The Oasis Plan: Man-made rivers and growth corridors span the deserts

by Marcia Merry

The Oasis Plan outlined by Lyndon LaRouche refers to a program encompassing already-proposed water management, transportation, and other projects, combined with the large-scale use of nuclear power to desalinate water, to establish a system of reservoirs and man-made freshwater canals and rivers throughout the Middle East-North Africa region. By this means, along with agricultural and industrial facilities, and the related provision of social infrastructure—housing, schools, health care, towns, cultural centers, etc.—the foundation is provided for economic development and durable peace.

We present here a summary picture of the priority projects for the region, and also a summary account of the means to provide the critical inputs for realizing these projects, from the output potential of the "Productive Triangle" region of central Europe.

Power to make water

First, consider what we can do with nuclear energy. Take a hypothetical case: Imagine an agro-industrial colony in the middle of a desert, in a location not conveniently reachable from a variety of freshwater management projects now on the drawing boards, but adjacent to salt water from the sea.

We take half a dozen high-temperature nuclear reactor (HTR) modules, of the type which today can be produced on assembly lines. We put together these modules into a power plant producing 1-2 gigawatts of electric generating power and an additional 1-2 gigawatts of usable heat output. We apply a portion of that electric and thermal output to desalinating seawater, using a combination of existing processes, at the rate of 70-100 cubic meters per second. This provides ample fresh water for the domestic, irrigation, and industrial needs of a self-sustaining agro-industrial colony of 1 million people—in the middle of a desert! The rest of the HTR power we use for pumping between the sea and the location of our colony (at an elevation of, let us say, 400 meters). A few more nuclear units cover the electricity and process-heat requirements of the colony itself.

Two dozen such HTR desalination centers produce a flow of fresh water equivalent to that of the Nile and Euphrates combined—a man-made river system!

In practice, the size of individual desalination complexes can vary over a wide range, using recently perfected modular nuclear reactor designs (see box). Complete desalination units, including nuclear power sources, can be built in assembly-line fashion on floating platforms for rapid transport and installation. The technology and most of the development work for such mass-produced units is already complete. The German firm Siemens and the Swedish-Swiss combine Asea Brown Boveri have project designs for these units. The HTR modules possess characteristics of stability and inherent safety which make them ideally suited for large-scale use throughout the region.

This application of nuclear power illustrates what can be done more generally, with the quality of productive power which nuclear technology embodies. Apart from the unlimited potential of desalination, it is eminently possible to transfer huge quantities of fresh water from areas with a surplus of such water—above all, the tropical rain regions of Central Africa—into the Sahel, North Africa, and even into the Middle East. Projects to accomplish this, through systems of canals, reservoirs, and pumping stations, have long been on the drawing boards.

