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## NATURAL AND CULTURAL LANDSCAPES OF EQUATORIAL AFRICA

**Abstract:** This paper attempts to characterise various cultural landscapes in the area of Equatorial Africa. To achieve this, the contents of various thematic maps and satellite photos representing: areas covered with forests (mostly secondary forests), nature reserves, areas of extensive and intensive agriculture and urban-industrial areas were overlaid with the contents of map of potential vegetation (which represent, to use a simplification, the natural, primeval landscape). The method applied allowed for distinguishing five types of cultural landscape that correspond to five levels of transformation of the primeval landscape.

The resulting map shows a mosaic-like structure of landscapes. This structure changes constantly. The surface area of regions with a certain landscape type increases or decreases, or else the regions change their locations. A detailed analysis of socio-economic processes (and the related changes in the natural environment) can constitute a basis for a prediction of cultural landscape transformation. It is the author's opinion that such prediction could be applied in various planning projects.

**Key words:** natural landscape, cultural landscape, transformation, prediction.

Landscape studies are the object of interest of many scientific disciplines, in particular of geography and ecology. It was in these research disciplines that such notions as *landscape geography* and *landscape ecology*, close to each other as regards their issues, goals and the scope of research were created. Nowadays there are few, if any, places on the Earth that can be described as virgin lands, not transformed by humans. Therefore, anthropogenic<sup>1</sup> landscapes are the subject of most landscape studies.

In this paper the author attempts to distinguish various cultural landscapes in the Atlantic zone of the equatorial Africa. These lands are characterised by a very humid equatorial climate and a humid subequatorial climate. The area of research is therefore, on the one hand, fairly uniform climate- and vegetation-wise, but on the other hand it is historically, ethnically,

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<sup>1</sup> Anthropogenic – „created or happening as a result of economic activities of humans” (Dubisz, 2003, p. 12).

culturally, linguistically and economically very differentiated. It stretches from the Fouta Djallon Mountains in West Africa to Lake Victoria in East Africa and to the southernmost parts of the Congo Basin in Central Africa. In this paper we will call this region Equatorial Africa.

The most often used terms in this paper will be: **natural landscape** and **cultural landscape**. The former denotes a system of connected components of nature, formed on the surface of the Earth according to natural laws, characterised by certain individuality, and whose functioning and capability to regulate itself has not been changed by human activities<sup>2</sup>. The latter – cultural landscape – denotes the natural landscape transformed by human activities. Cultural landscape is a fragment of the geographic space, created as a result of penetration of environmental and cultural effects and actions. It forms a specific, physiognomic structure, exhibiting a separate regional character.

One of the fundamental features of a landscape is its border. Semenov Tian-Shansky (1928) defined geography as a science of borders, and Berg (1947) claimed that delineation of natural borders is the beginning and end of each geographical paper (after Pietrzak 1998). Borders are, in most scientific papers in geography, defined as lines (or zones) separating areas that differ with respect to one or more features. According to Neef (1967) all borders occurring in nature are borders in the geographical continuum, which means that they do not define sharp divisions and are not clearly drawn lines, but form wider or narrower transition zones, where features going from one set of phenomena to another undergo changes (cf. Pietrzak 1998). In such situation phenomena from the set “A” occur more rarely or with smaller intensity as we approach the border of the set “B”, while phenomena from the set “B” occur more frequently and finally dominate in the landscape when the border of the set “B” is crossed. This phenomenon is relevant to the delimitation of individual sets, thus to the delimitation of the feature – or the set of features – which define a certain phenomenon.

In this paper borders of individual natural landscapes will be understood as borders of the potential reach of a certain definite plant formation. They do not have a strictly determined course in the terrain, but one can assume that they determine, approximately, the axis of the transition zone of the variability of a certain phenomenon. For instance, the border between humid, evergreen equatorial forests and subequatorial forests is determined by the percentage of trees which shed leaves during the season with smaller atmospheric precipitation, while the borderline between the subequatorial forest and the savanna is determined by the degree to which the terrain is covered by trees.

