

The Transaqua Project: Making Africa Bloom

The following report, which has been on the drawing boards for 17 years, is an example of the kind of African development initiative that should be taken by European nations and companies, in the interests of their own economic recovery as well as that of the African continent. It was published in 1991-92 in Italy under the title "Transaqua: An Idea for the Sahel," by Bonifica, Iritecna, Gruppo IRI. Subheads and emphasis are in the original. It was published in EIR, Aug. 29, 1997, and in a 1997 EIR Special Report, "Peace Through Development in Africa's Great Lakes Region: Proceedings of a Seminar in Walluf, Germany, April 26-27, 1997."

The Sahel Belt: An Impending Tragedy

1. In the last fifteen years the Sahel belt of countries has witnessed, impotently, a gradual process of desertification caused by the climatic upsets that have broken a centuries-long ecological balance represented by the scanty, precarious natural resources, by widespread subsistence agriculture and by pastoral nomadism. The fragile nature of the ecosystem has yielded before a sequence of years of drought and near-drought, and today its recovery appears very dubious.

Of the area of approximately 2,500 million acres, which—according to United Nations estimates—presents a *desertification risk throughout the African continent* (about 34% of the overall area), about 1,000 million acres lie along a continuous belt 6,000 km in length, situated between 10° and 20° North, stretching all the way from the Atlantic Ocean to the Red Sea.

A thousand million acres which represent a challenge to the technological capacity of our day and age, and where an immense ecological catastrophe is taking place. These are the countries of the Sahel region. The figures of this tragedy are by now known: tens of millions of persons with a per capita income of under \$200 a year, hundreds of thousands of head of livestock dying of thirst or starving, several thousand mil-

lion dollars spent on generous, albeit complex, operations to save millions of human beings who every year risk starvation.

Prospects of Recovery

2. One of the most disquieting areas of underdevelopment in the world, with perhaps the most gloomy prospects in the entire continent of Africa, it calls for courageous measures of a dimension and scope on a par with the drama that is being enacted in this poverty-stricken part of the planet due to the natural inclemencies and to the scanty results obtained so far by the aid provided by the industrialized nations, massive as this has been.

Rangeland wells, irrigation districts, storage facilities for strategic foodstuffs, reforestation programs, agroindustrial projects—all measures suggested by a tragic situation capable of proposing above all immediate operations of quick effect and rapid impact on the local context, able in some way or other to exorcise scenarios of hunger and desolation that is repudiated by international civil consciences.

Such specific but piecemeal projects have their precise role and a clear political and social rationale, as they are able, through their localized short-term—and sometimes very short-term—effects, to involve the local rural populations, in this way amplifying the effect of the aid, and curtailing, at least in part, the dramatic social decline of the Sahelian region.

But no one can reasonably delude himself that these initiatives, praiseworthy and highly useful as they may be, can truly achieve any real and effective long-term solution, scattered as they are over such a vast area.

It cannot reasonably be conceived that, even if scores and scores of these projects were really implemented within a short period, they could radically change a "year 2000 scenario" which in any case would lose very little of its dramatic character, but would only perhaps be slightly mitigated in its aspects linked with mere survival. Even if these modest enough effects are not negligible, the chasm between the results achieved and the sheer mass of the problems to be faced would still be infinitely great.

Problems which are those since forever, proclaimed at every international conference on the emergent countries, and allotted top priority by every financing agency; problems which in the Sahelian context inordinately magnify the consequences of the failure to solve them:

- the water-agriculture-livestock combination

- the transport-marketing binomial
- the energy-transformation binomial.

Our over thirty years' experience of the development of emerging nations—so miserably failing to meet the expectations of the beneficiaries—has amply demonstrated that any “piecemeal” project, however well implemented, is bound to prove an end in itself, or, worse still, will not even attain its economic and social take-off, unless closely tied into the regional and inter-regional context with solid, long-lasting transport and commercial infrastructures (often far more costly than the project itself).

Conceiving the creation of such transport facilities and such regional and interregional trading facilities of a permanent, efficient type, either preparatory to or contemporaneous with the individual hydro-agricultural projects, appears to be a more adequate approach to the complexity not only of existing problems, but also and above all of those which arise immediately after the single projects and the concomitant management operations.

Creating opportunities to offset hunger and thirst, but at the same time to construct those large-scale support infrastructures which will guarantee supplies of raw materials and the marketing of the finished products, providing incentives for regional trade, means laying the foundations necessary not only for the single projects to take off, but also for each one of them to bring forth an induced effect of multiplying initiatives and generating collateral activities; which complex process, with a simultaneous inner growth, can really be called development, that will be the more secure over the long term, the more opportunities it generates.

The Presuppositions of the Project Idea

3. The Transaqua Project presented here at the level of a project idea, is based upon the following simple presuppositions:

- the underlying cause unleashing the ecological imbalance of the Sahel is the lack of water due to several years of drought and near-drought and to abnormal weather. It is therefore necessary to identify and to create new sources of water supply to substitute rainfall:
- the rebalancing by man of the upset rural activities of the populations can come about over the medium and long term only, in substance, through irrigated cultivation, lacking a natural return to more favorable climatic conditions;

- the recovery of the Sahel, therefore, must pass by way of new types of balance, deriving from the partial abandonment of extensive agriculture (based on well-spread and above all constant seasonal rainfall, even though of modest quantity) in favor of the gradual development of intensive agriculture (based on “concentrated” water availability not dependent upon the seasons);

