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BOOK REVIEWS

THE RESOURCES OF AFRICA: A REVIEW OF TWO BOOKS*

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Africa is increasingly an area of world concern. While Africa usually conjures up an image of unusual animals silhouetted against Mt. Kilimanjaro, Africa also means ancient cultures, one of the world's largest desert regions, dense tropical rain forests, vast undulating plains, cloud forests, tremendous fresh water lakes, gleaming reef-protected beaches and untapped mineral wealth. The continent is huge—nearly as large as the whole North American Continent. There are hundreds of tribes of indigenous people each with a language and culture of its own, and the whole is overlain with a very thin veneer of European languages and customs.

Signs of modern industrial societies such as railroad systems of standard gauge, standardized highways, factories turning out consumer durables, or even specialized commerce are almost completely absent. Yet newly independent countries, often made up of people with stronger tribal allegiance than national awareness, are being urged to support themselves with economics geared to the mid-twentieth century. The path is fraught with innumerable difficulties. Not the least of these is a lack of adequate inventory data concerning the location, quantity and quality of natural resources. The extent of such knowledge is dependent upon the vigor and the sophistication of efforts designed to explore and chart these resources. Some contend that such data would enable resource planners to extrapolate from modern Western technology and set the wheels of development in motion. Reflection would reveal that the bulk of the so-called underdeveloped regions of the world today lie between the Tropic of Cancer and the Tropic of Capricorn—the tropics. It is in the tropical zone that attempts to transplant modern technology, contrived under temperate conditions, have met with the most re-

* UNESCO, *A Review of the Natural Resources of the African Continent*, Paris (1963), pp. 437, map of African mineral resources in jacket pocket; Raymond F. Dasmann, *African Game Ranching*, New York, The MacMillan Company (1964), pp. x, 75, \$1.45 (paperback).

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sounding failures. Yet the great bulk of Africa lies in the tropics and this simple fact should give pause to those who look for short-cuts to convert raw materials to finished products.

The Economic Commission for Africa (ECA), headquartered in Addis Ababa, Ethiopia, expressed the need for a comprehensive bibliography listing scientific surveys of resources already completed and a commentary which would point to major gaps in knowledge. At the request of the Executive Secretary of ECA, UNESCO undertook the preparation of the bibliography which, in UNESCO's terms, is to provide "a review of the conditions and natural resources of the African continent and Madagascar [in terms of] an overall picture of existing knowledge in this field."¹

The actual work was conducted by the UNESCO Natural Sciences Department, headed by Professor V. A. Kovda. First, a number of scientific experts with extensive working experience and knowledge of the African continent were requested to prepare critical reviews concerning their particular fields of endeavor. Second, the UNESCO Science Officer for Africa, Alain Gille, circulated the manuscripts, in the form of a draft volume, to member States, international organizations, government organizations, and an imposing list of experts for comments.²

The critical reviews were merged with bibliographies, maps, lists of institutes, centers and other sources capable of providing additional information and published under the title *A Review of the Natural Resources of the African Continent*.

UNESCO's contribution to the volume is a preliminary section, or "outline," of nine pages. In it the names, addresses and affiliations of the experts who prepared the critical reviews are listed. In addition, it is made clear that the work does not try to inventory or report on the utilization of resources. This sphere is described as being "purely economic." Even so, each author, one way or another, circumscribes what he considers possible in terms of "economic feasibility." Thus, the effect of world demand and resource substitutability, brought on by changing technology, varies from review to review. The outline then proceeds to present a résumé of each of the critical reviews, and concludes with some comments bearing on energy sources, including solid fuel, solar, wind, and atomic

1. UNESCO, *A Review of the Natural Resources of the African Continent*, Preface (1963) [hereinafter referred to as UNESCO Review].

