a visionary to perceive the unmistakable image of Africa’s future ... At the biological scale, Africa is tending towards savannah – a naked desert.<sup>9</sup>

The term *desertification* was first put forward in 1949 by the botanist André Aubréville, who was working not from surveying planes but through tactile on-the-ground experiences. By coining the term, Aubréville helped construct

a narrative that would resonate further than he could have imagined. The term’s history began when Aubréville was sent to Ivory Coast to document lands recently acquired by the French colonial government and to classify indigenous trees for prospective export. While Aubréville was generating an index of plant species on the ground that could be complemented by airplane flyovers to confirm economic potential, he was also recording root dynamics, species associations, and herbaceous flora across his assigned terrain.<sup>10</sup> As a result of fieldwork achieved close to the soil and through an intimate engagement with the micro-conditions of the forest, the young botanist was able to submit a detailed perspective of the vegetation, offering more than a marketable commodity.<sup>11</sup> Trained as a plantsman, Aubréville recognized that the fluctuating nature of the forest was the result of a shift in species abundance instigated by exploitation, namely colonial silviculture.<sup>12</sup> From the perspective of a botanist, mapping was an insufficient form of classification to describe the processes and cyclical changes observable on the ground. He worked from firsthand experience and an on-the-ground perspective. In *Climats, Forêts et Désertification de l’Afrique Tropicale*, Aubréville demonstrated order through comparative charts. More critically, he used

sectional drawings to represent and characterize the interdependence of plants. These drawings reveal associations both above and underground, exploring vital details of plant life and acknowledging, for example, the herbaceous (non-woody) layer and the ligneous (woody) layer, which are distinguishable as dependents in his drawings. He sketched wind direction and the presence of birds, insinuating seed dispersal patterns. Such sensitivity to the environment is unattainable when flying above the canopy in a surveying plane.

It was fieldwork that helped Aubréville articulate that the land under his review (and his boots) was not static but was an accumulation of the conditions or processes occurring aboveground and was intimately tied to the climate. He described how, under the pressure of human influence, tropical rainforest can be transformed into savanna, and savanna into desert. At the root of his description was the fact that destructive colonial forestry practices accelerated soil scarcity; harvesting too many trees ruins the topsoil, a condition to which the forests of subtropical Africa react by desiccating severely.

Identifying a shift in paradigm was certainly one achievement, but Aubréville went one step further and named the condition, thereby giving it identity and consequence: desertification, he claimed, results when

7. French West Africa, or L’Afrique Occidentale Française (AOF), was the colonial and administrative territory of French oversight whose makeup changed over time from 1895 to 1958. 8. André Aubréville, *Climats, Forêts et Désertification de l’Afrique Tropicale* (Paris: Société d’Éditions Géographiques, Maritimes et Coloniales, 1949). 9. “Il n’est pas nécessaire d’être un visionnaire pour apercevoir sans erreur possible l’image de l’Afrique future.” (Aubréville, *Climats, Forêts et Désertification de l’Afrique Tropicale*, 329.) Translations of Aubréville are by the author.

10. Aubréville, *Climats, Forêts et Désertification de l’Afrique Tropicale*, 6. There is some debate as to who first used the term *desertification*, as it is sometimes attributed to Philibert Guinier or Louis Lavauden. See H. E. Dregne, *Combating Desertification: Evaluation of Progress* (Foundation for Environmental Conservation, Volume 11, Issue 02, Summer 1984); and Diana K. Davis, *Resurrecting the Granary of Rome: Environmental History and French Colonial Expansion* (Athens: Ohio University Press, 2007). While the term may have been considered within an academic discourse at the university in Nancy, Aubréville retains authority over its application, as he was the first one to publish and define the condition through direct observation. 11. Aubréville was greatly influenced by his particular education as an engineer at L’École Nationale des Eaux et des Forêts (ENEF), the French national school of forestry and one of the first in the world to advance rural forestry and silviculture. The school flourished under the directorship of Philibert Guinier, who is sometimes referred to as the father of forest ecology. The school also prepared the most influential colonial scientists who facilitated the sequestration of natural resources from North Africa. Aubréville’s specialty in tropical botany was complemented by a high level of expertise in hand rendering and plant identification. 12. A subtle distinction can be made between a botanist and a plantsman. Whereas a botanist is more interested in the relationships of plants, a plantsman is more specifically interested in the plants themselves. The latter term is applied more to those whose study of plants is borne by passion rather than science.





Fieldwork drawing by André Aubréville as published in *La flore forestière de la Côte d'Ivoire* (1959). Aubréville's illustrations, based on direct observation, helped him capture details of individual species, often applying his own name to those most commonly found in the region of exploration. For example, *Aubrévillea platycarpa* (whose foliage is featured above) is a large tree found in dense evergreen and semi-deciduous lowland forests of Ivory Coast; its wood is suitable for construction purposes.

Credits N/A

desiccation, accelerated by human exploitation, manifests itself during a period of low rainfall.<sup>13</sup> By adding action to the noun *désert*, his term acknowledges the movement and transitions inherent in ecology and manifest through disturbance. Aubréville went on to add that human action was not only damaging ecological quality but also leaving land in a condition from which it could not spring back.