- a new balance to be achieved, at least in part, on the basis of intensive agriculture, cannot leave out of account adequate transport and marketing facilities which are regarded as indispensable supports for any serious hope of success;

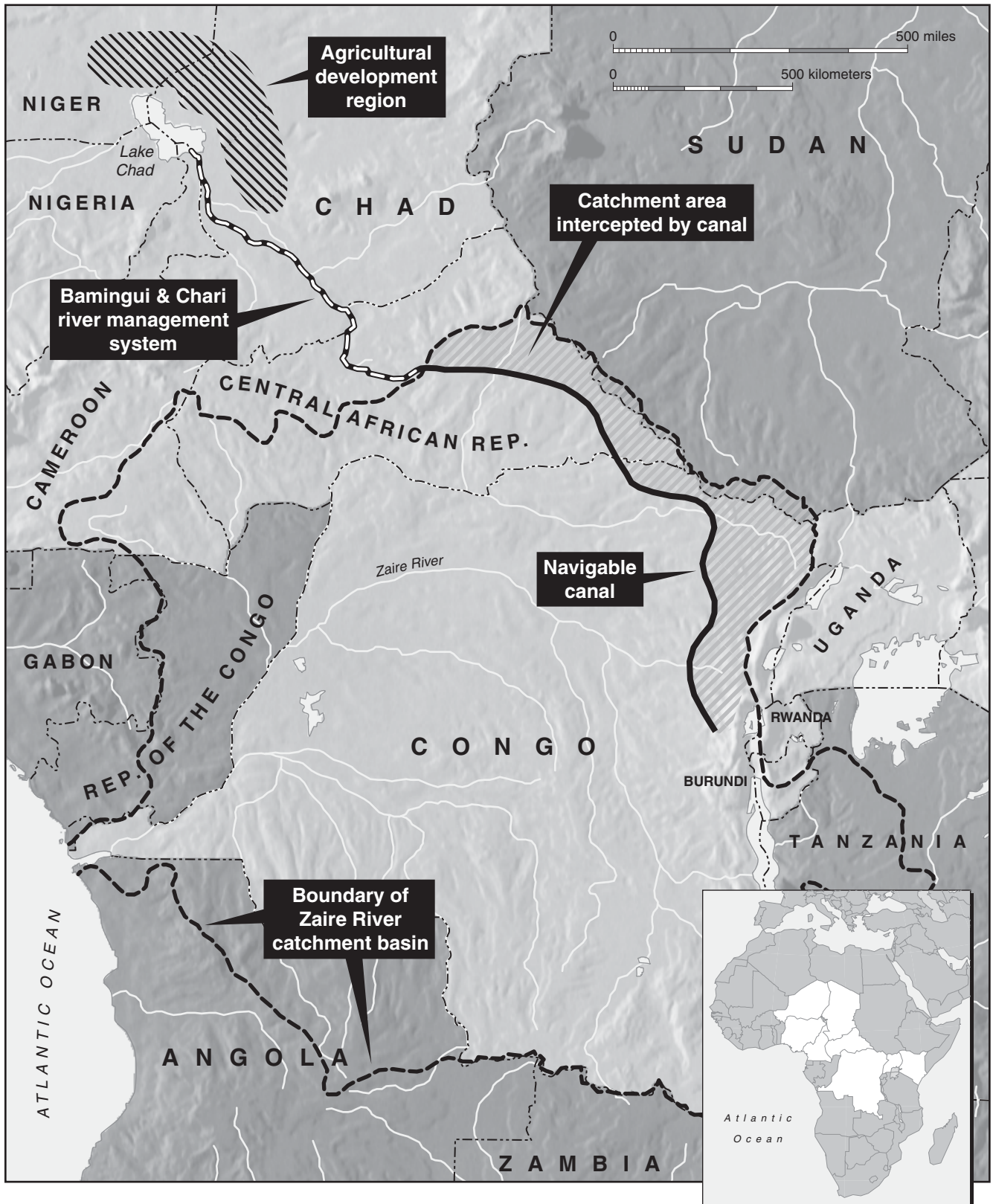
- the necessary initial transfer of inputs and technology must have as its objective the development of autochthonous African resources, the verticalizing of production processes through local value added, and the utmost amount of trading among African consumer markets, in such a way that the objectives to be accomplished can guarantee the maximum amount of operational and economic-financial autonomy, the sole condition that will assure irreversibility, and the only one capable of interrupting the massive flow of international capital necessarily needed for many years yet to come for purposes of subsistence pending the take off of autonomous developments.

The basic idea of the Transaqua Project is to “transfer” approximately 100,000 million cubic meters/year of fresh water from the basins of the River Zaire to the Sahelian area in Chad and Niger [Figure 1].

The support for this project idea is represented by the Central African geographical reality, in which the Zaire-Chad watershed is a natural barrier separating two great catchment areas; one to the north, where drought reaps victims because of the lack of water resources, and the other one to the south, where rainfall is so abundant that it creates extraordinarily lush environments that often experience—due to forest encroachment—the opposite sort of problems for the rational development of modern agricultural activities.

The mass of water of the River Zaire—the most important river in Africa, the second one of the planet, after the Amazon, in size of catchment area—calculated at its mouth to be around 1.9 million cubic meters flowing out into the Atlantic every year, would be “curtailed” by barely about 5% of its discharge as a result of taking off the approximately 100,000 million cubic meters a year, to change the face of the desert a few hundred kilometers further north.

