

# Spain-Morocco tunnel: a project to connect the Pillars of Hercules

by Mohamed Larbi Messari

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The two nations Spain and Morocco have decided to create a joint project to increase their ties, interchange, and cooperation, so as to continue their thousand-year history of cooperation which has been so beneficial to both sides. Spain and Morocco have always been complementary, and thanks to this prevailing symbiosis, Spain and Morocco never underwent the Dark Age. The proof stands in the Giralda and Kutubia, built by the king himself, and in the universities of Quaraouien and of Córdoba. The School of Translators of Toledo, founded by Alfonso X the Wise, was a direct antecedent of the Renaissance. Why should there not be a new School of Translators, which could serve as the liaison between Spain, with its Ibero-American dimension, and Morocco, with its Arab-African dimension?

The Gibraltar link project is hence an initiative that fits perfectly into this very broad context of encouraging a new Renaissance.

Further, the Gibraltar link is a project which tends to favor trade between two areas which need each other. I am referring to Europe and Africa, especially Western Europe and Northern Africa. Trade relations between Europe and Africa are substantial. Some 65% of African trade is carried out with western Europe. This trade currently takes place mainly by maritime means.

The development of air routes, which is constantly progressing, is encouraging human and cultural contact, a phenomenon which tends to grow with each passing decade. Europe, as is well known, has few raw materials of its own, and procures them, obviously, in Africa. The African continent depends to a large extent upon European technology. Therefore, it is necessary to prepare the appropriate framework for the growing development of this interchange. It was calculated in 1980, that between 13 and 14 million travelers circulate between the two zones of influence of the project. The travel distance of some 4,000 kilometers between one extreme point in Africa and the other extreme in Europe, would be reduced to 2,500 kilometers (see **Figure 1**).

Regarding the Strait of Gibraltar, in itself, the traffic between the ports of Ceuta and Tangiers on the African side, and those of the Iberian peninsula is undergoing a 9% annual

growth rate. In other words, within 20 years, maritime traffic through the strait would tend to increase 180%, in order to meet the growing rate of human and commercial interchange between the two coasts.

In 1978, the total traffic of the two ports was 4,067,465 passengers and 388,961 automobiles.

This traffic in the strait is very considerable and, as I have made clear, it is growing. It is also clear that this sea traffic is conditioned by the weather. Amb. Mohamed Ben Otman, who carried out various missions to Spain in the reign of Charles III (1759-88), recounts in his book *Fikak el Asir (The Freeing of the Prisoners)* that he had to wait three days in Ceuta for an adequate wind to set sail for Cádiz. That was 207 years ago. Today's technology has bettered conditions a good deal; yet, the pace of the traffic, as well as its scale, are still influenced by the factor of climate. And it is in order to overcome this factor, as well as to keep pace with the growing rate of human and commercial interchange, that the idea has come up of the alternative of a land link across the Strait of Gibraltar.

What we wish to accomplish is, in a certain sense, to recreate the tie that existed between Europe and Africa some 5 million years ago. Legend attributes to Hercules the task of separating the two continents, which supposedly took place when he broke apart the Calpe and Avila mountain chains.

We know through the seven volumes of research published by the Institute of African Studies (in Spain) that the idea of the Gibraltar link gave birth to some utopian solutions, some more rational hypotheses and demonstrations, and some very advanced concepts such as that of a tunnel. In 1869, Laurent Valdeuil presented a scheme for a tunnel. Others conceptualized a bridge. There were even those who proposed a dike.

## What is the best site?

Thanks to the studies which have been carried out so far, we know that in the zone of the strait, where the Atlantic Ocean and the Mediterranean Sea come together, the narrowest distance between the coasts of Morocco and Spain is 15 kilometers, but the depth of the sea at that point is 800 meters. Thus, the two parameters, distance and depth, do not permit the best conjuncture to build the link.

FIGURE 1

The main transport routes between Europe and Africa which the tunnel will aid



The zone where these two fundamental parameters are best combined is found to the west of the strait, about 9 kilometers eastward of Tangiers at the point of Altares, and some 12 kilometers west of Tarifa at the point of Paloma. There, the distance is 28 kilometers and the maximum depth is around 350 meters (see **Figure 2**).

The Strait of Gibraltar is a zone of exceptional geological complexity. It is known that in the Mediterranean, the water

from the rivers which flows into the sea is lower in volume than the quantity of water which evaporates, and that the balance of salinity of the Mediterranean is maintained via a significant quantity of water from the Atlantic which enters through the surface of the Mediterranean and a weaker Mediterranean current which flows out through the bottom of the strait toward the ocean.