The history of the term *desertification* has been well documented since its adoption by the United Nations in 1977, but its legacy may be less familiar.<sup>14</sup> For that reason, its popularization after Aubréville's discovery deserves closer consideration. Quite outside the assumptions of standard colonial forestry, Aubréville's narrative of environmental ruin would become a controversial claim within colonial forestry. His message – that nature was not a divine and endless gift – was disagreeable to French forestry officials, who initially refuted Aubréville's claim as an attack on their scientific practices. Instead of being rejected outright, however, the term *desertification* was adopted to describe any dryland condition to argue for its yielding to human intervention. When applied to the treeless desert, the threat was defined and resolved by planting trees. The term was finally adopted into common use when this particular correlation between ruin and salvation could be made or was accentuated by the forestry commission. While Aubréville is known for having expressed the influence of climate on vegetal abundance, it was the colonial foresters who exploited one component of

his thesis: that tree cover could mitigate the relationship between the soil and the climate.

By identifying *le problème de désertification* in 1949, Aubréville wanted to raise concern within the practice of commercial forestry. The notion that the soil was not resilient to exploitation and that the overcutting and burning of forest vegetation accelerated the condition led to a series of new counteractions. However, his coinage and the argument behind it were manipulated for other purposes. The most typical responses proposed improvement strategies and logistics that championed the planting of more trees, supposedly to counteract the effects of desertification, not of deforestation. This is where the power of the term emerges. Such additive measures were put forward to maintain the ambitions of increased harvest and export and to secure colonial presence in the region. In his writing, Aubréville alludes to managerial techniques of control, but it is safe to assume that he did not anticipate a tree-planting revolution. Nevertheless, tree planting emerges as the victorious rival to desertification:

Let us return to the brutal result of desertification, and no longer insist on the potential economic consequences of a lack of wood. First, is it correct to assimilate a country's increase in aridity to the expansion of savannas? Apparently, yes, the vast grasslands, dry and burned part of the year, seem well disposed to degradation at the biological scale of formation, but the impression of desertification that one experiences before a savanna is that it has

13. See Aubréville, *Climats, Forêts et Désertification de l'Afrique Tropicale*, 211. 14. At the United Nations Conference on Desertification, desertification was acknowledged not only as a legitimate environmental condition but also as a "worldwide problem." The conference's determinations would eventually result in the United Nations Conference to Combat Desertification (UNCCD) in 1994. See UNCCD history at [www.unccd.int/en/about-the-convention/history/important-dates/Pages/default.aspx](http://www.unccd.int/en/about-the-convention/history/important-dates/Pages/default.aspx).

substituted a forest, which is not purely subjective and only somewhat sentimental.<sup>15</sup>

The idea of desertification was not new when Aubréville introduced the term. In France, the naturalist and colonial administrator Henry Hubert coined the term *dessèchement* in 1920.<sup>16</sup> While the discovery might have been significant to the emerging discussion of soil conservation, Hubert failed to relate this drying to climate or rainfall.<sup>17</sup> The following year, the historian E. William Bovill recorded diminishing rainfall in Nigeria and put forward the observation as evidence of what he called “the encroachment of the Sahara on the Sudan.” His claim was never scientifically substantiated and, additionally, lacked a catchy name.<sup>18</sup> The most energetic protagonist of the “encroaching Sahara” scenario was the British forester Edward Percy Stebbing, who was alarmingly eloquent when describing processes of drought, using the term *desiccation* or “dehydration or dryness resulting from the removal of water.” Stebbing also referenced the American soil conservation movement and the recently established US Soil Conservation Service (1933), a federal agency, both of which voiced the consequences of imprudent land practices, such as large-scale deforestation and slash-and-burn techniques inherent to industrial activities. Stebbing was a great influence on Aubréville, a fellow botanist who mistrusted the motivations of colonial forestry

and the escalating agricultural cultivation it stimulated. Outside Aubréville’s endorsement, Stebbing’s populist tendencies were not received without criticism and hostility by colonial superpowers, which framed resource extraction as a measure of success.<sup>19</sup> His tone was menacing, and the options he presented for the most part would have impeded detrimental exploitation:

The people are living on the edge, not of a volcano, but of a desert whose power is incalculable and whose silent and almost inevitable approach must be difficult to estimate. But the end is obvious: total annihilation of vegetation and the disappearance of man and beast from the overwhelmed locality.<sup>20</sup>

### Real Tropics and True Deserts

It is essential to consider that by proposing the term *desertification*, Aubréville was addressing discoveries made in Ivory Coast, and therefore in the context of subtropical Africa. He was writing and reflecting on *la forêt coloniale* – a productive forest principally categorized by 700 to 1,500 millimeters of annual rainfall. Therefore he referred specifically to the transformation of productive land to nonproductive land in this region and insinuated that the effects were multiplying as extractive processes were amplifying: “These are real deserts that are being born today, under our eyes.”<sup>21</sup>

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In addition to his regional analysis, he was careful to describe how different forest types adapt to diverse transformations, from human influence to bioclimatic ranges. It was from the perspective of a botanist, focused on the micro-relationships in plant-soil dynamics, that Aubréville described savanna-like conditions emerging as a result of human exploitation. Using on-the-ground techniques, Aubréville was able to read and analyze the herbaceous layer of plants that is excluded in most geographic analyses. In drylands, the herbaceous layer is difficult to categorize, since the ground is naturally denuded at the end of a dry season and can appear to be stripped of vegetation. While desert soils might appear lifeless, especially as seen from the air, their plant life has evolved highly developed underground adaptations by conserving energy and extending dormancy. This cyclical and perennial system is active even when the land has been subjected to disturbances such as fire, grazing, or drought. By giving serious and sustained attention to the forest, Aubréville spun a much more accurate narrative of environmental deterioration. If land is in fact undergoing an act of drying, then additional moisture could actually counteract it. However, it was more often than not that the response to Aubréville’s discovery – adding moisture by inserting trees – was addressing very different environmental conditions.