2. *Id.* at 413-17, listing those experts consulted and those who prepared detailed comments.

energy, as well as a very strong series of arguments to support the contention that scientific research should be carried forward regardless of political conditions over long time periods. The argument is succinctly put: "But basic work is a slow, expensive and unspectacular task of which the full value is not apparent immediately but only after the lapse of many years. For example, basic mapping in topography, geology, hydrology, soils, vegetation, etc., is not undertaken for immediate results but for its long-term value in relation to the assessment and conservation of natural resources and its real importance to the economy becomes more and more evident with time as general development takes place."³

An interesting aspect is UNESCO's commitment to the conservation, in classic terms, of natural resources. Support for Sir Julian Huxley's mission to East Africa⁴ is pointed out, as is UNESCO's support of the International Union for Conservation of Nature and Natural Resources. (The Ninth Technical Meeting of the IUCN, held in Nairobi, Kenya, in September 1963, was devoted to the ecology of the tropical environment).⁵ The outline also summarizes the recommendations concerning the training of technical personnel made by the Conference on the Development of Higher Education in Africa, September 1962. The ten points put forward are extremely well stated and worth review. It is unfortunate that no one thought to tell the authors of the critical reviews that the statement about training was to be included. It would have saved a number of them the effort of composing statements about training needs in particular disciplines. The outline closes with a plea for the interchange of research data throughout the countries of Africa.

One then turns directly to the first critical review: "Topographic Mapping of Africa" by A. Rumeau (Director, National Institute of Geography, France). Mr. Rumeau reviews the conditions affecting the production of maps in general terms and then turns to map coverage of Africa in 1949. Then by sketching in the work carried out by the British, Belgians, Portuguese, and French between 1949 and 1959 he is able to present the general situation concerning map coverage in the continent in 1959. He proceeds to demonstrate some of the particular difficulties facing cartographers in Africa and con-

3. *Id.* at 16.

4. Julian Huxley, *The Conservation of Wildlife and Natural Habitat in Central and East Africa* (UNESCO 1961).

5. *International Union for Conservation of Nature and Natural Resources, Papers and Proceedings of the Ninth Technical Meeting* (in press).

cludes with a bibliography and an inventory of topographical maps of the African Continent, listed country by country, available at the end of 1959.

A "Review of Geology, Applied Geology, and Geophysics in Africa" was written by Mr. F. Dixey (President, Association of African Geological Surveys, Great Britain). He covers the subjects by reviewing the present state of geological knowledge; the work done by geological surveys, mines department, mining companies, universities, scientific societies and research organizations, international agencies, the total progress in geological mapping, geophysical surveys, radiometric surveys, and geochronology; the present state of mineral investigation and development in which he lists the mineral deposits discovered since the war, mineral deposits under investigation, mineral deposits in development, mineral deposits in production since the war, and mineral deposits awaiting development; the search for new mineral deposits; and recommendations. There is a bibliography, territory by territory, a list of scientific periodicals relating to African geology, geological research organizations presently operating in Africa, a review of geological mapping, and the pocket map indicating the location of the chief mineral resources. The review is extremely well done and would probably stand alone as a monograph. Its quality makes it an unwieldy partner in the context of this volume.

The seismicity of Africa is covered by G. P. Gorshkov (University of Moscow, U.S.S.R.). Mr. Gorshkov treats the subject of earthquake activity in Africa most adequately by the use of a series of charts showing the epicenters and resulting shock zones of the recorded earthquakes in Africa. He is able to clearly delineate those areas showing the highest potential for seismic activity in Africa. The article is concise, straightforward, and deals with the subject at hand with a minimum of fuss or wasted motion.

A section on climate and meteorology is divided into two segments—north of the Tropic of Cancer and south of the Tropic of Cancer. The first is written by Mr. F. Taha (Director General, Meteorological Department, United Arab Republic), and the second portion by Mr. H. O. Walker (deceased). With very limited exceptions the two articles could have been written as one. Both point to the paucity of available data, scattered nature of the observation stations, and the short history of records. Significantly, both point to the problems of obtaining meteorological instruments which are tailored to African conditions. Mr. Taha is particularly

concerned about the lack of observer information published in indigenous languages. For example, the available literature is in English or French, but he needs modern publications in Arabic to train his observers.