FIGURE 1
The Transaqua Project, as Proposed by Bonifica



This “modest” off-take would represent a constant discharge of about 3,200 cubic meters a second, equal to almost double the discharge of the Nile downstream of Aswan.

The basin of this largest African river forms a vast natural amphitheater, consisting of a central area—at an elevation of under 500 meters above sea level—corresponding to the main course of the river and of its chief tributaries, surrounded to the south, east, and north by a plateau (situated between about 600 and 1,000 meters above sea level) which is shaped almost like a semicircular crown. The project idea could be a technically feasible proposition with the construction of a broad navigable canal, which, running along the eastern and northern crest of the Zaire¹ catchment, could intercept the waters of the extreme northeastern edges of the basin and, after a course of about 2,400 km [Figure 2], would reach the Zaire-Chad watershed in Central African Republic territory and discharge its entire flow at the head of the River Chari, a tributary of Lake Chad.

In Chad, probably using in part the bed of the Chari itself, the waters could be conveyed to the areas of Chad and Niger north of Lake Chad which are in the process of becoming desertified. In these regions of the Sahel, it can be reckoned that between 12 and 17 million acres could be brought under intensive and semi-intensive type irrigation development (for purposes of comparison, it is pointed out that 40 million Egyptians live in an irrigated area of under 7 million acres, although cultivated very intensively).

The sector of the Zaire catchment area intercepted by the approximately 2,400 km of artificial canals would be located between about 2°S and 8°N, while the waters collected therefrom would be utilized right in the midst of the Sahel area, between 12° and 16°N.

In its drop down to Chad, this mass of 100,000 million cubic meters per year of water could, via a series of hydroelectric stations, produce energy to the extent of some 30-35,000 million kwh, equal to about 70% of Italy’s hydroelectric production and to about 15% of its entire production of energy (hydro, thermal, and nuclear). Such a quantity of energy could radically change the face of the present rural settlements and provide a strong boost for future agricultural developments, both in the foreseen area north of Lake Chad, and in the new development area along the navigable canal, by means of two high-tension electricity lines; one of them, dis-

tributing energy to Chad, about 1,300 km long, and the other, distributing energy along the navigable canal, about 2,400 km long.

The Project Idea

Transport, processing, and commercial infrastructures; container port and industrial free trade zone:

5. But the idea of a “transfer of water” as an end in itself, even of a mass of water greater than the discharge of the Nile, however appealing against the grim background of the arid Sahel, would still only be partial and insufficient unless framed in the vaster African international transport system: the planned Lagos-Mombasa Trans-African Highway, which will run for over 6,000 km and connect the Indian Ocean with the Atlantic, and the Lagos-Algiers Trans-Sahara Highway, practically already in operation and which, once it has been completed for its full length, will permit fast links between the Gulf of Guinea and the Mediterranean. It is also and above all in this context of big African international lines of communication that the Transaqua Project should be considered: a huge “riverway” able to connect up the markets of vast Central African “enclaves” such as Rwanda, Burundi, the Kivu region, the whole extreme northeastern part of Zaire and of the Central African Republic, with consumer centers of other Central African countries (Nigeria, Niger, Chad, Cameroon, Kenya, and Uganda) and with the two ocean ports of Lagos and Mombasa for trade flows outside of Africa.

This international traffic link-up could take place at the crossing with the planned Lagos-Mombasa Trans-African Highway, where one can conceive the construction of a river container port with an adjoining industrial “free trade zone.”

If this node or “marshalling yard” for river- and road-borne goods were to be planned at or near the pass where the navigable canal crosses the Zaire-Chad watershed, there is no doubt that it could benefit from an enormous quantity of hydroelectric energy that could be produced on the spot, after the construction of a hydropower station at the head of the Chari catchment, which would be the first, from a topographical standpoint, of a series of such stations almost as far as N’Djamena. In this way a polyfunctional free trade zone could be established in Central African territory [see Figure 3] which, as well as functions of marshalling container-borne goods, could cater for the impor-

1. Zaire is now the Democratic Republic of Congo—ed.

tant economic and commercial task of product processing, by means of a series of agricultural and food plants, textile mills, and woodworking units, based on African agricultural, live-stock, and forestry products from newly developed areas which would become available for productive agricultural activities precisely thanks to the new riverway and to the future Lagos-Mombasa Highway. In particular, the economic means of river transport represented by the 2,400 km of canal through Zaire and Central African territory would act as an agricultural produce marketing facility which, equipped with a series of small “moorings” or “berths,” would provide a stimulus for the agricultural development of a large number of river valleys upstream of the waterway and throughout its course.