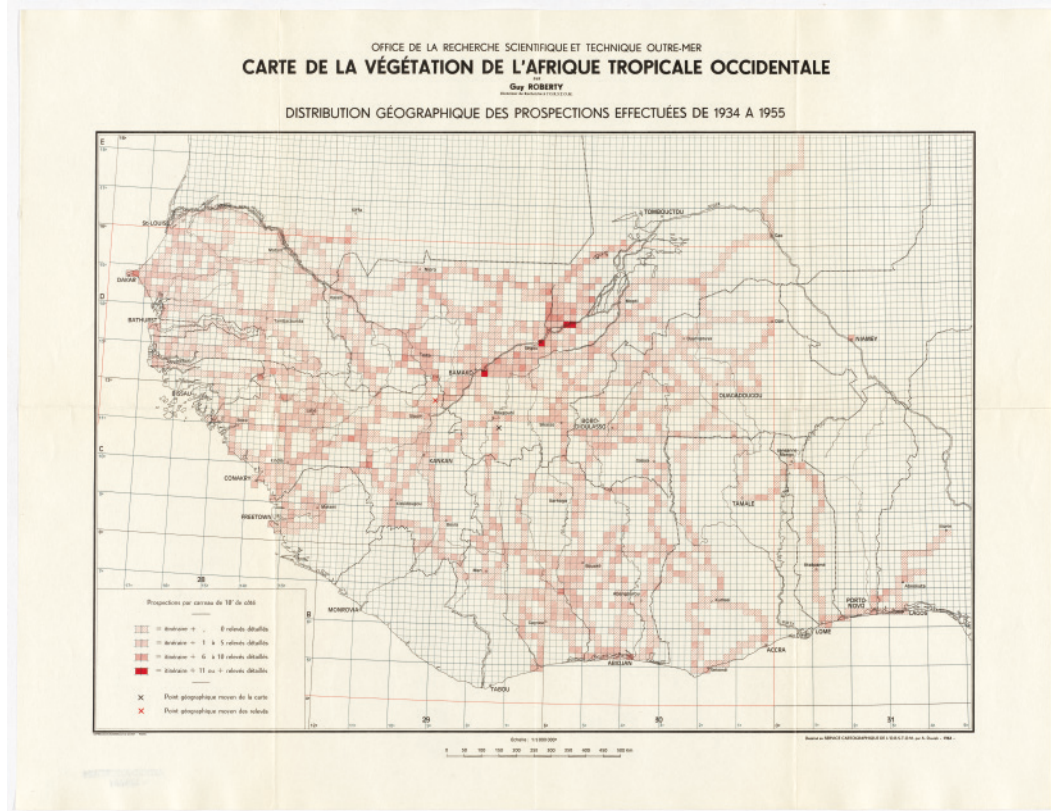
### Propagating Terms

By planting more trees to combat the degradation inherent in exploitative forestry, the colonialists were able to establish a tree-planting narrative that justified quantities in terms of spread, speed, and source rather than ecological specificity. Desertification – as a threatening condition – offered colonial forestry a continuing administrative purpose and encouraged increased investment in tree-planting initiatives, strategically drafting trees into service across regions, scales, and terrains.<sup>22</sup> Critically absent from the extensive application of the term is the fact that Aubréville was describing abuse to existing forests in a subtropical climate. By planting more trees to combat the degradation inherent in exploitative forestry, the colonialists were able to establish an environmental defense narrative that justified quantities in terms of spread and speed rather than ecological specificity. The colonialists’ adoption of *desertification* meant the drafting of trees into economic service. Since then, the term has been popularized beyond recognition, and desertification is assumed to be the culprit of a condition that is said to extend across a third of the globe.<sup>23</sup> More egregiously, it is actively applied to nonexploited lands such as