In most cases borders between cultural landscapes are not sharp, either. Individual types of these landscapes are also determined by other variables. For instances, the borderline between the secondary forest landscape and

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<sup>2</sup> This definition has been created by comparing the definitions of „landscape” suggested by Richling and Solon (1996) and Ostaszewska (2002).

the extensive agriculture landscape separates, to use a simplification, areas of different degree of woodiness. The border of the extensive agriculture landscape, in turn, delimits an area where fields under cultivation and fallow lands, occurring alternately, and – less frequently – forests are the main elements. On the area of the intensive agriculture landscape, however, fallow land either does not occur or the time of resting does not exceed 2-3 years. The exact course of these borders can be traced only on a topographical map showing land use; the course of the borders is fairly complicated. On a small-scale map, however, the borders are closer to the straight line.

Clearly delineated borders are characteristic for landscapes strongly transformed by humans, thus for example for urban-industrial landscapes (areas of raw materials extraction, urban areas).

To draw a map of cultural landscapes, the contents of the potential vegetation map<sup>3</sup> has been placed on top of the contents of various thematic maps, presenting:

- National parks and nature reserves (according to Sayer's paper 1992 and The World Conservation Union, 1991);
- Regions of existing equatorial and subequatorial forests (maps drawn on the basis of satellite photos<sup>4</sup> have been used and well as satellite photos from the web page <http://glcfapp.umiacs.umd.edu:8080/esdi/index.jsp>);
- Regions of extensive and intensive agriculture (based on maps included in: *Diercke drei Universalatlas*, 2001);
- Regions strongly transformed as the result of industrial work or as a consequence of urban development (also based on *Diercke drei Universalatlas*, 2001).

On the map created this way, corrections are subsequently marked. These are corrections of the outline of certain borders, resulting from field observations of the author from the years 1995-2004 in various places of the region under investigation (Democratic Republic of Congo, Rwanda, Burundi, and Ivory Coast).

Since the cartographic sources used were made in various scales (and in various projections), they were scanned and then digitalised, in order to

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<sup>3</sup> The map of the potential vegetation has been made using climatological data drawn from the 1984 FAO report „Agroclimatological data for Africa”, based on the relationship, confirmed in many papers – e. g., Kawalec (1980, 1987) and *Atlas de l'agriculture africaine* (1986) – between the duration of the plant vegetation season (PVS) and the potential vegetation in the equatorial climate zone. This relationship can be presented as follows: in the zone where PVS last more than 260 days, humid equatorial forests are the natural plant formation; in the zone with PVS between 230 and 260 days, subequatorial forests, shedding leaves in the dry season are such formation; in the zone with PVS below 230 days, it is the open savanna communities. Because of the small scale of the map, the distribution of the genetic types of soil has been omitted (which also decide about the occurrence of the given potential vegetation type) – the map would be illegible. One should, however, emphasize that the soil cover (and also surface relief as well as local climatic conditions) should be taken into account in projects with larger scale (in regions of smaller area, in particular in regions located on the boundary between two different plant formations).

<sup>4</sup> For instance, maps included in: Gilarowski (1995) and Sawyer (1992).

obtain a map in form of a digital image (in the MapInfo format). Thanks to that, data regarding the values of the area of all the fields appearing on the map were obtained through the overlaying of all the contents listed above.

The **map of cultural landscapes** obtained in this manner shows five types of landscape:

- Quasi natural landscape,
- Secondary forest landscape,
- Extensive agriculture landscape,
- Intensive agriculture landscape,
- Urban-industrial landscape.

Using other, possibly more detailed criteria of delimitation (e. g., the scope of various religions and the architecture related to them, or else the way of dressing, structure of crops, kind of building materials, etc.) in the region in question one can distinguish much more types of cultural landscapes. The author's intent, however, was to distinguish such types of landscape which would correspond to the consecutive levels of the transformation of the natural environment. For instance, the type "quasi-natural landscape" represents the environment changed to the smallest degree, close to the natural one, while the urban-industrial landscape, the environment transformed to a very large degree. The scale of the map was not without significance (if one took into account other or more detailed criteria of landscape delimitation, the map would be hard to read).

**Quasi-natural landscape** is represented mainly by humid, evergreen equatorial forests, where nature is protected. These are national parks, nature reserves, reserves of fauna and the so-called special reserves, an example of which is provided by the Presidential Reserve Wonga-Wongué in Gabon.