The Great Projects

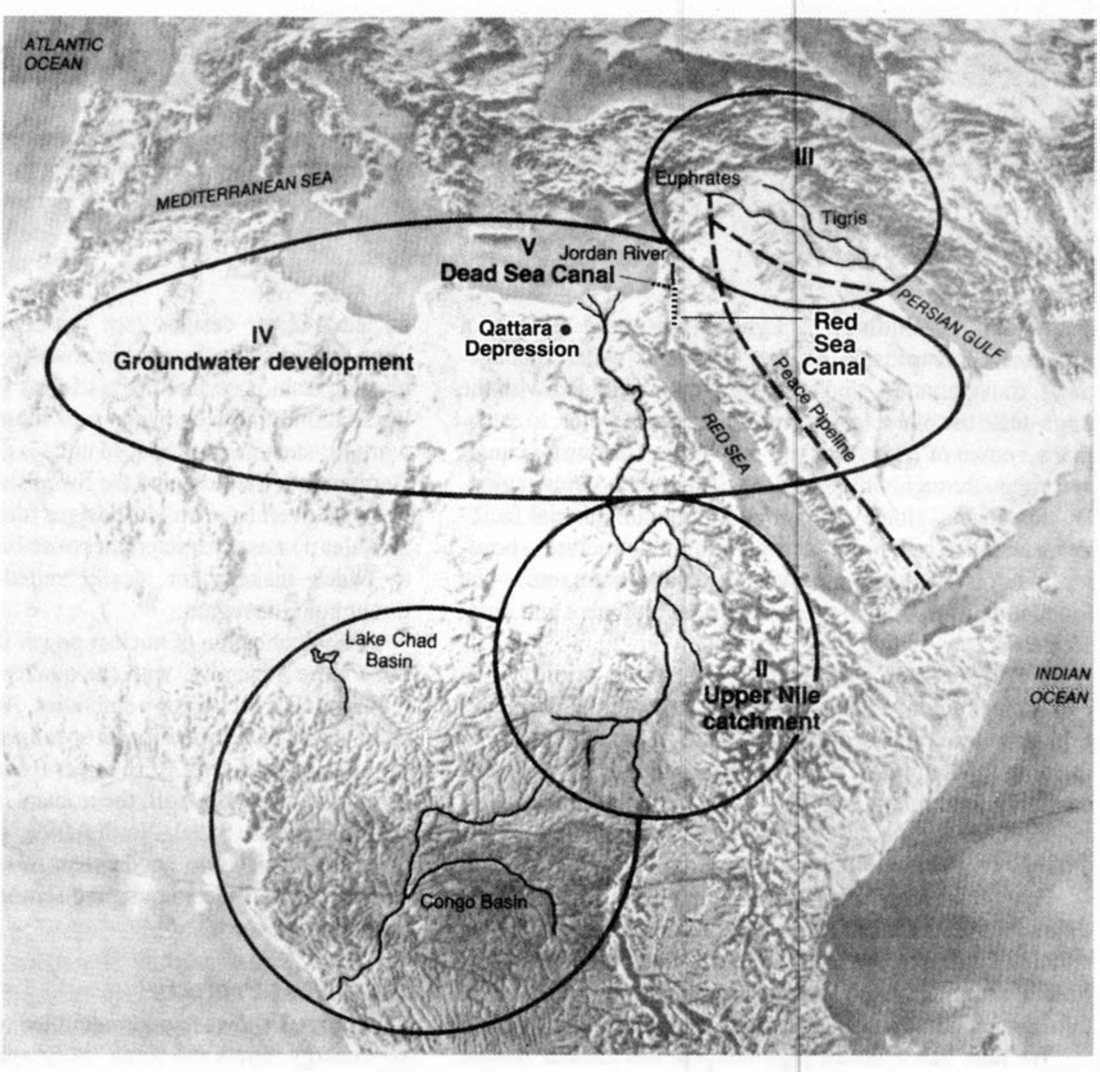
Figure 1 shows regions encircled where, with the necessary energy inputs and some "geographic engineering," water can be channeled from surplus to deficit areas. Other types of projects are also indicated.

Engineering plans exist for the following projects:

- Transferring water from the Zaire (Congo) basin, out of the Ubangi River system, into the Lake Chad basin to stabilize the lake and provide water resources for Sahel development.
- Capturing more of the White and Blue Nile rivers to improve the headlands and downriver regions.
- Developing the groundwater resources from underneath the Sahara, from North Africa across to northern Somalia, and under the Arabian Desert. In particular, the Qattara Depression is shown in northern Egypt, where a huge dry hole is a made-to-order lake bed for seawater to be transferred in via a 35-mile canal from the Mediterranean.

In Libya, 1992 saw the opening of the "Great Man-Made River" project, in which water is pumped up from under the Sahara and carried by a huge underground pipeline to population centers on the Mediterranean coast which are oth-

FIGURE 1
Major water development projects



erwise running out of water.

• Improving the flow of the run-off originating in the Anatolian highlands in Turkey, down through the Euphrates and Tigris River basins. The map indicates this by the two-pronged "Peace Pipeline" proposal of Turkey, which, even though the proposal has been used as a geopolitical ploy, symbolizes what could be done in terms of making run-off available in other ways—augmented flow, aqueducts, tunnels, etc.—to enhance the region. On the lower Tigris and Euphrates, Iraq has built a "Third River"—a large drainage canal to carry away the saline irrigation run-off to the Persian Gulf.

• The centerpiece projects of the entire region are proposed canals that would connect the Dead Sea either to the Mediterranean, or to the Red Sea, or to both, serving as seawater channels, along which nuclear-powered desalination units can provide the water resource base for development corridors throughout the region. **Figure 2** shows schematically the possible routes of these canals.

The Mediterranean-Dead Sea proposals have been discussed for decades. The route through Israel, south of Beersheba, was proposed by Dr. Gad Yaacobi. According to another proposal by Prof. Haim Ben Shahar, former president of Tel Aviv University, the project was more an energy program, not a water source—although recent technological advances in desalination have superseded this view.