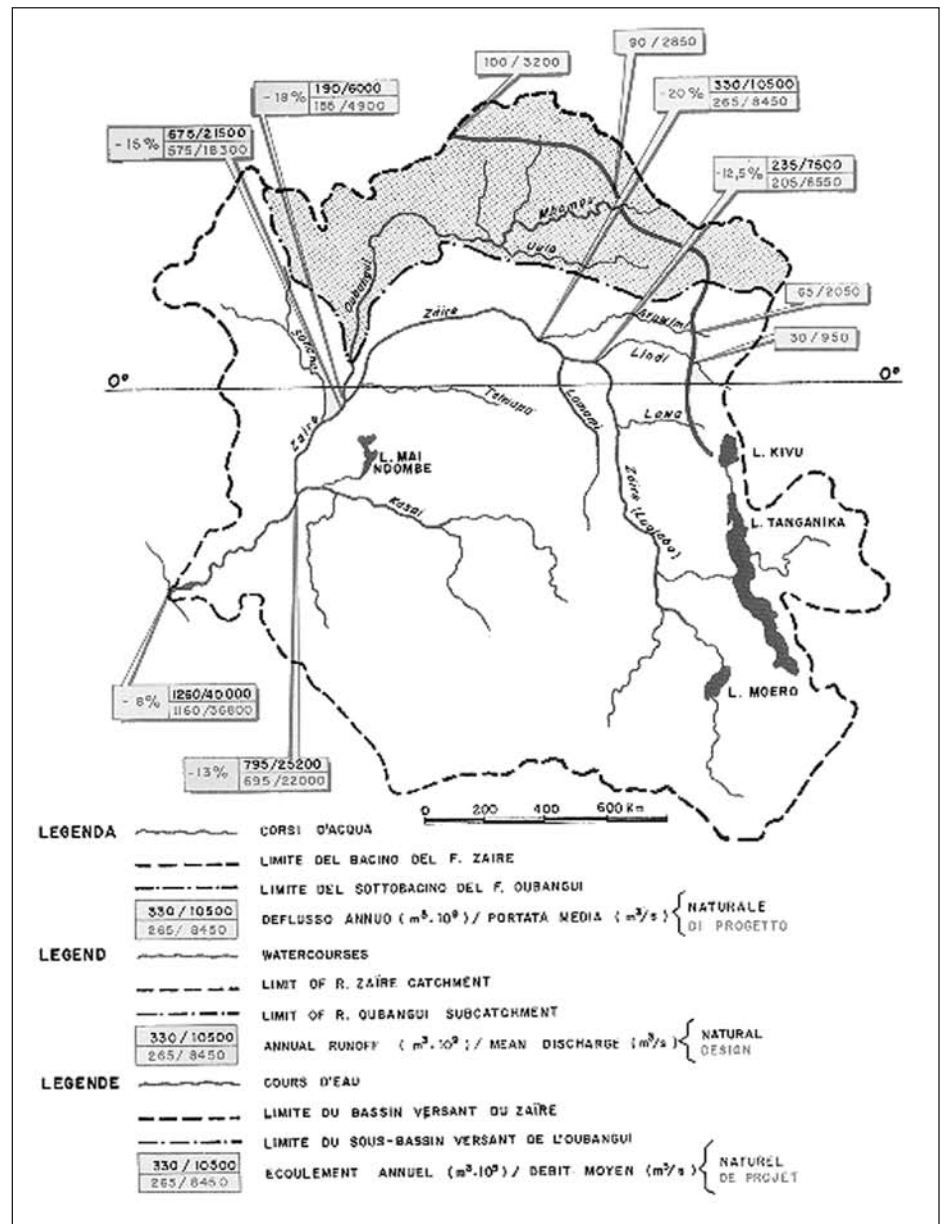
Many areas of the Sahel could, in the long term, be supplied not only with water and electricity, but also with cereals, meat, milk, etc., produced on African soil instead of having constantly to depend on costly and precarious imports from other continents.

Plausible Prospects

Decisive water and energy supply for the Sahel; a practical start of the post-colonial dream of economic integration:

6. The Transaqua Project, viewed from the sole standpoint of transferring water resources to the semi-desert areas in the Chad-Niger border region, would lead to the creation of a series of irrigation areas in a region of some 50-70,000 km² (about the same size as southern Italy) in the heart of what is considered the “traditional Sahel, formed by eight countries (Cape Verde, Gambia, Senegal, Mauritania, Mali, Upper

