Library Buildings in Newly Developing Countries

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To anyone who has watched the progress of libraries in tropical areas since the end of World War II the changes must seem to be remarkable. In 1945, in most British dependent territories, for instance, there were no institutions of university standing, inadequate public library services, if there were any at all, and a scarcity of trained librarians. Since that time there have grown up university colleges, public library services, special libraries, and a considerable body of trained people.

The implementation of educational programs in dependent territories involved provision for library services at all levels, and one thing followed quickly upon another. In Jamaica, for instance, a University College Library was begun in 1948, and a public library service inaugurated in the following year. At the present time there are nine parish library buildings of excellent design throughout the island, and a public library headquarters in Kingston, as well as a modern and recently enlarged University College Library. All are staffed by qualified local librarians. It was inevitable that there should also come about an extension to the Institute of Jamaica, qualified supervision of the Government Archives, a library book bindery operated as a joint venture of the Jamaica Library Service and the University College, and a Library Association. So within a few years in countries like Jamaica, the Eastern Caribbean, Ghana, Nigeria, Burma, Ceylon, and Singapore, library buildings have arisen which are proud symbols of a new era and worthy representatives of modern library services. So it has also been in other countries within the tropical belt.

The tropics and sub-tropics—especially parts of Southern Africa, South and Central America, Japan, Hong Kong, and Singapore—

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possess many buildings, of course, that vie with those of Europe and North America, but as climates know no political boundaries so the same architectural problems impinge upon rich and poor countries alike. The adequacy of the solutions depends primarily upon the material and human resources at their disposal. For this reason, instead of attempting to discuss library building developments in specific countries or giving too detailed descriptions of individual libraries, an attempt will be made here to outline some of the problems facing designers and builders of libraries in tropical areas generally and the means taken to solve them.

Since the war the tropics have been “on the map” as never before. Most tropical countries are underdeveloped, and, whatever their political status, they are regarded as very much the concern and responsibility of the rest of the world. Great efforts, from within and without, are being made, therefore, to develop their natural resources, create new industries, and improve education, all of which involves building, which in turn calls for local technical knowledge and skill and local materials. The second world war fostered industries in many countries, and furthered research into the effects of tropical conditions on essential materials. Ever since it ended the multiplication of local industries and research into the nature and use of local materials has gone on. In addition to what underdeveloped countries have done for themselves, assistance has come from colonial and protecting powers, from governments organized in regional groups to tackle common problems, from international organizations, and from charitable and educational trusts and foundations.

As far as libraries and building are concerned, there is a hierarchy of active organizations, of which it would seem necessary to mention only a few as examples. At the international level, there are the Housing and Town and Country Planning Section of the Department of Social Affairs of the United Nations, the U.N.O. Regional Economic Commissions, and the International Council for Building Research Studies and Documentation in Europe; on the regional level, the Commission for Technical Cooperation in Africa South of the Sahara, the Pan American Union, and the Caribbean Commission; and on the national level, the Department of Scientific and Industrial Research of Great Britain, with its ramification of research stations, such as the Building Research Station at Watford. All these are concerned with housing and town planning problems, with existing building practices, and new techniques; with methods of
testing local materials, structural components, and even entire structures; and with scientific studies of particular building problems. One of their prime objectives is the substitution of local for imported materials, and much technical information on the preparation and use of local materials—clays, gypsum, lime, woods, etc.—has been published. Particular attention has been paid to the making of building blocks from materials easily available locally—sands, and lateritic earths—with cement as a stabilizer, so that now cement-stabilized building blocks are a common building medium, and the durability of local structures has been greatly improved as a result. At the same time local cement making has been encouraged. Since 1950 cement factories have started production in Northern Rhodesia, Nigeria, Uganda, Kenya, Jamaica, Trinidad, and elsewhere.