Most recently, the Dead Sea-Red Sea proposal has been advanced by Dr. Munther Haddadin, a former director of the Jordan Valley Authority and head of the Jordan delegation for negotiations over water in the recent Multilateral Peace Talks. He has stressed the role of bringing in seawater to raise the level of the Dead Sea, which has fallen dramatically. A higher Dead Sea water column will act beneficially to stabilize the aquifers on both sides of it. Haddadin said in

Energy and water for the Mideast: the MHTGR

High-temperature gas-cooled reactors (HTGR) are an advanced form of nuclear fission reactor that originated as a spinoff of NASA's search for a nuclear propulsion system for manned missions to Mars in the 1960s, and prototype reactors have been operating for years at Fort St. Vrain, Colorado, and in the Federal Republic of Germany.

Designs are now forthcoming for modular reactors (MHTGRs) from General Atomics of California, and Siemens/Asea Brown Boveri of Germany. General Atomics proposes a standardized design for an HTGR module, able to produce 350 megawatts of thermal energy, which can be converted to about 140 MW of electricity. Asea Brown Boveri proposes small modules that can be "floated" into place on barges, and hitched with desalination facilities to cheaply produce fresh water.

The MHTGR uses helium gas as a coolant, instead of water. Since helium gas is inert, and has very low neutron absorption characteristics, the MHTGR is top of the line in design safety. Pipes, valves, and other metal reactor parts will not react with helium, virtually eliminating corrosion. The inability of helium to absorb neutrons means it cannot become radioactive, so problems with embrittlement and possible fatigue failure of metal parts are also eliminated. Moreover, since helium remains as a gas throughout the reactor cycle, there is no chance that the coolant will boil away; this also allows for visual television inspection of the inside of the reactor while in operation—something not possible during the steam phases of a water-cooled reactor.

MHTGRs for desalination

A study by the U.S. Department of Energy and the Metropolitan Water District of Southern California found that one single desalination plant, consisting of four 350 MW MHTGRs, could produce 106 million gallons of water per day, or 38.6 billion gallons per year, and provide at the same time, 466 MW of electric power each as well. There are also designs for smaller units, easily mass-produced.

A unique advantage of high-temperature gas-cooled reactors is that their energy can be used as process heat or steam. Seventy percent of industry's energy needs are of this type. With the advantage of MHTGRs' flexibility in siting, they can be located strategically where they can provide water, electricity, and process heat for industry all at the same time.

June 1992, "The days to come and the months to come would probably witness a dialogue over a project like this [Dead Sea Canal] in the multilateral talks, and see how best that level of the Dead Sea be controlled."

Through these and related projects, significant improvements in the water supply of the Middle East and North African nations could be realized within a few years, with dramatic improvements accruing by the turn of the century.

Man-made rivers and lakes

It is crucial that the water flows thus generated not be dispersed in an arbitrary manner, but be organized and concentrated in what could best be described as a "network of man-made rivers and lakes." Water from the Mediterranean, Red Sea, Persian Gulf, and Arabian Sea can be channeled via canals into a series of artificial reservoirs.

Where necessary, water must first be raised through pumping to points from which the water can then flow to reservoirs via canals. The power for this can be supplied by nuclear reactors. Where the creation of canals and reservoir basins requires large earth-moving operations, nuclear excavation can be employed with advantage.

Canals provide both the water flow to fill the reservoirs, and also a transport means. Along the canals and reservoirs we can construct "nuplexes"—complexes of nuclear power and large desalination units, generating fresh water for a system of smaller and larger freshwater canals ("artificial rivers"). Large-scale use of desalination is complemented by channeling and pumping of fresh water from natural sources.