The zone of the project is characterized by its relatively

FIGURE 2

**Closeup of Strait of Gibraltar area**

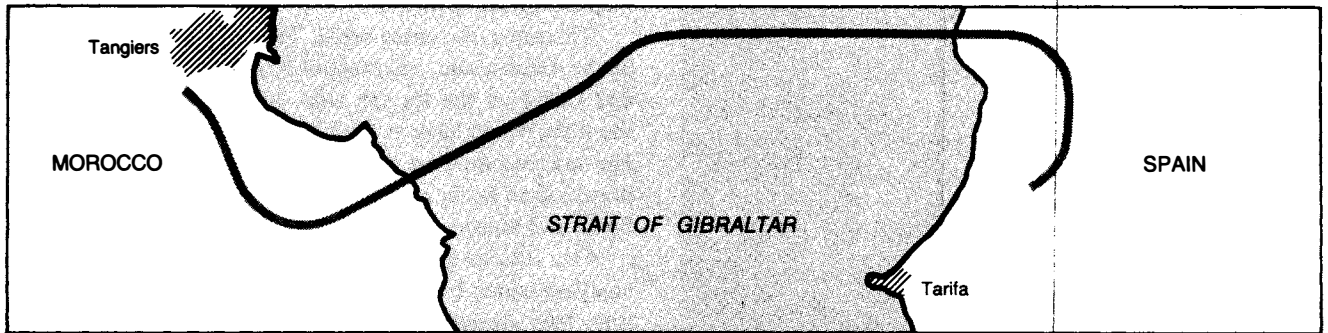
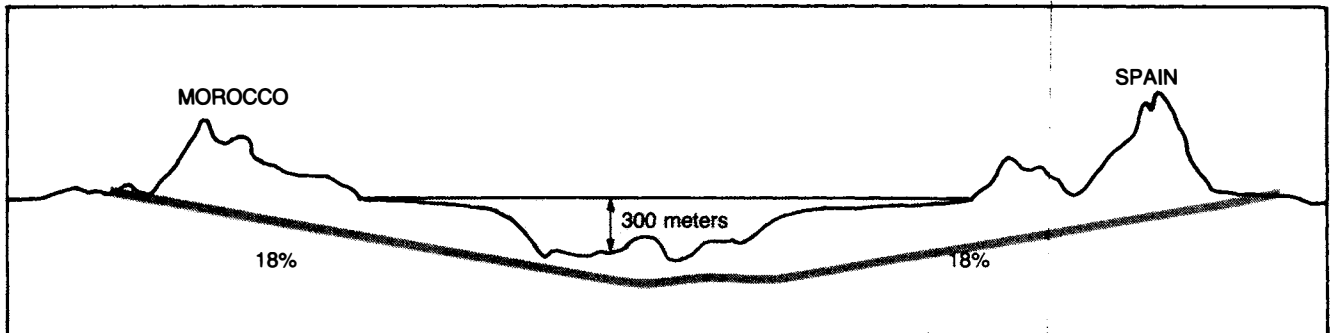


FIGURE 3

**Cross-section of proposed route for the Spain-Morocco tunnel**



low seismic activity, despite its nearness to the Azores-Sicily fault. No seismic movement has been registered of greater intensity than six on the Mercali scale in a radius of 60 kilometers around the project zone.

Knowledge of the morphology and the meteorology (winds, visibility, precipitation, etc.) helps to choose between tunnel or bridge. For example, the distribution of the velocity of the currents which enter and leave the Mediterranean constitutes a complex problem in the case of the bridge option.

Also, the construction of supports for a bridge is quite problematic. We know that the biggest span achieved in giant bridges is just barely 1,410 meters (Humber Bridge in Great Britain, inaugurated in 1981).

To plant pillars across the strait would end up impeding the passage of ships and also involve the risk of collisions against these supports. We know that 50,000 boats cross through the strait yearly, among them some of the world's largest oil tankers. Furthermore, neither the U.S. nor the U.S.S.R. would allow themselves to be forced to make their submarines cross the strait by well-defined passageways.

That leaves the solution of the underground tunnel, which

is also the oldest proposal. This is the same choice as was made for the link under the Channel between France and England. So the tunnel idea has the most reference points for this type of communication.

There is a very important precedent, which is the tunnel of the Strait of Tsugaru in Japan, which joins the islands of Honshu and Hokkaido. It is known by the name of Seikan and spans a distance of 53.85 kilometers. In the English Channel, the maritime surface is 37 kilometers.