Progress in building is retarded by the lack of trained building technicians and skilled artisans. In some areas local workmen may have skill only in traditional methods which may prove unsuitable for the needs of a rapidly developing industry. Where there is a high percentage of illiteracy, training is the more difficult. Under such circumstances building materials and finishes are generally inferior to those in Europe and America. This may not be true, however, of particular materials, like stone, long used traditionally or used in the raw, or when traditional skills can be applied as, for example, to woodworking by Sikhs in Uganda, or where there are new settlers skilled in the building trades, like Italians in East Africa who make excellent terrazzo and mosaics. It is possible, for instance, in East Africa to complete an excellent building from local materials, with the exception of glass and steel (though steel frames and windows are manufactured in Kenya), but purely African building remains very backward. The library of Makerere College was built by a European foreman mainly with Sikh and Indian fundis and African laborers, and windows, acoustic tiles, and cork flooring were imported, as was the cement used for heavy reinforcement. Judging from Uganda alone, the present building boom is having a rapidly beneficial effect upon the variety and quality of materials, and workmanship generally, and upon the availability of mechanical equipment for large projects.

Architects have been rare phenomena in many underdeveloped areas and the local public works departments, largely under the direction of civil engineers, have been, until recent years, the principal building organizations in, for example, East and West Africa, Malaya,
Library Buildings in Newly Developing Countries

and rural India. Events, therefore, have favored architects and engineers. There has been an unprecedented influx of them into tropical countries, with almost unlimited opportunities for experimentation, at least as far as the English have been concerned, at a time when the outlook in architecture is perhaps more international than ever before. What has happened of architectural importance in one country has not been lost on the others. Moreover, the flow has been in both directions; while American and European architects have been given commissions abroad, indigenous prospective architects have been sent for study to Europe and the United States. The architecture of the United States and of South America, with its regard for sun control and its concrete technology, have obviously exerted great influence, as has the American approach to library design in general. There is now a considerable accumulation of experience on tropical building and design, and this, with freedom afforded to architects, the loosening of constricting ties with Western traditions, and the idealism and sense of social obligation which so often accompanies the performance of tasks in underdeveloped countries, has produced a series of exciting library buildings. Since the problems faced and the means at the disposal of architects are much the same, it would not be surprising if the general effect was near uniformity in design and appearance, largely attributable to the sun-screen devices so necessary in the tropics. "Buildings always wrapped in lace can become monotonous even faster than the dull nudities of speculative office buildings," the editor of the Architectural Forum has commented, in criticism of a tendency to use screens as ornaments instead of for functional purposes. Marcel Breuer, a functionalist, considered that the sun control device on the outside of a building was so important a part of open architecture as to develop into a form as characteristic as the Doric column. Certainly it is a prevailing characteristic of tropical architecture and tropical libraries.

In general, the buildings look as if they are built for the tropics. National influences are seen at their strongest in countries which have a long architectural record and strong traditions—India, South America, the Arab world, and Japan. In British territories the new architecture seems less "national" than generally tropical in appearance. Western functionalism and technology are strongly in evidence throughout. Sigfried Giedion has written in his book, Architecture, You and Me, that "Through its contacts with both primitive civilizations and ancient civilizations, contemporary architecture has en-
larged both its domain and its scope. It has been deepened as well as widened.¹ Le Corbusier, working in India, has been influenced by existing forms while creating new forms of his own. E. Maxwell Fry has put into his sun screens in West Africa strong sculptural forms in rhythmical patterns which he considers appropriate to tropical surroundings. More self-consciously Edward D. Stone and José L. Sert have tried to capture local atmosphere in their U.S. Embassy buildings in New Delhi and Baghdad, with, in Stone's case, detailing "deliberately attuned to the traditionally intricate rhythms of Indian craft." In contrast to the personal approach are the functional, efficient, but anonymous buildings created by teamwork in the offices of large architectural firms, of which, as with some West African buildings, it would be difficult to say who did what.