The review "Hydrology in Africa" is written by Mr. J. Rodier (Chief, Hydrologic Service, Office for Overseas Scientific and Technological Research, France). The author starts, naturally, from climatology and proceeds to describe what is known about surface and subsurface water resources in each of the regions: the Mediterranean, the Sahara, tropical Sahelian, Northern Tropical Regions, Equatorial Region, Southern Tropical Region, Southern Desert Zone, and the Republic of South Africa. The review is followed by an extensive bibliography divided into topics, such as Groundwater, Infiltration, and Soil Moisture, further divided by country within each topic.

One of the best reviews concerns itself with "The Soils of Africa." The author is Mr. F. Fournier (Director, Inter-African Bureau for Soils, France). He deals with soil classification and cartography, general soil science studies, soil conservation and utilization studies. During the course of his presentation he puts his finger on a number of factors affecting development in Africa. And the section on soil conservation and utilization is particularly good. For instance:

It is therefore since World War II that more serious attention has been given to the damage which is being done. The traditional working methods of the African farmer achieve a low state of equilibrium, but it is nevertheless an equilibrium. The increase in population and cattle and the intensification of cultivation which followed the arrival of the European destroyed this equilibrium. It was therefore necessary to find new solutions to the problems occasioned by over-cultivation and over-grazing and bush-burning, which have been practiced for as long as man has existed in Africa.⁶

And further :

In respect of the nature of the soil, the savanna soils present a characteristic, which, more than any other, makes them particularly vulnerable to erosion, namely, the great instability of their structure as soon as they are over-cultivated. Two successive years of mechanized cultivation are enough, in a savanna zone, to degrade soil structure and to reduce permeability. . . .

6. UNESCO Review 233.

There is intense erosion on all kinds of slopes—even the gentlest—because of the intense action of rainfall. The part played by relief is therefore negligible in initiating the phenomenon. . . . Critical values for rainfall characteristics have been determined. Its action is so marked that the inter-tropical zone is one of the zones of the world which has suffered most from erosion.⁷

The review carries a conclusion and a bibliography divided into segments for conferences, soil properties, genesis, evolution and classification of soils, erosion, conservation and utilization of soils, and a list of scientific periodicals relating to the soils of Africa.

The review on flora is divided into northern and southern portions. "Flora of Africa North of the Sahara" is written by Mr. M. Drar (Orman Botanic Gardens, United Arab Republic), and "Flora of Africa South of the Sahara" is by Mr. J. Koechlin (Office for Overseas Scientific and Technological Research, France). Although both authors present essentially comparable information, they do it in completely different manners. One author concentrates some attention on a list of the herberia at the outset of his review, while the other attaches a list of herberia to his review as an annex. Both articles have a section describing economic research and neither of them quite knows what to do with it. The sections would be better dropped.

The matter of African fauna is divided into five segments. The first, "Taxonomy, Ecology and Zoogeography" is written by Mr. F. Khalil (University of Cairo, United Arab Republic). Professor Khalil has done a remarkable job of synthesizing the available data into a comprehensive listing of habitats and description of mollusca and vertebrates. Some of the exposition seems elemental; for example, describing how small rodents escape the heat of the desert by burrowing deep in the sand. But by and large the description of the ecology of animals under Desert, Savanna, Forest, Caves and Estuaries headings is very adequate. The taxonomic list is straightforward and the section on Zoogeography follows classic lines.

"Economic Aspects of Entomology" is written by Mr. W. F. Jepson (Cyanamid of Great Britain, Ltd., Great Britain). He describes entomological knowledge in terms of those insects acting on crops, acting on wild and domestic animals, attacking man, and beneficial insects. The major portions are devoted to insects attacking man and crops, possibly giving some indication of how the deci-

7. *Id.* at 234.

sions for allocation of capital for scientific research are made. The section on "Fresh Water Biology" by Mr. G. Marlier (Belgian Institute for Scientific Research Overseas, Belgium) seems dedicated entirely to the proposition of explaining the characteristics of the lakes and rivers of Africa from the standpoint of producing edible fish products. For some particular reason, not explained by the author, a combination of purely scientific and practical motives have caused a number of countries to send expeditions to Africa. "The combination of all these scientific and practical interests and of such diverse branches of study has caused limnological studies to be, on the whole, more highly developed in Africa than in any other 'hot climate' continents."⁸ Most of the bibliography is used during the course of the text.