FIGURE 2
Hydrological Features of the Zaire River Basin

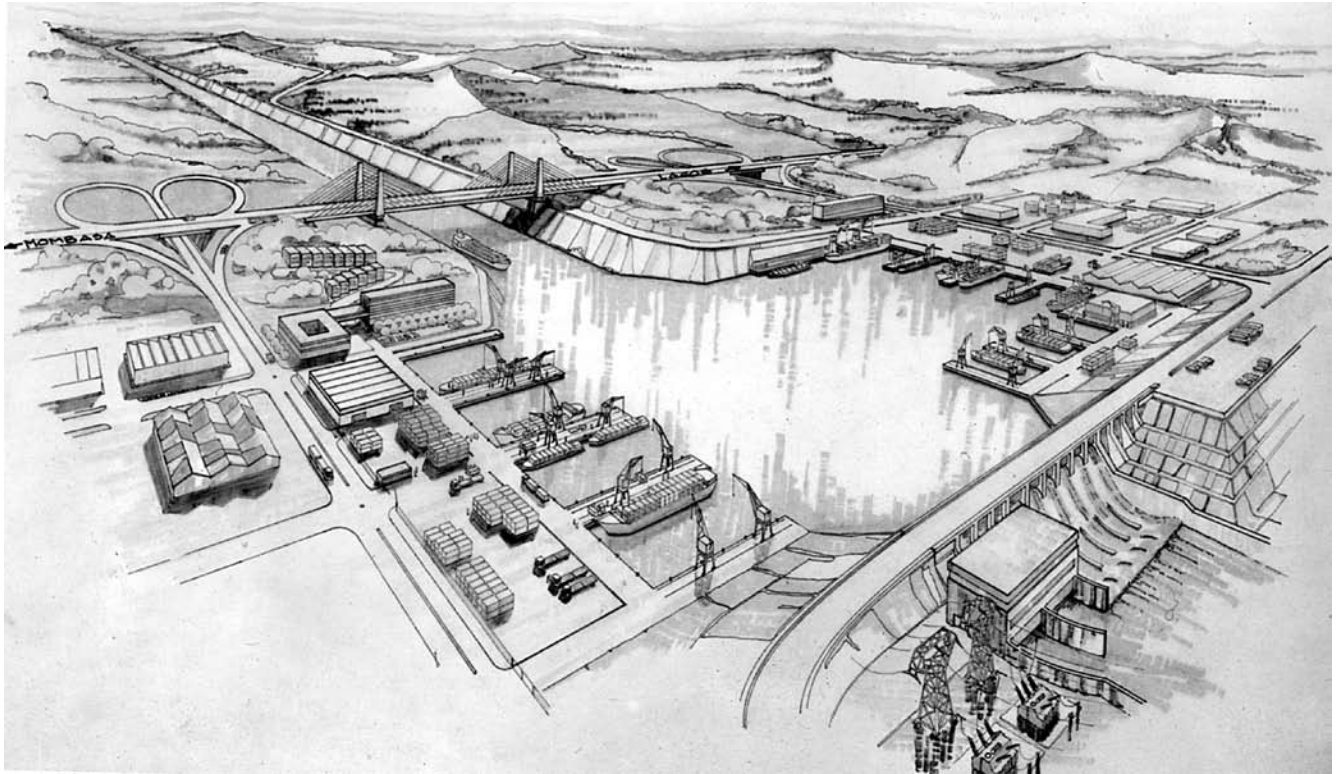


Volta, Niger, and Chad). The Transaqua Project is, from the water and energy point of view, aimed at the final and lasting solution, albeit over the long term, of the problems of hunger of over 50% of the Sahelian area, since the two countries that are the direct beneficiaries thereof account for about one-half of the total Sahel area and for about 30% of its entire population.

The Transaqua Project, viewed in the context of the ten Central African countries more or less directly concerned by the planned network of international river

FIGURE 3

Artist's Rendition of Integrated River Port in Central African Republic



and overland transport (Niger, Nigeria, Chad, Central African Republic, Cameroon, Zaire, Rwanda, Burundi, Uganda, and Kenya, representing in terms of land area approximately one-quarter of all Africa), is undoubtedly a decisively propulsive element for the practical start-up, perhaps within the span of one generation, of the African post-colonial dream of the international economic and productive integration of the continent, an indispensable condition for true economic autonomy and political independence.

The time is ripe for a Transaqua Project.

Russia has started work on the transfer of 60,000 million cubic meters per year of water which the continent's relief today causes to flow into the Arctic Ocean, the final aim being to divert this flow to the dry regions of Kazakhstan and of Uzbekistan by means of a 2,200 km navigable canal (the envisaged cost of the hydraulic works alone is about \$18,000 million), which should transform these semi-desert areas into some of the most fertile lands of the CIS [Commonwealth of Independent States].

The direct and indirect benefits of the Transaqua Project deriving from the agricultural outputs obtainable, their processing and marketing, from the transport economy and energy production, enable us to foresee, despite the obvious present uncertainties regarding investment costs, a return on the operation that is interesting even from the economic and financial standpoint.

It is plain that, in view of the mass of investments required and the size and quantity of the foreseeable works along a stretch of 2,400 km, the project should be carried out in successive stages, each of them to be economically and socially justifiable. Such should undoubtedly be feasible assuming a start be made on constructing the canal at its downstream and, gradually extending it in an upstream direction to its point of origin. The technical means to construct such works do not constitute an insurmountable obstacle.

The units of measurement of the investment costs are not only millions of dollars, but the absence of wars, millions of human beings saved from starvation, social peace, and an international conscience.

Central African ‘Transaqua’: The ‘Pivot’ Role of the Central African Republic

1. The Transaqua Project, in its Central African Republic stretch, assuredly displays its most qualifying aspects, at both the technical and social and economic level.

It is in the Central African Republic, in fact, that the project’s most demanding technical engineering problems have to be resolved, considering that in this stretch the waterway will have to cross the divide between the Zaire-Lake Chad catchment areas, will have to feed an artificial lake which will be the basic infrastructure for a river port for containers, and lastly, will have to link up with the country’s major road: the Lagos-Mombasa Trans-African Highway.

From the functional aspect, the Central African Republic area will host the vital center of the Transaqua Project and the system’s operational nucleus.

In point of fact, the complex of works made up of the incoming canal, the balancing basin, the dam with its hydroelectric station, and the link roads with the Lagos-Mombasa Trans-African Highway, will constitute the Inter-African Polyfunctional Trading Area (IPTA), provided with an industrial free port area and a container port.

The geographical position of the Central African Republic, penalized by the lack of ocean outlets, is instead—in the context of this Transaqua Project—privileged by its location straddling the Oubangui-Chad divide, enabling it to assume the highly important role of pivot between these two catchment areas.

Some Technical Considerations

2. The canal in the Transaqua Project will flow through the territory of the Central African Republic for a length of approximately 800 km, in the northeastern part of the Zaire basin, drained by the Oubangui and its tributaries. The canal will run more or less parallel to the divide with the White Nile catchment area.

The canal alignment will then make a westward turn until it crosses the divide with the Chari catchment basin at the most favorable point, the canal then discharging into said basin.

In Central African territory the canal will intercept the upper Oubangui basin in the area of the highest

catchments of its right-bank tributaries as well as the right-bank tributaries of the River Mbomou, in its turn the major tributary of the Oubangui and marking the northeastern border with the Republic of Zaire.

In its course the canal will drain an area of about 80,000 km² which will contribute some 20 billion cubic meters of water a year to the Transaqua canal, i.e., about 10% of its total discharge.