Ellen Jawdat, writing in Architectural Design, described the predicament of indigenous Iraqi architects very well:

They are constantly torn by conflicts, between forms the more daring accept and the more conservative merely find baffling, between structure which is technically possible and that which can economically be achieved under local building conditions. . . . The central problem, as they see it, is to find a truly indigenous expression for Iraq today. Beyond the rational discipline of their European or American training and the appeal of the functional approach to design, we find a constant effort to use effectively the traditional materials of the region, to incorporate familiar architectural forms, to make use of time-honoured and often ingenious building customs, and create spatial patterns rooted in the Arab consciousness.²

Librarians, too, in recent years, have traveled extensively. The scope of their work has been immeasurably widened by welfare plans for overseas dependencies, like the colonial development and welfare schemes of the British government, which have enabled them to build university libraries in Nigeria, Ghana, Jamaica, Uganda, Singapore, Ceylon, and Rhodesia; by the establishment of information and library services by the United States government and by the British Council; and by Unesco, which has sent experts to assist with library services in member states, and, through them, has created excellent pilot project library buildings at Medellin in Colombia and Enugu in Eastern Nigeria. The number of librarians giving serious thought to library building must be greater than ever before.

The tropics are characterized in the main by relatively high temperatures combined with excessive humidity, long periods of intense
solar radiation, heavy rainfall concentrated in relatively brief periods, small variations in temperature, and, in some areas, by distinct prevailing breezes. Protection against solar radiation and humidity determines, therefore, the elements of design and construction. The tropical pattern of climate is by no means uniform, and variations can be very great between hot dry, hot humid, monsoon, upland, and island climates; while seas and lakes temper with breezes. In the hot dry climates, with very high day temperature, hot winds, low humidity, and, in the short winter, cold nights, the objectives are to provide shade, keep the air temperature down, prevent desiccation, and keep out intense heat radiated from the ground and surrounding buildings. Circulation of air is not so important. One can expect thick walls, with small, high windows built of materials with a high heat capacity, that neither heat up excessively during the day nor lose heat too rapidly at night; buildings closely spaced for mutual shading; the use of sheltered courts with high walls, and cooling water if available. A strong vertical treatment of facades creates satisfyingly deep shadows. Horizontal treatment and stucco finishes collect dust. Glazed mosaics and tiles weather well, but heat up excessively, and are only for shaded walls. Colors burn out with the sun. Thus the architect turns to plain concrete, as does Le Corbusier in Northern India, and to local bricks, as in Iraq where yellow brick is the prime walling material. Effect is obtained from the weathering surfaces of these materials and from texture and shadow created by design. The northern Sudan and northern Nigeria share this trying climate.

Hot humid climates have only slight variations of temperature, and the main objective is to keep air circulating and allow the buildings to cool quickly at night. Structure can be light, it should keep out the sun and excessive glare from clouded skies, and catch whatever breezes there are. As body temperature is regulated by the evaporation of moisture the slightest breezes have a markedly beneficial effect upon comfort, and in order to catch them fenestration needs to be generous. There are two fundamental types of buildings in the tropics, the one looking outward to use the breeze (not as in the temperate zone to seek the light), the other looking inwards to create shade.

The monsoon climate is intermediate between hot humid and hot dry, and requires heavy buildings with shading in the rainy seasons and provision for air movement in the drier seasons. The courtyard plan is common.

The upland climate, sunny but relatively cool, with a wide swing
in temperature from day to night, requires shading during the day and indoor warmth at night.

Under these conditions the librarian looks for sun control, breeze control, and insulation against heat and cold. Extreme durability, which depends upon good workmanship and design, is necessary in buildings which might be subject also to earthquakes or hurricanes. Only careful design and construction will deter termites. Prescribed vents for air circulation may need to be covered with wire mesh against insects and (in Uganda) bats, thereby reducing air movement and light by as much as 25 per cent. Similar screens, in hot dry areas, will be persistently clogged with dust. That no building will be perfect is certain, and compromises are unavoidable.