15. “Mais revenons au fait brutal de la desertification, sans insister plus longtemps sur les conséquences économiques possibles du manque de bois. D’abord est-il exact d’assimiler une extension des savanes à une aggravation de l’aridité d’un pays? Apparemment, oui, ces vastes formations herbeuses, sèches et brûlées une partie de l’année, semblent bien marquer à une dégradation sur l’échelle biologique des formations, mais cette impression de désertification, que l’on éprouve devant une savane qui s’est substituée à une forêt n’est-elle pas purement subjective et en quelque sorte sentimentale.” (Aubréville, *Climats, Forêts et Désertification de l’Afrique Tropicale*, 330.) 16. Notably, Hubert was trained as a naturalist and was chief administrator for AOF in 1924. 17. H. Hubert, *Le Dessèchement Progressif en Afrique Occidentale* (Paris: Bulletin de Comité d’Etudes Historiques et Scientifiques d’AOF, 1917), 401–467. 18. E. W. Bovill, “The Encroachment of the Sahara on the Sudan,” *Journal of the African Society*: Vol. 20 (1921): 174–185. 19. Gregory Allen Barton, *Empire Forestry and the Origins of Environmentalism* (Cambridge: Cambridge University Press, 2002), 110. 20. E. P. Stebbing, “Encroaching Sahara: The Threat to the West African Colonies,” *Geographic Journal* 86, (1935): 506–524. 21. “Ce sont de vrais déserts que naissent aujourd’hui, sous nos yeux, dans des pays où il tombe cependant annuellement de 700 à plus de 1,500 mm de pluies.” (Aubréville, *Climats, Forêts et Désertification de l’Afrique Tropicale*, 332.)

22. See Davis, *Resurrecting the Granary of Rome*, 61. Tree-planting initiatives in Africa originated in Algeria and found form in the projects initiated by François Trottier, a French arboriculturist who was heavily invested in the economies of trade and export using fast-growing *Eucalyptus* species. 23. See United Nations, *World Desertification Day and UNCCD* (2010, 2012), a brochure that claims, “Due to drought and desertification each year 12 million hectares are lost (23hectares/minute!), where 20 million tons of grain could have been grown”; see [www.unccd.int](http://www.unccd.int).





The French botanist and contemporary of Aubréville, Guy Roberty created this map to chart the vegetation in French Africa, elucidating the ambitions of botanists of the time to reduce land characteristics to a field of pixels or descriptive quadrants for surveying local plant communities. The contemporary viewer of this map might find it oversimplified; however, the simplification of biological character continues to pervade as a tactic for governing nature, as evidenced by Africa's Great Green Wall Project.

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“The Great Green Wall initiative is packaged as a comprehensive supranational, cross-continental tree-planting plan to hold back the desert.”

deserts and savannas, which, not unsurprisingly, by definition lack tree cover.<sup>24</sup>

The manipulation of language, or the purposeful application of ecological principles to highlight apparent disorders, is representative of the rise of defense ecology. The appropriation of *desertification* is not disconnected from the overuse and intentional vagueness of terms such as *sustainability* and *green infrastructure*. And terms propagate more terms: desertification can be countered by another contemporary label, *greening*. An invented ecological paradigm occurs when the authority of natural systems yields to the need for uncomplicated meaning. *Desertification* is especially problematic, as few definitions proposed for the term are explicit about its process, such as where or when it is likely to develop, how it spreads, and whether it is a permanent or cyclical condition. The concept itself is generally misunderstood and has been commoditized and popularized beyond recognition of Aubréville's meaning. According to Helmut Geist in *The Causes and Progression of Desertification*, there are over a hundred existing definitions of the term.<sup>25</sup> The United Nations Convention to Combat Desertification (UNCCD) controls the current definition, asserting that the condition is “land degradation in arid, semiarid, and dry sub-humid

areas resulting from various factors, including climatic variations and human activities.”<sup>26</sup>

### The Great Green Wall

One consistency in each description of desertification is human-induced acceleration. Another is that planting trees is a natural means of mitigation. The term therefore comes to signify both a threat and its packaged solution. In this way, desertification has been reduced to an anthropogenic vice that elicits urban anxiety about unknown or misunderstood rural dynamics, as opposed to a condition characterized by meteorological drought and deforestation.<sup>27</sup> There are a remarkable number of plans being deliberated and discussed, in terms of how to counter the escalation of drought. In almost every case, the solution relies on large-scale afforestation, or tree-planting, initiatives rather than on efforts to abate deforestation practices. Most strategies aim to “green the desert,” ideas that are supported by the statement that desertification is a threat that affects 13 million square kilometers of the world's land. In the current situation, in which the agencies, including the World Bank, funding these projects shield their ambitions behind the principles of ecology, it is difficult to determine whether

24. The manipulation is complete when permanent groundwaters are tapped to irrigate and maintain the application of a superficial and synthetic forest plantation. 25. Helmut Geist, *The Causes and Progression of Desertification* (London: Aldershot, 2005), 12. 26. United Nations Convention to Combat Desertification (UNCCD), *Down to Earth: A Simplified Guide to the Convention to Combat Desertification* (Bonn: Secretariat of the UNCCD, 1995), 4. 27. Anthropocene is a term currently employed to signify the contemporary time period as one “in which surface geological processes are dominated by human activities.” See P. J. Crutzen and E. F. Stoermer, “The ‘Anthropocene,’” *Global Change Newsletter*, 41 (2000): 17–21.