This off-take from the right-hand part of the upper basin of the Oubangui, together with the water diverted from the left-hand part of its upper basin in Zairean territory, estimated as a further 25 billion cubic meters a year, will mean a decrease of approximately 18% in the total discharge of the river at its confluence with the Zaire, currently 6,000 m³/second. About 60% of this total off-take will concern the Central African Republic, and some 40% Zaire. The off-takes resulting from the canal drainage through the Central African Republic will be concentrated during the months of heaviest rainfall, in this way contributing towards regularizing river flows and controlling floods, by means of a series of balancing basins constructed along the canal.

The canal runs from south to north, as follows:

- The southernmost stretch of the canal enters the Central Africa Republic at 27°E and approximately 5°N, intercepting the River Mbomou—which forms the border with Zaire—in an area between Obo and Bam-bouti. Then, running through the Upper Mbomou region at elevations of around 700 m above sea level, it receives the waters of the upper stretches of the Rivers Ouarra, Ngoangoa, Vovodo, and Chinko, in their turn all right-bank tributaries of the Mbomou.

The basins of these rivers receive a mean rainfall generally in excess of 1,500 mm a year, and their runoff coefficients appear to be between 20 and 30%. The contributions of these four basins are concentrated from the months of May-June to September-October, in which periods more than two-thirds of the annual rainfall occurs.

- The northern stretch of the canal continues with a broad sweep westwards through the entire region of the Upper Kotto at elevations of under 700 m above sea level until it reaches the southern slope of the Bongo Massif north of Yangalia where the mountain chain separating the two basins is at its lowest point (about 600 m above sea level). In this last stretch, the canal intercepts the Kotto and its tributary the Bongou, the Kotto being in its turn a direct tributary of the Oubangui. The fea-

tures of the drainage system of this region are not very dissimilar to those of the Upper Mbomou, although flows are smaller because of the lower rainfall (generally under 1,000 mm/year) and the longer dry period.

- The stretch of the canal affecting the Central African part of the Chad basin will start in a crossing area to be identified between the upper Bamingui basin and the upper basin of its tributary, the Koukourou, both of these rivers being tributaries of the Chari. Their river beds, duly conditioned, could receive Transaqua's flow of over 3,000 m³/second in addition to their own natural discharges. The flows of what will be in actual practice a new river will be conveyed along the whole western border of the Bamingui-Bangoran National Park, entering Chad at the northern boundary of the park. From the divide to the border with Chad, the Bamingui drops from about 600 to 300m above sea level, meeting the Chari at the frontier between the Central African Republic and Chad.

Foreseeable Environmental Impact

3. The interception of the flows of the upper Oubangui basin and the off-take of a total of about 35 billion cubic meters annually (of which some two-thirds are in Zaire and one-third in the Central African Republic) will not only not have negative consequences but, on the contrary, will have considerably positive effects.

In fact, the drainage basins intercepted by the canal are generally characterized by a hydrological behavior differing through the course of the year; the southern basins have more than 1,500 mm of rain a year distributed over about six months; the northern basins instead have more modest rainfall (800-1,000 mm/year) concentrated in three to four rainy months alternating with eight to nine dry months.

In Central Africa, the canal crosses, in fact, a belt of wet tropical climate, in its southern stretch, and a zone of sub-Saharan type climate, with a long dry season, in its northern part.

The immediate effect of the canal will therefore be to control the floods and to convey the waters of the rivers intercepted in the south to the watercourses intercepted in the more northerly stretch, either by means of direct flow into the rivers or by creating special storage and balancing basins. This water compensation system will be able to guarantee longer annual periods of water use of even secondary rivers normally dry for several months.

From the climatological standpoint there can be no consequences of any sort, since the canal does not form a concentrated water surface, as instead is the case when large artificial reservoirs are constructed.

The ecological effects on the natural environment, finally, will be comparable with those caused by making a large thoroughfare through a more or less virgin area. In view of the great abundance of ecological themes and the huge area concerned, the canal will produce only negligible consequences from this point of view.

'Central Africa 2000': Political and Economic Prospects

4. The Central African Republic's support for the Transaqua Project will bring in very great economic and political benefits to the country.

Being situated at the very economic center of the Transaqua system, indeed the country can expect the advantages deriving from the establishment of the Inter-African Polyfunctional Trading Area (IPTA) which will be located in the Upper Bamingui Valley in an area between said river and its tributary, the Koukourou. These advantages can be summed up as follows:

- powerful development of commercial traffic due to the new waterway which could be connected, by means of two simple road links, with the Lagos-Mombasa Highway, and also with the river port of Bangui and, via this, by river, with Brazzaville and Kinshasa;
- the creation, for the first time in the heart of continental Africa, of a large river port equipped to handle containers, linked with the ocean ports of Lagos and Mombasa;
- the production of a very great amount of hydroelectric energy with the construction of a series of dams along the modified course of the Bamingui, the first and most important of which will be situated at the IPTA (the hydroelectric potential of the Transaqua in its drop to the Chad is estimated as some 30-35 billion kwh/year, two-thirds of it producible in the Central African Republic and one-third in Chad;
- the establishment, in the IPTA area, of a vast industrial zone specialized in the agro-food sector, capable of ensuring, with the setting up of agroindustries of adequate size, the processing of the agricultural and animal products from the newly developed agricultural areas. These areas will be created, both in the Central Africa Republic and in Zaire, along the alluvial valleys intercepted by the canal, and will be served

by river landing stages;

- the upgrading and development of the mining region traversed by the canal, including Bakouma, Bria, Mouaka, and Ouadda;

- the recovery for production purposes of a region of about 100,000km² today completely without any road network and which will be able to use the waterway link to the IPTA and, through this, to ensure the movement of agricultural and animal products to be processed and the supply of production inputs, in their turn indispensable for the development of the new agricultural areas;

- a massive and unprecedented influx of capital and of international undertakings into the country, guaranteeing permanent employment for at least twenty years for the Central African populations.