It is not always possible, even in the tropics, to site a building ideally. The ideal siting would seem to be north-south, when small overhangs would ward off the sun’s rays from the north and south facades most of the time. Elevations facing south-east, north-east, north-west, and south-west require a mixture of vertical and horizontal shading devices. East-west elevations are the most difficult since they face low morning and evening suns, and only solid vertical obstructions can keep the low solar rays from their windows. Trees will do; so will other buildings; or no windows at all; or banks of overlapping vertical louvers, preferably adjustable. Makerere College library in Uganda faces north-east and south-west and at certain times of the year it catches the low setting and rising suns which penetrate directly through the pierced ceramic grille screens, so that curtains are necessary; it was thought that trees would provide the necessary protection eventually, and that the light and breezes coming through open screens which, in any case, shade the building the greater part of the time, would compensate for this short-term inconvenience.

Sun control devices are the most noticeable feature of tropical and semi-tropical libraries. They are external obstructions which intercept the rays of the sun before the heat becomes trapped behind glass and fills the interior of the building with solar heat. They take many forms: verandahs, eyebrow projections, pierced screens and walls, hoods, egg-crates, vertical and horizontal fins, and shutters. Some devices are adjustable. Commonly they are built into the facade, but they are increasingly being built as independent structures attached to and shading inner glazed walls. At the University College Ibadan, the pierced sun screen is the wall; there is no glazing, rain and damp being controlled by doors between the outer wall and the book
Library Buildings in Newly Developing Countries

stacks. Today it requires a good deal of ingenuity to invent a new
sun control device. Materials commonly employed are concrete, alu-
mínium, wood, ceramic tile, brick, and non-actinic glass.

All the African west coast libraries have screening of one kind or
another against direct sun and sky glare, which is excessive in the
hot, humid tropics. Certain sun control devices are also effective
against rain. They present opportunities for generous glazing, shading
the glass and subduing the light in one-room width buildings, while
allowing adequate light penetration in wide buildings. The libraries
of the Ghana Library Board at Accra, Kumasi, and Sekondi have
view windows. Makerere College library, because of its screened
verandahs, has been able to have windows from floor to ceiling along
the entire length of each side of the building on two floors. Views
through some tropical windows are irresistible, and a view into the
library can have considerable propaganda value, particularly when
illuminated at night. In the Caribbean and South America adjustable
horizontal louvers of wood or aluminium often replace windows.
The University of Puerto Rico library has deep protruding egg crate
sun breakers with inset adjustable horizontal louvers.

Ventilation of buildings is usually strictly controlled by local author-
ities, especially in warm humid climates. It must be possible to open
all windows. It is typical of tropical libraries which are not air condi-
tioned that they are generally one-room wide to insure cross-ventila-
tion. They tend, therefore, to be long and narrow. High level windows
disperse pockets of warm air. The parish libraries of the Jamaica
Library Service have high level windows above the wall stacks, and
adjustable louvers below them. Ashanti Regional library at Kumasi
has "breathing" blocks instead of louvers. An internal court can pro-
vide cross ventilation that would otherwise be lacking in a wide build-
ing; at the same time it can soothe with its vegetation and dehumidify
the air through plant respiration. It should, of course, be shaded.

Air conditioning greatly affects tropical design. It is usually out of
the question for an entire building but is often possible for part of
it. Indeed, room conditioners are now commonplace in Nigeria, al-
though a novelty as recently as 1956. Uncertainty about maintenance
and cost are the usual deterrents. It is doubtless a wise measure, in
some areas, to install sliding rather than fixed windows as a precau-
tion against breakdowns in the supply of electric current. Precautions
against sun penetration are not precluded by air conditioning. It is
claimed that conditioning allows such substantial reductions in the
height of rooms that the total savings may pay for the air conditioning installation. While sun control remains the building may assume any shape, and for large libraries more economical and manageable shapes, not to mention control of temperature, humidity, desiccation, and insect life, become possible. If only partial air conditioning is possible the librarian tends to favor his stock rather than his readers. The new Raffles National Library at Singapore has a windowless, air conditioned stack; similarly, Mexico University’s famous conditioned stack tower has blank walls unbroken except for tiny stair windows. The librarian of the University of Rangoon reports that only air conditioning is able to maintain books in his stack in good condition. In designing a building, air conditioning must be seriously considered for it is not easy or economical to install it later in a building not planned for it.