The review section "Marine Biology and Biology Applied to the Fishing Industry" is written by Mr. E. Postel (Director of Research, Office for Overseas Scientific and Technological Research, France). This is another first-class article that could be issued separately as a monograph. He writes well and comprehensively covering a far-flung and diverse subject. The last section is concerned with "Conservation and Management of Game Stock," by Mr. F. Bourliere (University of Paris, France, currently President, International Union for Conservation of Nature and Natural Resources). After a short reiteration of the remarkable wealth of large mammals, unmatched elsewhere in the world, Professor Bourliere concentrates on the role of national parks and reserves and the newly advanced theory of calculated cropping of African ungulates as a continuing source of protein for the rapidly increasing African populations. His portion of the review is accompanied by a short bibliography covering standard publications and specialized reviews relating to the conservation of wildlife. He has added, with the help of Mr. George Treichel, a list of official and private organizations concerned with wildlife conservation in Africa, and a list of national parks and equivalent reserves established in Africa.

The resulting volume is massive. The pages are 8¼ inches by 10½ inches, with minimal margins. In many ways the title is a misnomer. A much more accurate description would be "A Review of the State of Scientific Knowledge About African Natural Resources."

Each of the authors was free to tackle his subject as an entity.

8. *Id.* at 343.

The reviews, taken altogether, add up to a clear statement of many of the problems generally facing all developing regions. Attention is called to the need to attract young people to careers in science; to a variety of spatial regions adapted to differing needs; to the need for focusing international competence on particular issues; to the need for specific equipment and methods geared to natural conditions in Africa. It is unfortunate that one must plow through the whole book in order to obtain a whole picture in dribs and drabs. The editors could have alleviated the problem, and much of the redundancy, by undertaking the task of drawing the framework material together at the outset and setting forth the terms of reference for each of the subject matter divisions, and making the authors conform. The meat of each section would have been better served, too, in that the reader would be able to go to the heart of research work undertaken without sifting through so much chaff.

Some authors put forward pleas for vertically integrated specialist organizations or services which raises the age old administrative quandary of how one manages to achieve coordination. The authors can agree on the need for regional universities offering educational opportunities and cooperating with dedicated field services in the scientific investigation of natural resources. But no one mentioned the training requirement for the veritable armies of technical field men to serve in range inventory teams, forest guard posts, park installations, and so on. The need for trained personnel is so acute in most African resource management agencies that men undergoing field level instruction at the College of African Wildlife Management, Mweka, Tanzania can expect to be a park superintendent, and anyone with a college degree can expect to be number one or two in most game or park departments.

While everyone agrees that the basic research programs which ought to be undertaken will be expensive, take a long time to be fully meaningful, and will require great numbers of qualified technical assistants, political and social pressures raise another issue. "Answers must be given to the barrage builders, to the agricultural engineer, to the bridge builder who cannot wait ten years until the series of observations has assumed reliable proportions."⁹

This raises one of the most significant questions for the administration of resource development: Should the countries go forward as rapidly as world politics permit funds to be invested and take

9. *Id.* at 196.

a chance that the short-term field investigations to implement specific projects will avoid long term destruction, or should they wait for basic data to be developed and the long awaited tropical technology to arrive so that resources can be developed with a minimum of environment degradation? Crash programs like the International Geophysical Year and the on-going International Hydrological Decade may be part of the answer.¹⁰ In the short run, teams of research people should be employed so that as many facets of subsequent effect as possible can be explored. Individual researchers are likely to have a narrow conception of what constitutes beneficial end results. For example, in the review of hydrology by Mr. Rodier, we are told of subsurface water development in the alluvia of the Chad Basin (which is in the semi-arid zone south of the Sahara). According to Rodier. "A good deal of exploratory work is being done with the object of establishing watering places for cattle, and considerable progress has been made in the search for ground water."¹¹ By removing the restraint put on cattle numbers by a limited water supply, it was possible for the local tribesmen to merrily increase the numbers of stock. The increased pressure was far beyond the capacity of the range to endure. The net results of this encouraging development of subsurface water is the destruction of the habitat and an increase in the rate of the encroachment of the Sahara to the south. But no research method will produce rational decisions unless the data can be inserted in the decision making process early enough to influence the decision makers.