The vegetation of national parks and nature reserves in the zone of humid equatorial forests can be regarded as close to natural (forming a quasi-natural landscape). Physiognomically, this vegetation has a primeval character, although in most cases it was probably subject to the slash-and-burn farming.

Apart from the possible changes in flora, resulting from forest clearing of the equatorial forests in the past (change of the species composition), climax communities of humid equatorial forests on the terrains of national parks and nature reserves bear insignificant signs of transformation. Their anthropogenisation results mostly from tracing trails, used by guards and tourists (and sometimes poachers), as well as from the construction of (very few) infrastructure buildings. One should be aware, however, that as a result of insufficient protection and push of the neighbouring farmers, one can encounter isolated farmed fields even in the midst of a national park.

**Secondary forest landscape** occurs in the areas of equatorial and subequatorial forests, not under protection<sup>5</sup>, where the population density

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<sup>5</sup> Or in regions where nature protection is entirely fictitious (Equatorial Guinea), or else where it is a very recent phenomenon and the natural environment has not yet admitted the characteristic of a natural landscape (Nigeria).

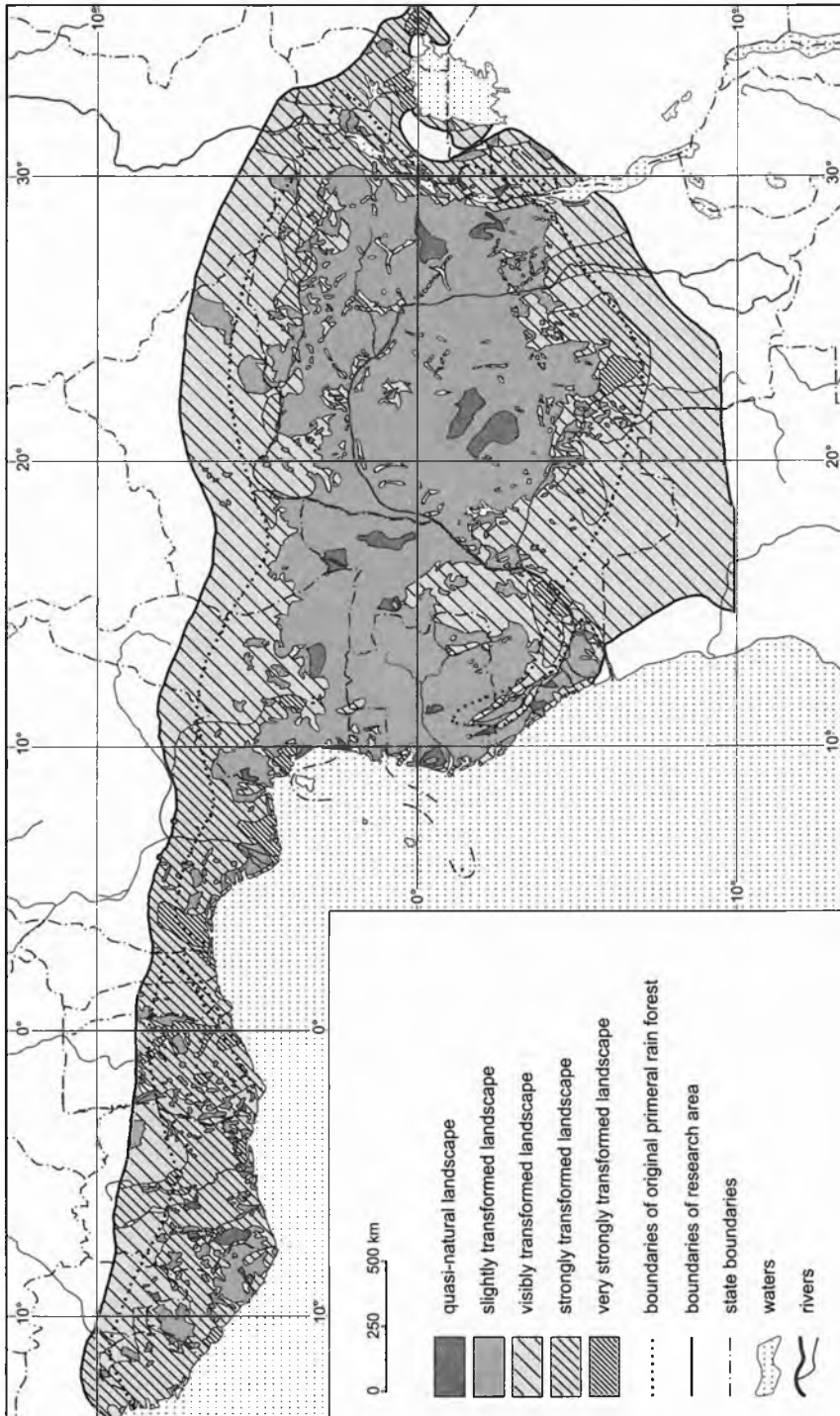


Fig. 1. Degree of transformation of original vegetation landscapes

is very low (usually not exceeding 20 people per square kilometre). On such areas, secondary forests, in various stages of succession towards primeval forests, occur most often. Due to the low population density, the period of lying fallow is long, since farmers prefer to choose for forest clearing the oldest secondary forests, under which the soil underwent regeneration to the largest degree.

Such landscape occurs far away from the main communication lines and largest population centres, and its agricultural production is conducted primarily for one's own needs (cf. Gilarowski 1995, 2002). The inhabitants of such areas are usually engaged in nomadic fallow farming. This is an example of quasi-natural economy, in which production for commercial purposes plays only a small role.

This landscape type includes also the terrains of national parks and nature reserves, located in areas deforested in the past, where thanks to nature protection progressive succession of plants towards tree communities occurs (e. g., national parks – Garamba in north-eastern part of the Democratic Republic of Congo and Murchison Falls in north-western Uganda as well as fauna reserves – Zemongo in the eastern part of the Central African Republic and Lekoli-Padnaka in the north of the Republic of Congo).

Areas with secondary forest landscape occur mainly in the Central African countries, where the population density is much lower than in West African countries.