## “Desertification is combatted through any given agency’s symbolically effective use of a tree silhouette in its logo”

their motivations are any different than those of the colonial foresters who planted trees as investment. Further, despite trusting the arrangements of biology and long-term systems thinking that take into consideration dynamic landscapes, the project offers a sessile reaction, an assumed permanence that might offer short-term advantage. As dunes continue to shift and observations of climate change feed beliefs about escalating dryness, projects respond by accelerating the pace to keep up:

Each country concerned with the wall should provide a strip of 15 km wide in compliance with the general indicative course. The strip should necessarily be located within the Sahel zone with average rainfall between 100–400 mm. The green wall would thus be a large green avenue, more or less linear but continuous and as far as possible.<sup>28</sup>

The Great Green Wall (GGW), or La Grande Muraille Verte, is a proposal to consolidate the battle against desertification across eleven countries from West to East Africa. Following on the heels of other greening strategies, the Great Green Wall initiative suggests a contemporary manifestation of these environmental fears, packaged as a comprehensive supranational, cross-continental tree-planting plan to hold back the desert.<sup>29</sup>

By campaigning against desertification, the project positions a shelterbelt of trees in the region between the Sudano-Sahelian savannas and the Sahelian shrublands. The project boasts continental scale, cross-border ambitions, and advanced technology provided by “high definition vegetation mapping.”<sup>30</sup> The project for the Sahel-Sahara region was officially proposed in 2005 by Nigeria’s president, Olusegun Obasanjo, and promoted as the only solution to desertification. The project was anticipated as a further implementation strategy to satisfy the request made by the UNCCD in Rio de Janeiro at the 1992 United Nations Conference on Environment and Development (commonly known as the Earth Summit). A year after President Obasanjo’s announcement, the project gained further momentum during the Conference of Parties to the Climate Change Convention (COP 12) in Nairobi, Kenya, in 2006. No conclusions or commitments were agreed on during COP 12, but there was one noteworthy consequence: it was the first COP held in Africa. Introducing a local context to the traveling experts, the Great Green Wall’s supporters secured support and capital among an international community of governmental and nongovernmental agencies. The ambitions of this supranational project filled a gap in the environmental dialogue between matters of international politics and economics.

The list of agencies involved in the Great Green Wall project is a complex and multifaceted array of acronyms. All of them have been amalgamated into one five-letter acronym: NEPAD, the New Partnership for Africa’s Development. The partnership provides regular public updates that often reaffirm its ambitions “to erect a physical barrier made of trees over a 15 km-long area linking Dakar to Djibouti – 7000 kilometers – in order to stop desert encroachment and protect human and natural systems south and north of the Sahara against the adverse effects of desertification on their economic and social development.”<sup>31</sup>

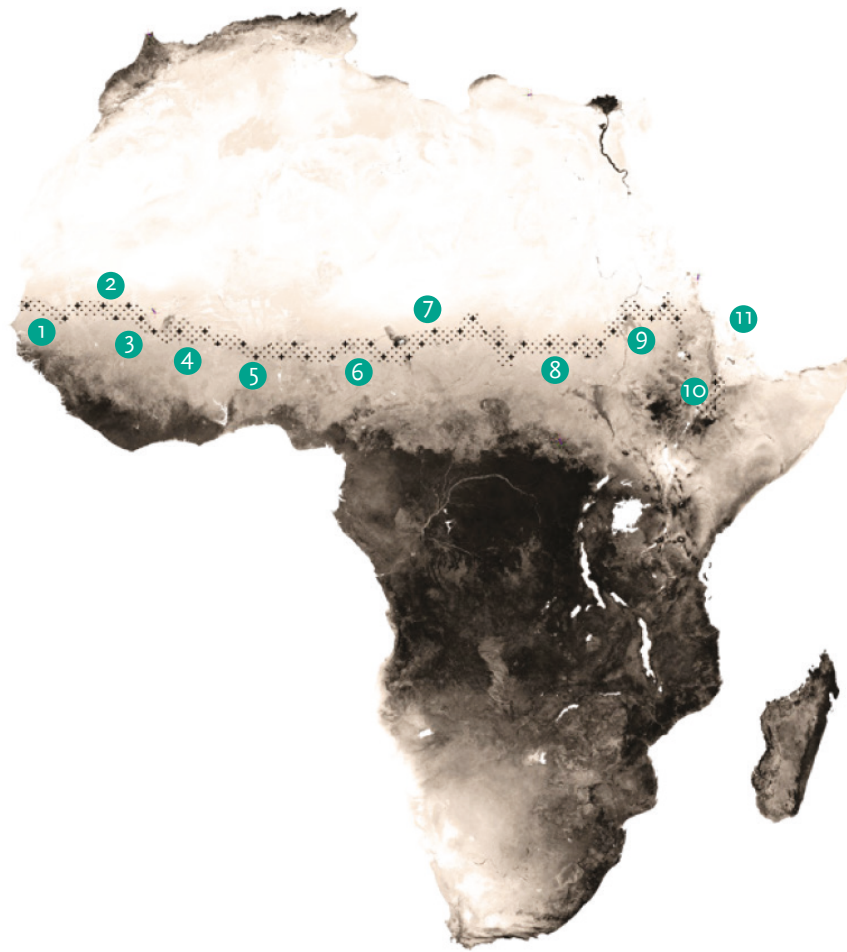
The GGW project, still in its formative years of determining sites, preparing planting lists, and initiating pilot projects, offers a continually worked and reworked document that registers escalating global concern and shifting regional economies. Claiming to lead the project in partnership, the Community of the Sahel-Saharan States (CEN-SAD) and the African Union (AU) created the Pan-African Agency of the Great Green Wall (PAGGW) in 2011. Each country is responsible for adopting and implementing the plantings on its respective soils. At the same time, PAGGW is securing funding in sizeable amounts from various sources: for example, hundreds of millions of dollars from the World Bank, Food and Agriculture Organization United Nations (FAO), and the United Nations Economic Commission for Africa (UNECA). The great number of countries and agencies involved in the project obscures measuring the total capital investment and its distribution.