This volume is a landmark. Here for the first time is an Africa-wide compendium of experts, institutions, publications, and periodicals dealing with scientific research in the whole continent. It supplants that doughty ecological pioneer E. B. Worthington, who has worked so closely with African science for over 30 years.¹² It provides an ideal starting point for anyone considering serious work in Africa. Not only is the book itself significant, but the reporting of the tremendous increase in tempo of scientific research since 1949 is indeed heartening. Certainly scientific research will not bear on the problems of rational allocation of available land, labor and capital to maximize actual and social benefits. It will, however, set the parameters within which political and economic actions can maneuver

10. For articles describing the International Hydrological Decade, see *The UNESCO Courier*, July-Aug. 1964.

11. *UNESCO Review* 187.

12. E. B. Worthington, *Science in the Development of Africa* (1958).

without courting disaster. It is also encouraging to see the slow but steady breakdown in the cult of the research monarch. During the early days of scientific exploration, any scientist who ventured forth in Africa immediately became the sole expert. Woe unto those greenhorns who attempted new methods or questioned the assumptions of the master. Under a more liberal institutional arrangement there is a vast, exciting, and challenging field for scientific inquiry in almost any field one cares to name. By issuing the book, UNESCO may encourage a number of imaginative young scientists to take up work in Africa.

The small book by Raymond Dasmann reports the work done by him and his colleague, Archie Mossman, in Southern Rhodesia during 1959-1960. The main theme is closely allied to the thesis set out by Professor Bourliere in his discussion of conservation and game management mentioned above. Dasmann was a professor of wildlife management at Humboldt State College, California and is now on the staff of the Conservation Foundation. He is fascinated by the remarkable African fauna and wants to make a contribution toward the preservation of viable numbers of *all* existing species. He feels strongly that a clear statement of the profitability of using some of the wild animals for high-intensity protein production will make such a contribution. The book is organized so that Chapter I sets the general pattern of flora and fauna over most of Africa in terms of the kind of game country it is and the sorts of creature excitement one can feel when viewing troops of giraffe or vast herds of wildebeest. He accompanies this description with a short table classifying the large ungulates. The major point made is that even though biologists have been interested in the unique fauna of Africa ever since the mid-nineteenth century, they have concentrated on taxonomic work rather than the habitat requirements of this unique animal world.

While biologists were collecting specimens and building up classification, ivory hunters, and particularly European colonists during the eighteenth and nineteenth centuries began to kill off the wild animals, first for ivory and then to eliminate damage to settled areas. In addition, domestic livestock was introduced and the settlers were determined to have the domestic animals survive in spite of disease—often attributed to wild animals—and the competition of the wild animals for available forage. During the latter part of the settlement period, colonial administrators realized that it would be necessary to take action in setting aside blocks of land to protect the

animal species. This was in accord with the then prevalent ideas of total protection for wildlife. Following World War II increased ecological investigation by such pioneers as F. Fraser Darling and E. B. Worthington began to unravel the relationships of the various kinds of animals to the various kinds of plant communities which supported them. Their findings changed the entire approach toward wildlife management in Africa and set the stage for Sir Julian Huxley's dramatic public pronouncement that wild animal herds should be used to provide a regular source of meat supply for hungry African people.

Dasmann and Mossman were Fulbright scholars, invited to Southern Rhodesia by the National Museums of Southern Rhodesia. The Director of the Museum, Mr. Reay Smithers, has been a bulwark for animal conservation in Southern Rhodesia for many years. Several of the Fulbright scholars, such as Thane Riney, an American imported from New Zealand, and W. Leslie Robinette, performed outstanding work which constituted the first systematic management work in Central Africa. It is difficult to give too much credit to Mr. Smithers and the National Museums.