In our case, we are talking about a tunnel which runs below the water for 28 kilometers, but its length will be 50 kilometers, because the opening of the tunnel would have to start, both on the Moroccan and the Spanish side, a bit back from the water and, also, since the tunnel has to descend more than 350 meters below the sea, the trajectory would have a slope of 18% (see **Figure 3**). Another factor which has been taken into account is the linkup with the national highway networks on both sides.

The tunnel will have one main passageway with two-way traffic, and a service passageway.

There is also a study of a tunnel with two main passageways with only one-way traffic in each passage, and a service



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*A view of the Casbah and shoreline at Rabat, the capital of Morocco. This is situated to the west of the planned African side of the Spain-Morocco tunnel, on the Atlantic coast.*

passageway.

The main tunnel will be equipped to receive conventional rail traffic, and ferry traffic in which land vehicles would be mounted on rail platforms.

There is a series of unknowns in calculating the costs, but the estimate is around \$3 billion for a two-way rail tunnel.

The expected construction time varies between 10 and 14 years (the Seikan took more than 20 years).

In the case of an underground land tunnel, the length would be 33 kilometers, the cost would be about \$4.5 billion, and the construction time around 12-16 years. The problem for traffic in this type of very long tunnel is ventilation, which could give the traveler the feeling of claustrophobia inside the tunnel.

### **Economic and political impact**

Now a few words on the economic and political repercussions of the project.

This project, as we said, does not merely concern Spain and Morocco, but rather involves a link between two continents. From the projected analysis we conclude that the following will result:

- An increase in human and commercial interchange between the two continents;
- A radical change in the land transportation systems in the two zones of influence.

Thus, the future planning of the localities which are found in a considerable zone of the Iberian Peninsula as well as in north Morocco, must be conceived from now on in an intercontinental context.

Therefore, the cities Sebta, Tangiers, Tetuán, and Arcila on the African side, and those of Algeciras, Gibraltar, Tarifa, and Cádiz on the Iberian side, have to be converted into satellites which have as their axis the zone of the fixed link. For this reason we are pleased to underscore the fact that this project shall be the consecration of an eternal peace between Spain and Morocco.

One curious thing has become known during the various analyses which have been conducted, and this is that countries like Austria and Switzerland produce a significant freight traffic by land and air routes via the strait.

This shows the need to reach the African zone of influence, with a network of highways that could arrive in Senegal, Ivory Coast, and Nigeria.

At the African level, the integration of the transport systems of the Maghreb countries and with sub-Saharan Africa has been under way since the 1970s.

In fact, African ministers and transportation experts have met several times in Morocco, Kenya, and most recently in Zimbabwe to discuss the link to Europe. At the outset there were three options, that of the axis which runs through Egypt, the central one across Algeria, and the one through Morocco. It was decided that this link should go through Morocco, and that was the origin of the Tangiers-Lagos axis.

Africa has been interested in this concretely since the Conference on African Highways organized in Abiyán in October 1976. That meeting invited the International Federation of Highways to promote a union by highways between Europe and Africa, thinking in terms of an axis which would extend from Amsterdam to Dakar, i.e., an axis of some 6,200 kilometers.

As we said at the beginning, studies have shown that present traffic across the strait is 4 million travelers and 400,000 vehicles.