If a library is carelessly designed and of materials which weather and wear badly it will deteriorate quickly in the tropics, where there is sometimes a general attitude of indifference towards maintenance of buildings and little money for restoration. With an eye on maintenance costs it is worth putting up a durable building at the start. It is interesting, therefore, to note that use has been made of durable local materials which can be left in an untreated or cheaply-treated state. Villaneuva has used exposed concrete on the facade of the University of Caracas library. The infill walls of the University College of the West Indies library are of exposed concrete compounded of white stone which it was unnecessary to paint. The bald concrete structures of Le Corbusier in northern India are obviously logical answers to the problems of an unrelenting climate. Dressed and random rubble stone have been used for walls, particularly as splash walls in red soil regions; terrazzo has been used for walls, stairs, and floors; stone-cement aggregate slabs and mosaics have been used for walls and fascias; flagstone and tiles for floors; asbestos-cement and concrete, in shell construction, have been used for roofs. Screenwork, with its horizontal surfaces, is liable to spoil and the library of Makerere College has used glazed ceramic unit tiles.

Openness and flexibility, as far as tropical conditions and funds have allowed, are characteristic of the new libraries. The modular conception of a building of Angus Snead Macdonald has not always been fully realized. For economy reasons beam spans have sometimes been small; many libraries are narrow one-room width buildings; others are too small to allow large open spaces between essential fixtures, for
Library Buildings in Newly Developing Countries
gross ventilation, or they are broken up by courtyards. Local fire regu-
lations sometimes forbid large areas uninterrupted by masonry walls.

Plans in general, however, show new libraries to be of modular or
grid construction, with reinforced concrete columns and floors, ex-
ternal infill panel walls, and a minimum of internal masonry obstruc-
tions. Module sizes vary a good deal from the 22½ feet and 27 feet
recommended by Macdonald. They are usually smaller, although the
University College of Rhodesia and Nyasaland has a 22½ foot module.
In libraries one module wide, like those of the Ghana Library Board,
the narrowness of the module, as represented by pillars in the external
walls, is not discernible since the entire interior space is free. Ashanti
Regional Library in Kumasi has a grid 8 feet by 24 feet. The new
Raffles Library in Singapore has three grid sizes, 23 feet by 23 feet
and 22½ feet by 15 feet for non-air-conditioned areas, and 11¼ feet
by 19½ feet for the air-conditioned stack tower. These buildings ap-
pear to be capable of extension and adaption—so necessary in coun-
tries where library buildings are built piecemeal—and the University
College library at Ibadan, encased as it is with easily removable con-
crete grille panels, also seems to be extendable at any point.

Most public and college libraries have open access stacks, and are
small enough to merge or bring reading and stack areas closely to-
gether. The stack capacities of the university college libraries estab-
lished in British dependent territories do not, for the most part, exceed
250,000 volumes. At Ibadan there is a very flexible arrangement of
open stacks and reading areas running alongside each other on each
story. This is also the arrangement in the University College of the
West Indies although a recent stack extension provides mainly core
stacking with some perimeter reading. The university colleges of
Rhodesia and Nyasaland, and Ghana, have favored more formal read-
ing rooms with separate but adjacent stacks. The University of Malaya
has a formal reading room, with open stacks at each end and a mezz-
azine gallery. Makerere College has small reading areas enclosed
by open stacks and individual tables around the perimeter with open
stacks adjacent.