It seems that government agencies involved are indeed receiving international funding for these projects, but the complicated network of actors makes it difficult to measure effectiveness, if there is any at all. Senegal actively publicizes its seedling plantings with press releases and headlines that boast planting quantities in the millions.<sup>32</sup> With eleven national governments and countless non-governmental organizations involved, the initiative is also an experiment in geopolitical collaboration, not to mention the implicit cultural, linguistic, and social discrepancies involved in collaborating at the continental scale. This circumstance begs the question: is it possible to protect a multitude of human and natural systems from climate change through a proposal as simplistic as afforestation? In addition to the clarity of the championed solution, what remains clear is that desertification is combatted through any given agency’s symbolically effective use of a tree silhouette in its logo (see graphic).

Faith in tree planting as a means to halt desertification is exemplified in the select and diminutive species lists that are proposed, highlighting a brazen confidence in the cultivation of only a few species. Any discussion of plant material in such severe conditions must take into careful account several sensitive factors. The various ways in which plants appear to cope with aridity include, most critically, morphological intelligence, or the ability of plants to transform or adapt to changing environmental conditions. One example is the approach to water management; for instance, Sahelian terrestrial life

28. African Agency of the Great Green Wall website, listed as of January 22, 2014, under “Concept Planning Documents,” [www.grandemurailleverte.org](http://www.grandemurailleverte.org). 29. Other similar projects include the Three North Shelterbelt Project (China), Barrage Vert (Algeria), the Great Plains Shelterbelt Project (USA), and various Jewish National Fund projects (Israel), each varying in scale and complexity but generally couching geopolitical strategy under the rubric of tree-planting initiatives and progressive environmentalism. 30. “Harmonized Regional Strategy for Implementation of the Great Green Wall Initiative of the Sahara and the Sahel,” New Partnership for Africa’s Development, [www.fao.org/fileadmin/templates/europeanunion/pdf/harmonized\\_strategy\\_GGWSSI-EN.pdf](http://www.fao.org/fileadmin/templates/europeanunion/pdf/harmonized_strategy_GGWSSI-EN.pdf).

31. “Africa’s Decade of Change,” New Partnership for Africa’s Development (2011). [www.nepad.org](http://www.nepad.org). 32. “‘Green Wall’ Project Gathers Pace in Senegal,” NEPAD Today (August 17, 2011), [www.nepad.org/system/files/newsletter/2011/08/nepad\\_today\\_17\\_august\\_2011\\_pdf\\_21454.pdf](http://www.nepad.org/system/files/newsletter/2011/08/nepad_today_17_august_2011_pdf_21454.pdf).



Map of continental Africa with estimated path of the Great Green Wall, an anti-desertification project planned to span eleven countries from Dakar to Djibouti. The path is based upon information released by the Pan-African Agency of the Great Green Wall. Senegal is the coordinating country for the Great Green Wall, having successfully appealed to the United Nations in 2009. The country's former president Abdoulaye Wade claimed that Senegal plants two million acacia trees every year.

*Map courtesy of Rosetta S. Elkin*

1. Senegal 2. Mauritania 3. Mali 4. Burkina Faso 5. Niger 6. Nigeria 7. Chad 8. Sudan 9. Eritrea 10. Ethiopia 11. Djibouti

is well adapted to even nominal changes in soil moisture. The intrinsic survival strategy of these life forms and the evidence of their change over time merit serious consideration. Tree cover percentages are carefully calibrated to root capacity and spread, depending on the availability of underground resources. Desert trees are sparsely positioned, their roots competing for water that sometimes lies up to ten meters below the surface. Most soils in arid lands contain only small amounts of moisture, and with seasonal precipitation, the percentage increases to carrying capacity. In that regard, soil texture and saturation levels determine species survival. Given a wide range of possible conditions, most plants (mesophytes) reach wilting point when water is no longer available and simply die from thirst.<sup>33</sup> In contrast, xerophytes, the kinds of plant species that populate the Sahel, do not die but simply become dormant, anticipating that a period of stress will be followed by a period of productivity. With the slightest moisture variation, xerophytes either descend into dormancy or awaken into development. It is this phenomenon that enables the desert in bloom, a site of shocking beauty, with flowering plants carpeting the ground after the smallest period of rain.