There is no doubt that the socio-economic impact which the country will receive as a result of the Transaqua Project will be decisive and will condition the whole development of the Central African population in the short, medium, and long term. The Transaqua Project—with its direct effects and its induced and side effects—will provide a formidable boost to the country's socio-economic development and will be projected into a productive dimension and a commercial logic anticipating development models which, in the coming twenty years, the African continent will have to adopt, exploiting the inestimable resources of its territory above all by means of exporting agricultural and food products, obtained with suitable and appropriate technologies, to adjoining countries and also to markets outside of Africa, increasing the dynamism of agroindustry, transport, and energy production.

Since the design logic foresees the start-up of canal construction at the northern end, then proceeding gradually with construction in successive stretches southwards, the Central African Republic will be the country that will “lay the foundation stone” of the Transaqua Project, the first worksite being opened along the Oubangui-Chad artery in the vicinity of a mountain “crossing” from which it will be possible to dominate, in a southerly direction, the equatorial water-donating areas and, northwards, the arid, desolate regions of the Sahel, the final recipients of said water. At this “crossing,” Africa will be able to show that the most viable North-South dialogue is one that can take place within the continent itself.

‘Transaqua’: Zaire’s Priority and Essential Role

1. There is no doubt that, as the Transaqua Project is accepted and supported by the countries directly concerned (Zaire, the Central African Republic, Chad, and Niger), the partner among these countries which emerges to the greatest extent in the framework of international aid from future donors of funds will be the one supplying the project almost all of the water, namely Zaire.

Zaire, indeed, would supply the project about 90% of the water intended to feed the Sahel regions, while the remaining part would be taken from the navigable canal in Central African Republic territory.

It is foreseen that the water will be obtained by off-takes from the water courses in the extreme eastern belt of the Haut-Zaire and Kivu regions, in climatic areas where the average annual rainfall is around 1,800-2,000 mm and where the surface runoff feeds the four hydrographic systems of the Oubangui, the Aruwimi, the Lindi, and the Lowa, which in their turn are tributaries of the Zaire.

The numerous tributaries of the four abovementioned catchment areas could be intercepted in their upper basins by means of barrages which—guaranteeing continuity to the big navigable canal—would at the same time create large artificial reservoirs which would deliver part of their waters to the courses of the dammed rivers, thereby regulating their flow regime downstream of the barrages, especially during the peak flood periods.

Numerous alluvial valleys will become available along the courses of the rivers intercepted, upstream of the individual dams, and the reservoirs created by these structures could form lake areas ideal to accommodate a whole series of river ports, regular commercial “terminals” serving the new development areas for the export of agricultural products, and for the supply of the necessary means of production, with the low costs of transport characteristic of river routes.

At least 10 areas seem suitable for integrated agricultural and stockraising development already from this first “project idea”: those corresponding to the flood valleys of the rivers Dungu, Nzoro, Ituri, and Epulu, and the upper basins of the rivers Uere, Bomo-kandi, Nepoko, Lindi, Oso, and Lowa. Surface off-

takes from these upper catchment areas would have no appreciable practical consequences in terms of discharges at the level of the four hydrographic systems mentioned; on the contrary, there would be certain advantages deriving from their partial control.

Some Technical Considerations

2. The canal in the Transaqua Project will run through Zaire territory for a length of approximately 1,600 km, along the western side of the divide between the Zaire basin and the Great Lakes region, at elevations of not more than 900-950 meters above sea level.

It will drain the upper basins of the right-bank tributaries of the Lualaba and the Oubangui for a total surface area of about 220,000 km², about 140,000 km² of which is in Zaire.

Proceeding from south to north:

- the southernmost stretch of the canal (running from the Kivu region towards Haut-Zaïre) will be fed by the upper basins of the Lowa and the Lindi.

Both of these basins are situated in areas with rainfall of over 1,800 mm/year and a large part of them have rainfall of more than 2,200 mm/year. The runoff coefficients are always high, greater than 40% taking almost the whole of the upland contributions from the middle and lower courses of these rivers will not lead to any negative effects, considering that the availability in these areas is overabundant, and that the rainfall/evapotranspiration balance is amply positive in every month of the year.

On the contrary, abstracting the contributions of the upper mountain basins by means of the canal will have a regulating action on the flood flows of the individual tributaries of the Lowa and of the Lindi.

The upper catchments of these two important right-bank tributaries of the middle course of the Zaire will, according to calculations, supply some 30 billion cubic meters a year, equal to an aggregate discharge of about 950 m³/second. At Kisangani therefore the average discharge of the Zaire River will be less than about 12.5% of the 7,500 m³/second that is the present discharge.

- the intermediate stretch of the canal, flowing through the Haut-Zaïre region in a south-north direction, will be fed by the upper Aruwimi basin, with off-take works on the main tributaries, the Lenda, Ibina, Epulu, Dnuye, and Nepoko.