The university and university college libraries of the West Indies,
Malaya, Ghana, and Rhodesia have mezzanines, those in the last
two being primarily for stacks. There is an excellent mezzanine gallery
also in the library of the Inter-American Housing Centre in Bogotá.
There is, indeed, much to recommend mezzanines, particularly in
regions without air conditioning and where ceilings have to be high
in any case. By increasing the compactness of book and reader accommodation, to which they are particularly suited, since neither book stacks nor small area usages require high ceilings or thick floors, they do affect over-all savings. Macdonald estimated that if carried on structural columns spaced about nine feet apart in both directions they could be of flat concrete slab only 4 to 4½ inches thick. They are certainly attractive opposite high ceiling areas, they break the monotony inherent in repetitive modular construction and by affording wide interior views increase the atmosphere of spaciousness, which adds to comfort in relatively small buildings in some warm climates.

Open air reading is encouraged in some libraries. The Raffles National Library will place newspapers and popular periodicals in a room with two sliding screen walls which can be opened in fine weather and closed during the windy, wet monsoon period.

Hard floors of flagstone, tile, cement screed, terrazzo, concrete with granolithic finish, and wood, seem to be used more frequently than imported soft flooring like cork, vinyl, rubber and linoleum, probably for financial reasons, ease of cleaning, insect resistance, and because contractors are more skilled in laying them. Reports on noise suggest that tropical peoples tend to tread silently and that they have an addiction to rubber soles, so that noise is less than might be expected. One objection has been made to such floors which is that they can be cold if readers are barefooted. There is no doubt that cork, if it can be afforded, is the material most acoustically effective, as is being experienced in Makerere College library and its new medical branch library. Smooth concrete structures in the tropics transmit noise easily and if there must be a choice of acoustical treatment it is more important and cheaper to treat ceilings than floors. In Kenya excellent decorative acoustical tiles made locally from sisal are now available. The Ghana Library Board libraries have hard floors and soft ceilings of wood-wool slabs.

Lighting practice varies but generally there seems to be overhead lighting, sometimes fluorescent, sometimes incandescent, sometimes both. A point for consideration is that fluorescent generates less heat than incandescent lighting.

It is traditional in many tropical countries to enliven plain surfaces with decoration and it is gratifying to find examples on library buildings. The obvious one is Juan O’Gorman’s central library at the University of Mexico, the central stack tower of which, decorated with a rough mosaic of natural minerals, has been described as the most
Library Buildings in Newly Developing Countries

successful example of large scale use of figural decoration in modern architecture. There are stained glass windows by Fernand Léger in Villanueva’s library for the University of Caracas. Wallpaper, which is cheap and can be used with insect-resistant adhesives, has been tried with effect at Makerere College.

Service arrangements are generally in line with Western library planning. They vary from small open access public library branches of 1,000 square feet to Singapore’s large Raffles National Library of 102,000 square feet, with partly open and partly closed access, children’s and adult lending libraries, reference and commercial libraries, mobile library quarters, rooms for illustrations, Braille, projection, archives, and a lecture hall. There is little that is peculiarly tropical—not even the fumigation chamber. It may be that provision of reading space in public libraries should be more generous when many of the readers do not have rooms at home for private study.

On the whole, the libraries built recently are dignified rather than monumental. The designs reveal an international outlook, with regional influences secondary. They give an impression of professional efficiency and in their countries they stand as symbols of a new era.

Some Postwar Libraries in the Tropics

University of Caracas, Venezuela.
University of Mexico.
University of Puerto Rico, Rio Piedras.
Medellin Public Library, Colombia.
Jamaica Library Service: Headquarters library and parish libraries.
University College of the West Indies, Jamaica.
University of Rangoon.
Raffles National Library, Singapore.
University of Malaya, Singapore.
University of Ceylon, Peradeniya.
University College of Ghana.
University College, Ibadan, Nigeria.
Ghana Library Board: Accra Central Library and regional branches.
Eastern Regional Library, Enugu, Nigeria.
University of Dakar, French West Africa.

[ 289 ]
HAROLD HOLDSWORTH

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