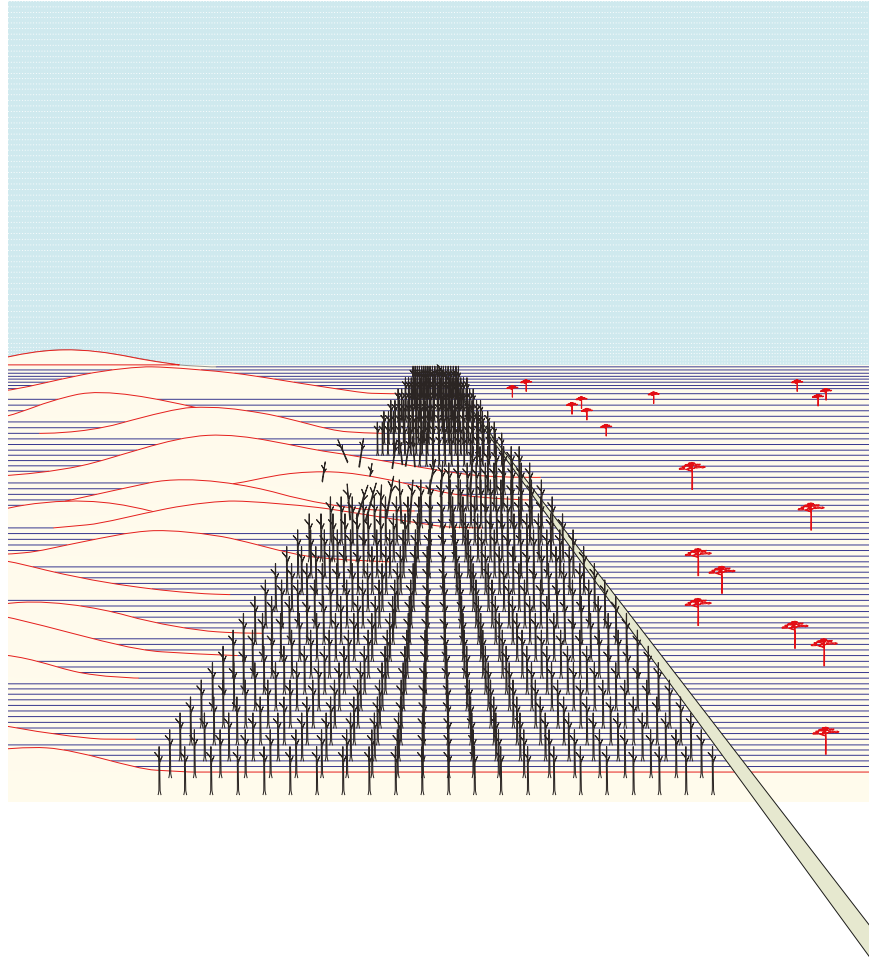
A second way of considering this morphological intelligence arises through considering tree cover. As defined by foliation, tree cover is timed to periods of productivity and rainfall; ephemeral, annual, and perennial plants have distinct rhythms of foliation dependent on moisture availability.<sup>34</sup> Within the Sahara and Sahel zones, trees are most often found in association with shrubby grasslands – certainly not

along the evenly spaced grids of afforestation projects. In drylands, sparse spacing between plants, a seemingly lifeless environment, belies the presence of a well-orchestrated biological system based on thousands of years of adapted survival intelligence. Dryland vegetation tends to respond to human impact in sporadic and unpredictable ways, which frustrated colonial forestry projects. Irregularity is embedded in the nature of each dryland species, which have developed extremely resilient evolutionary traits, including deep root systems and long dormancy periods, to survive bouts of drought. For these species, ample spacing is essential to ecosystem function in order to avoid subsurface water competition. Trees may appear deprived from a ground-level perspective, but below the surface, they develop rapidly, in effect conserving their energy aboveground, by limiting their exposure. Any future discussion of plant resources can only be useful if it acknowledges a gradient of environments that are interconnected and interdependent, as Aubréville expertly reveals. Intimate observation reveals the real tensions on the ground.

These two examples of the intricacies of plant species highlight the thriving nature of plants in less-than-green environments. At this stage, the acronyms behind the GGW have not disclosed how large-scale tree planting proposals will engage these ancient systems. As afforestation projects are launched, young whips are planted in grids, under the assumption that forests are the primeval natural state of the landscape. Pilot projects under development prioritize planting over site and quantity over species specification. Planting trees has