The two Fulbright scholars set up shop on a ranch on the Rhodesian low veld in the vicinity of the Limpopo River. They utilized strip counts to locate the kinds of animals and the numbers of each species present. In addition to the strip counts, a collection of animals was started so that information concerning the time of the year when young were born and the numbers of young per female could be gathered. In addition, spot counts were made at water holes and other places. Based on this census, a rough idea of the allowable harvest consistent with a healthy breeding herd could be made. The investigators were fortunate in their selection of location in that no major difficulties were encountered. Thus after twelve months of work regular inventories had been carried out in a fifty-square mile game area which supported an estimated 3,785 game animals, ranging in size from 1,000-pound giraffes to twelve-pound steenboks. Of this number it was thought that 941 animals yielding a total of 118,300 pounds of dressed meat, worth approximately 1,540,000 dollars could be taken. Under very good conditions it might be possible to support an annual yield of 94,500 pounds of beef per year from the same area, but the cost of producing that beef would be twice the cost of producing the 118,000 pounds of wild game meat, which means a net profit six times as high.

This would appear to be a convincing case. Of course, it is not.

In many places European settlers cling to the tradition of livestock as tenaciously as the tribesman clings to livestock numbers as an indication of wealth. Custom and tradition are difficult things to overcome. Dasmann puts forward a number of problems, many of which would require new institutional arrangements, such as dedication of a percentage of wholesale meat proceeds for the support of game departments to permit accelerated management and enforcement activities. Unfortunately, an outbreak of foot-and-mouth disease brought a quarantine to the ranch area and stopped marketing of both livestock and game animals. Significantly there was little difficulty in finding ready markets for the wildlife meat until the cattlemen began to raise objections resulting largely from their fear of lower cost competition.

Dasmann reports that "one of the largest ranches in Rhodesia—the million-acre holdings of Leiebig's Consolidated, Ltd., started in 1963 on a game cropping program, in place of their earlier efforts toward eliminating the more 'troublesome' kinds of game."¹³ Dasmann also indicates the need for additional research into the habitat of the various species and determining ways and means of regulating the productivity.

It should be noted that if commercial cropping of wild game animals is indeed to be considered as a major factor in feeding Africans and maintaining viable wildlife numbers, then it is time for some competent economic research to go hand in hand with the physical research suggested by Dasmann. Just how much meat can the African market absorb? What will happen when more million-acre ranches shift to wildlife meat production? Can one expect the usual mechanics of agricultural production to obtain in these cases? That is, in the face of declining prices, will ranchers slaughter larger numbers than permissible in order to maintain their gross income? What sorts of investment alternatives are open to the ranch operating units, particularly if a diversified agriculture will contribute to a more stable agriculture? Unfortunately, the only people talking about the desirability of game meat production on a purely commercial basis are the natural scientists and a few ranchers. These people do not request economic evaluations. Those persons who should be following these developments with interest are preoccupied with the use of economics to justify preconceived development schemes based on temperate technology.

13. Raymond F. Dasmann, *African Game Ranching* 64 (1964).

All in all Mr. Dasmann has produced a fast moving, readable little book which may serve to whet the appetite of some readers. It is worth noting that his colleague Mossman was scheduled to return to Southern Rhodesia during the latter part of 1963 to continue the work. The illustrations for the book are fine black-line drawings and rubbings from bushmen cave paintings and from real life by the author's wife Elizabeth.

An appropriate closing is provided by Postel in his review of marine biology in the UNESCO book. He says:

However paradoxical it may seem in a continent whose development has only just begun, efforts have to be concentrated on . . . ecology and its corollary, the protection of the [habitat]. The state of anarchy which accompanies the rapid growth of African [resource development] calls for the sternest vigilance. The riches of Africa are in a precarious position, the equilibria of [Africa] are unstable. There will always be time to study neglected subjects later, but we can never recreate what has been destroyed.¹⁴

14. UNESCO Review 391.