These basins, too, as the ones above, are characterized by considerable rainfall (averaging around

1,800 mm/year) and high runoff coefficients, and therefore, also in this stretch, removing flows from the upper mountain basins from the Aruwimi hydrological system will have no other consequence than that of regulating the discharges of the river system downstream of the canal during the periods of maximum rainfall.

The upper catchment of the Aruwimi will contribute about 35 billion cubic meters a year to the canal, equal to a discharge of about 1,100 m³/second. Downstream the confluence, at Basoko, the Zaire River will therefore have a decrease of about 20% in respect of the estimated average discharge of 10,500 m³/second.

- The most northerly stretch of the canal, running almost parallel to the Zaire-Sudan border and the Central African Republic-Sudan border, will intercept the tributaries of the Oubangui, namely the Uele and its tributaries, the Bomokandi, Nzoro, Dungu, Duru, Garamba, and the Uere.

The basins of these rivers receive rainfall of between 1,800 and 1,500 mm/year and their slopes gradually decrease towards the northwest. The runoff coefficients also tend to decrease in the same direction and average about 30-20%.

There is a portion of the upper catchment of the Oubangui in Central African Republic territory, where the upper basins of the Mbomou, the Quarra, the Ngoango, the Vovodo, the Chinko, the Kotto, and the Boun-gou also share in supplying the canal with water.

On the whole, the upper Oubangui basin will contribute about 35 billion more cubic meters of water to the canal, equal to an aggregate discharge removed from the Oubangui of some 1,100 m³/second equal to 18% in respect of average discharge of 6,000 m³/second.

Of this discharge, it is estimated that about one-third will be taken off in Central African territory and about two-thirds in Zaire.

Due to this third decrease and to those made upstream the medium average discharge of the Zaire River, downstream the confluence of the Oubangui River near Irebu, will have an estimated total decrease of about 15%.

This corresponds to a decrease from 21,450 to 18,300 m³/second (equal to 680 billion m³/second and 575 billion m³/second, respectively).

The total of these three losses represents about 8% of the total discharge of the river Zaire, considered at its mouth.

Foreseeable Environmental Impact

3. From the hydrological standpoint, the removal of even considerable flows from the watercourses intercepted by the southern stretch of the canal cannot have any negative effect on the flows downstream of the canal, in view of the high rainfall regime and the distribution of the rains, spread over almost the whole of the year.

On the contrary, the reservoirs that will be created along the course of the canal at each watercourse intercepted will act as precious water “fly wheels” which will function effectively in routing flood discharges and for the possible regulation of flows in the watercourses intercepted by the most northerly stretch of the canal.

In fact, the catchments of these rivers are subject to a rainfall regime—and therefore to hydrological behavior—of a more differentiated nature (spring minimum and autumn maximum), and therefore the canal and the linked reservoirs can help to regulate their flows on an all-year basis, diminishing the flood discharges.

The possibility will also be studied of increasing the low-period flows of these rivers with waters from the more southerly basins, conveyed in the canal, using to advantage the fact that the relevant hydrographs are not in phase.

The tributaries of the Oubangi especially will be able to benefit from the canal as a means to regulate both floods and low flows.

Lastly, the regulation of the flood discharges of the rivers Lowa, Lindi, and Aruwimi, diminishing the flows in the middle course of the Zaire, will mean a decrease in the swampy areas of the “cuvette.”

From the climatological point of view, no appreciable consequences of any type are foreseen, in view of the fact that the canal does not create—as, on the contrary, is the case with large artificial lakes—sizable areas of water concentrated over a given stretch of territory.

The ecological effects will be the same as those caused by the construction of a large highway through an almost virgin area. In view of the great abundance of ecological themes present throughout the area, the canal will produce only negligible consequences from this point of view.

‘Zaire 2000’: Political and Economic Prospects

4. Zaire’s support of the Transaqua Project, apart from giving the country international prestige that would derive from being the promoter and sponsor of a

continental-scale project, above all to make a truly resolute contribution to a vast area of the Sahel, would bring a series of direct and indirect benefits to the country which is difficult to identify in their totality.

Certainly the most evident direct advantages, apart from those of political prestige, are the following.

- a massive influx of international capital, without precedent in African territory;
- very large investments in the country following measures by large-scale international enterprises, continuing for about twenty years and therefore capable of permanently involving the professional activity of managerial, middle, and worker levels for a whole generation of Zaire citizens;
- the productive recovery of a region of some 200,000 km² today lacking in road connections with African centers of consumption and supply, which would be linked with an Inter-African Polyfunctional Trading Area provided with a free port, and via the IPTA container port, with Lagos and Mombasa by means of the Trans-African Highway, at present already at an advanced state of construction;
- the integrated intensive development of numerous areas having high agricultural and stock-raising potential connected with the IPTA by a navigation canal, and complete electrification of all the development areas using hydroelectric energy;
- commercial openings for agricultural and livestock products of the new areas of intensive development in eight African countries;
- possible transition of commercial traffic to and from Burundi and Rwanda.

While it is true that the essential basis of the “Transaqua” Project is the water of the river Zaire, it is no less true that the donor country of this water will be the one that will receive perhaps the major economic benefits, not only in the long term but also over the short and medium term.

In fact, the working hypothesis is, obviously, to start construction of the canal from its northern end and then gradually to make extensions southwards until it is completed. Therefore Zaire will be able, together with the Central African Republic, to make use of the economic, commercial, and social advantages stemming from the project right from its very earliest phases of implementation.

With the help of Transaqua, “Zaire 2000” will be able to contribute significantly to the image of Africa at the dawn of the coming century.