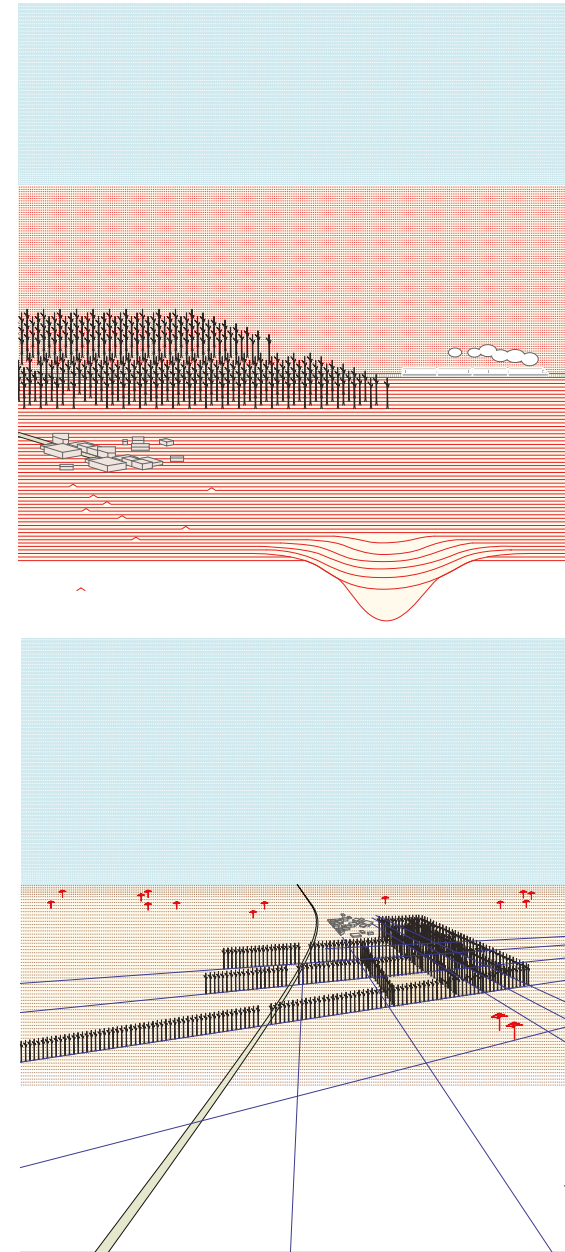
<sup>33</sup> The range of life for mesophytes is between 10 and 20 percent soil moisture. Xerophytes can survive at moisture levels as low as five percent, but no plants survive below that level. <sup>34</sup> R. L. Heathcote, *The Arid Lands: Their Use and Abuse* (New York: Longman, 1983), 81–85.





In order to explicate the simplification of Roberty's map, the diagrams (above and opposite) explore the typical planting forms for green walls and their associated outcomes: (1) The agricultural grid offers single-row plantings, which are meant to protect and delineate cropland. This tactic eventually desiccates the crops, as a result of the surrounding trees' water absorption. (2) Shelterbelts of varying depths, planted in a grid to arrest mobile dunes. In time the dunes tend to overwhelm the static grid. (3) Infrastructural barriers are realized adjacent to roads and rail networks, without proper attention paid to local occupation. In time sinkholes form and villages are left without water, as the significant tree plantings uptake most of the scarce and localized groundwater, causing land above to collapse.

*Renderings by Rosetta S. Elkin with Clay Baylor*





### RISK OF DESERTIFICATION

The United Nations Conference on Desertification released this map of the threat of global desertification in 1977; the first time desertification had been visualized as a global condition.

Credits N/A

Very High
  High
  Moderate
  Hyperarid zones (deserts)

come to represent fertility and the hopes of permanence to local communities, despite the obvious commodification and territorialization of ecological systems. However, permanence is a mirage, for the process of planting millions of trees in desert land draws on ancient, non-replenishing underground aquifers. Due to limited water resources, the drifting of dunes can be mitigated for only a limited time. The deleterious effects of overplanting and of over-reliance on aquifers are well known, registered historically through various sinkholes that surround ancient agricultural villages. Planting, or greening, will eventually prompt the need for a new ecological term to describe the next imminent disaster, which will be borne out of water scarcity.

The work of botanists can be comprehensive only if it includes a consideration of plants in space, i.e., in different types of landscapes. At this point, the work of geographers becomes important through the development of maps as tools to determine and to analyze distribution in space.<sup>35</sup>

Since Aubréville coined the term to clarify the detrimental effects of specifically located human intervention, *desertification* has subsequently come to justify massive frameworks of even more human involvement, epitomized by projects like Africa's Great Green Wall.<sup>36</sup> There is no question that trees hold a powerfully nostalgic association with positive sentiment toward environmentalism and more recently the culture of preservation.<sup>37</sup>

This sentiment is also a contemporary trend, reinforced by climate change and the analogy that planting a tree is inherently an act that will "offset" our urban guilt. Ingrained with tendencies of uniformity and control, environmental defense projects herald trees as stewards and afforestation projects as fixes. The value of individual species and their calibration to location are rarely deliberated, as quantity trumps quality and simplistic, fixed structure tries to control perennial drift.

While human impact certainly accelerates drought-like conditions, we have seen that the origin of the term is rooted in projects and places, namely subtropical Africa, not immediately relevant to the siting of the contemporary response. The Great Green Wall is a supra-national project funded and planned from a distance analogous to the aerial perspective. A once site-specific observation has been exploited as a single-word global phenomenon. Working through the assumption that simplification is progress, the misappropriation of an ecological analogy has been formalized as a barrier of trees, an ecology of defense. International policy makers have become the new cartographers, and trees are their new tools.

<sup>35</sup> A.W. Küchler, *Vegetation Mapping*, iii. <sup>36</sup> For a discussion of a similarly ambitious and contemporary tree-planting initiative, the Chinese 2-North Shelterbelt Project, see R. S. Elkin, "Planting the Desert: The Chinese Three North Shelterbelt Project," *Topos* XX, no. 82 (2013): 30–36. <sup>37</sup> See also [plantabillion.org](http://plantabillion.org), [planttrees4life.com](http://planttrees4life.com), [treegreetings.com](http://treegreetings.com), [greenpop.org](http://greenpop.org), and [nationalforests.org](http://nationalforests.org). For a comprehensive history of Arbor Day, see Shaul E. Cohen, *Planting Nature: Trees and the Manipulation of Environmental Stewardship in America* (Berkeley: University of California Press, 2004).