In the **extensive farming landscape** fallow farming predominates. These are areas where one square kilometre is inhabited by 20 to 30 people on the average. This causes the length of the vegetation regeneration on the abandoned field to last no more than 10-15 years. After this time, the fallow land, although not yet of tree community character (it is formed mainly of umbrella trees), again undergoes forest clearing. Because of the demographic pressure restocking of the forest never happens.

In this landscape, apart from farmland and fallow land, derived savanna<sup>6</sup> occupies a large area (occurring in areas not cultivated for a long time, on soils of poorer quality). Forests do not occur here (perhaps apart from the sites of religious cults – the so-called *holy forests*).

This landscape type occurs mainly in eastern Guinea, north-eastern part of the Ivory Coast, western Ghana, central Cameroon, southern part of Central African Republic, northern and southern part of the Democratic Republic of Congo and in the southern part of the Republic of Congo. Agricultural production is directed both for one's own needs and for selling on the local market. A visible element, although occupying a small area of this landscape, are human settlements.

The **intensive farming landscape** is formed primarily of vegetation of farmlands and plantations (mostly coffee, cocoa, oil palm and bananas) as

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<sup>6</sup> This term has been used for the first time by Devred (1958) to denote savanna vegetation appearing on the areas destroyed by farmers and forest shepherds.

well as – on worst soils – degraded derived savanna. A marked element of this landscape are human settlements and communication routes. In this area, fallow lands either do not occur or else the period of fallowing is very short (rarely longer than three years). Population density on most of the area usually exceeds 40-50 people per square kilometre.

This landscape type occupies largest areas in the countries of western Africa. It occurs also in Rwanda and Burundi (where population density on farmlands exceeds even 200 people per square kilometre), eastern part of the Democratic Republic of Congo and in Uganda. On the remaining parts of the area under investigation it occupies small areas, mostly in the vicinity of large cities, industrial areas or else along the communication routes.

**Urban-industrial landscape** is encountered in strongly urbanised areas and in areas where industrial plants are concentrated (mostly extractive industry). Buildings, roads covered with asphalt, mine dumps, drilling shafts, or pits of open cast mines predominate here. Also characteristic for the area under investigation are plots of ground of intensive vegetable growing, squeezed among urban and suburban development areas and communication routes (on any area where development is possible).