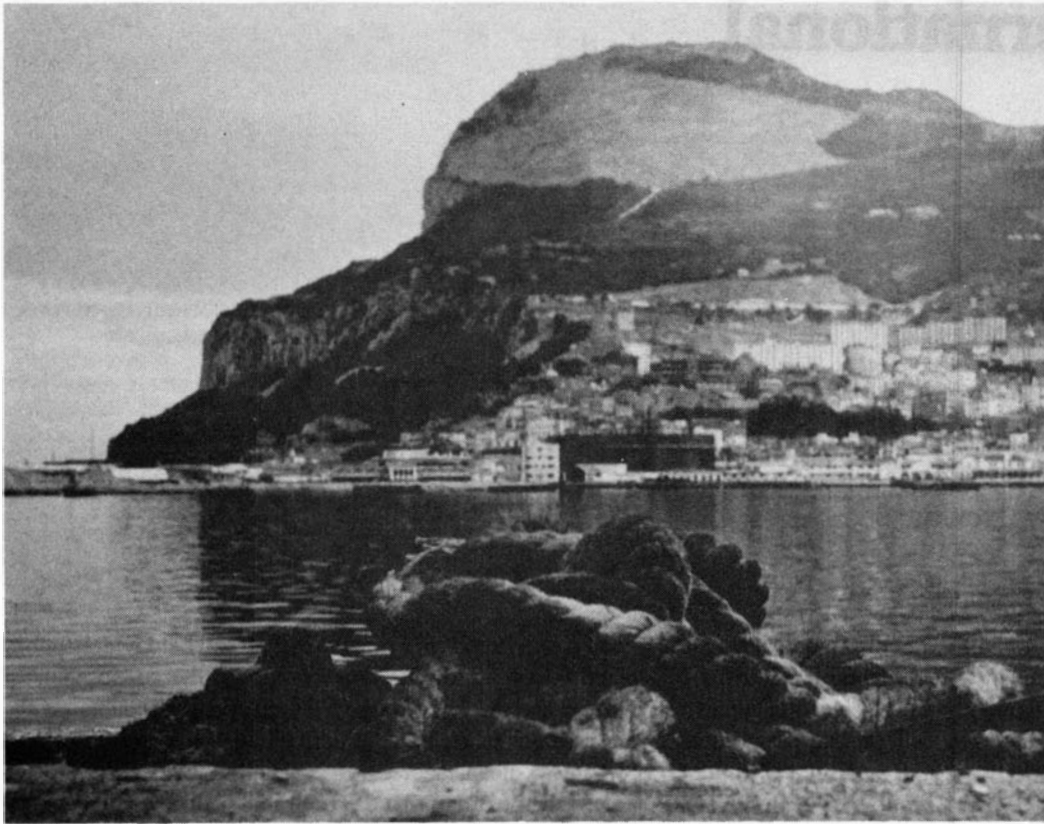
The total volume of freight is 210 million tons between the northern and southern parts of the strait: in the south-north direction, 170 million tons, and in the north-south direction, 40 million tons. That means that the Africa-Europe tonnage is more than four times greater than the Europe-Africa tonnage.

By the year 2000, the number of travelers would range between 8.8 and 12.6 million per year in the case of a bridge, and a slightly smaller number in the case of a tunnel. In freight traffic, with the bridge solution, 4-6.7 million tons a year is foreseen, and in the tunnel case, 1.3 million tons a year.

### **What has happened so far**

The project has aroused much interest, as is evident in the countries of the zone of influence.

In Africa, the project has been given priority in the context of the African highway network. The Second Conference



*A view of the northeast bay of Gibraltar, with the right-hand "Pillar of Hercules," on the European side of the strait to be linked by the new tunnel.*

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of African Ministers of Transport, Communications, and Planning, which took place in Addis Ababa in March 1981, integrated this project into the program of the decade 1978-88 of the United Nations for Transport and Communications in Africa.

This same conference adopted a resolution in Cairo by inviting all the countries concerned to improve the networks which connect with the Tangiers-Lagos axis to meet the route of the Gibraltar link.

In the European context, the project has attracted attention for some time, and, above all, since 1981, of the Committee of Internal Transport of the Economic Commission for Europe, which approved the project in its Geneva meeting of the Gibraltar link.

At the Athens seminar on the North-South link (December 1981), it was recommended that the Economic Commissions for Europe and Africa organize a special seminar on the Gibraltar link. In fact, this seminar was held in Barcelona in June 1983.

The United Nations got interested in the project when on July 30, 1982 in Geneva, the U.N. Economic and Social Council adopted a recommendation inviting people to study the project. A group of experts were informed in Rabat and Madrid about the feasibility of the link in March 1983.

The result of this mission was a report drawn up by these experts, which became the basis for a recommendation of the

Economic and Social Council of the U.N., adopted with the purpose of continuing the study of everything that concerned the link project.

On Oct. 24, 1980, after a scientific and technical accord between Spain and Morocco was signed on Nov. 8, 1979, a joint Spanish-Moroccan Commission was set up and two national study societies were formed: the SNED (National Society of Studies of the Strait) and SECEG (Spanish Society of Studies for the Fixed Communication Across the Strait of Gibraltar).

Delegates of several countries and different international agencies participate in the different activities organized by the joint Spanish-Moroccan Commission to carefully monitor this project, which will certainly require the technical and financial participation of the international community.

Public works companies in Brazil should get interested in this project; there is room for everybody. Morocco and Spain invite all friendly nations to participate. Through this participation, this work will take on a universal dimension.

And finally, here is a panoramic idea of this grandiose project. What I have tried to do is to shed a ray of light on the task which two sister nations have proposed to carry out, nations to which geography and history have offered the unique situation of serving as a cultural link. With this tunnel, we will try to make it happen that the miracle of the crossing of the sea will not be unique to Moses.