The city, which is the main element of this landscape, is a relatively new creation. Most of the metropolitan areas existing in the region under investigation were built at the end of the 19<sup>th</sup> century; the dynamic growth of their population took place only after the countries had gained independence. The natural environment within the cities and suburban zones underwent degradation in a very short time. For instance, small settlements existing in place of today's agglomeration of Kinshasa, Kisangani or Jaunde were surrounded with forest as late as at the turn of the 20<sup>th</sup> century (and sometimes much later), while farmlands and fallow lands occupied a small area.

Industrial areas are the second element of this landscape. Extractive industry began together with the beginning of colonisation, but it achieved a greater importance as late as in the 1920s. In the area in question, apart from the terrain of oil exploitation in southern Nigeria and the mining regions Kananga/Mbuji-Mayi in the Democratic Republic of Congo there are no large concentrations of the extractive industry (but even in these cases one can't say that typical industrial districts have been formed). The remaining centres of extraction of useful minerals are spread and occupy small areas. Due to the scale of the map they have not been included in the map.

All borders of cultural landscapes are characterised by great mobility. For instance, as the population in rural areas grows, agriculture becomes more intensive and therefore the area with extensive agriculture landscape decreases. On the other hand, extensive forest clearing for farming needs cause the decrease of the areas of the secondary forest landscape, while the farming landscape area increases. The latter, located in the vicinity of cities and terrains of extraction of useful minerals, give room to urban-industrial landscape.

The map of cultural landscapes shows a mosaic landscape structure. It shows the situation at the beginning of the 21<sup>st</sup> century; one should keep in

mind, however, that the landscape structure changes all the time. A detailed analysis of the socio-economic processes during a certain time, of their directions and intensity (and of related changes in the natural environment) would allow for predicting the transformations of cultural landscapes. The author believes that such predictions could be applied in various planning actions.

As regards the degree of landscape transformation, the area under investigation can be roughly divided in two parts – regions of Central Africa (changed moderately) and regions of West Africa (strongly changed)<sup>7</sup>. In West Africa areas with intensive farming landscape and with urban-industrial landscape occupy as much as 2/3 of the area of this region, while on terrains located in Central Africa regions with secondary forest landscape and with extensive farming landscape occupy over 4/5 of the area. Quasi-natural and secondary forest landscapes, in turn, form almost half of the area of Central Africa and only 1/8 of West Africa (in the regions under investigation). Reverse proportions exist in the case of strongly transformed landscape. For instance, regions characterised by the intensive farming and urban-industrial landscapes form 70% of the region in question located in West Africa and only 15% of this region located in Central Africa.

Taking into account the literature dealing with the relationship of humans and environment in the given area and comparing the map of cultural landscapes with maps of settlements, population density, land use, farming type one can say that such a large difference in the degree of anthropogenisation of natural landscape in West and Central Africa has two, mutually strictly connected indirect causes. The first is the length of the period of the human economic activities, the second, population density.

Plant cultivation developed in West Africa much earlier: already during the first millennium b.c.e. (Murdock, 1959; Fage, 1978; Fage and Olivier, 1977; Vansina, 1990). During that time Central Africa was almost uninhabited. Only dispersed groups of Pigmy inhabited this region, but their influence on the natural environment was insignificant. Farming was first introduced by Bantu, wandering to the south of the continent (the first major groups reached this region only in the beginning of the first millennium c.e.). The period of anthropopressure is therefore at least five centuries shorter in Central Africa.

The earlier settlement of rural population in West Africa (as compared with Central Africa) results also in a greater – now and in the past – population density. In the entire region it is equal to 95 people per square kilometre, while in Central Africa, only 27 (Demographic Yearbook 1999, 2001). A longer period of anthropopressure and large population density (and, related to that, a dense communication network and a large concentration of cities) became the most important indirect causes of an almost

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<sup>7</sup> To simplify the language the author uses the terms „West Africa” and „Central Africa”. One should however remember (taking into account various divisions of Africa into regions) that in this paper the areas of West Africa and also of Central Africa are only parts of the areas corresponding to these regions.



complete deforestation of this region of Africa. In Central Africa, where one square kilometre is inhabited by one-third fewer people and cities are more dispersed, terrains with secondary forest landscape occupy over half of the area of the region. The most important factor in forest degradation in the area in question is forest clearing for farming.

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