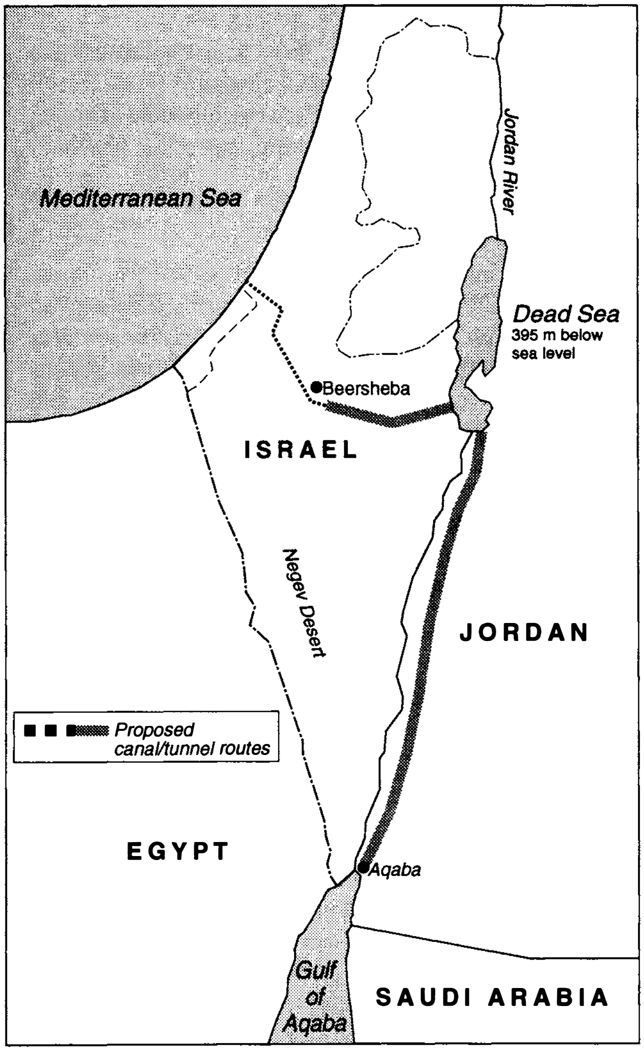
Instead of simply spreading the fresh water around evenly in an irrigation system, we can create with these rivers a network of interconnected "green bands" of development. As opposed to merely isolated "green islands," these green bands become at the same time transportation axes for the movement of goods and persons by ship, rail, and road, and the locations for new towns, cities, and industrial complexes.

The locations and courses of the new rivers and "green bands" must be determined on the basis of geographical, geological, and infrastructural considerations, bearing in mind the future growth of population and transport as well as the regime of water flows which will arise through increase in natural rainfall.

The reservoirs of salt water channeled inland from the seas will serve several purposes. First, they supply the desalination plants and various industries along their shores. Second, they provide a means of transport, together with the canals. Third, the water from these lakes enhances the water cycle of the atmosphere; and there are potential hydrostatic

FIGURE 2

Proposals for a Dead Sea-Red Sea canal, and a Dead Sea-Mediterranean canal



benefits for the groundwater.

The ability to provide flows of fresh water in the indicated fashion also gives us the power to modify the climate of the region in a most beneficial way. Evaporation from lakes and reservoirs, and above all transpiration from plants and the other effects deriving from large-scale, irrigated, intensive agriculture in desert areas, greatly enhance the natural processes for generation of rain. Provided that water management and agriculture expand in parallel with the increase in rainfall, this process becomes self-accelerating. The throughput of water among the atmosphere, sea, land, and biomass grows to the point that the deserts finally disappear, and a mild, "Mediterranean" climate is established throughout the region.

Inputs from the European 'Productive Triangle'

The most essential precondition for the proposals outlined here, is the realization of Lyndon LaRouche's infrastructure development program for the "Productive Triangle" – the three corners of the spherical triangle defined by the cities of Paris, Berlin, and Vienna. The fate of the Middle East is inseparably linked to generating a new "economic miracle" in central Europe via high-speed rail and magnetically levitated rail systems and a renaissance of nuclear energy. **Figure 3** shows the core region of the Productive Triangle, and radiating outward, spirals of development corridors along the centers of population and economic activity.

Given the collapse of the U.S. economy, it is continental Europe, together with Japan, which must provide the decisive margin of technology for developing the Middle East. This includes the mass production of nuclear modules and desalination units over the next 15-20 years.

In this context, we must massively upgrade the transport infrastructure between North Africa, the Middle East, and the Productive Triangle in Europe. This must include connections to the southern tip of Spain, a bridge to Sicily, high-speed rail connections to Istanbul, and connections to the Black Sea.

Among the proposed elements of this transport grid are:

1) Construction of a transport route across the Strait of Gibraltar.

2) Extension of high-speed freight and passenger rail lines from central Europe into a closed loop around the Mediterranean: over the Gibraltar bridge along the coast of North Africa, over the Suez Canal to Israel-Jordan-Lebanon-Syria, and via Turkey back to central Europe.

3) Massive upgrading of rail connections through Turkey into Iraq, Iran, and beyond.

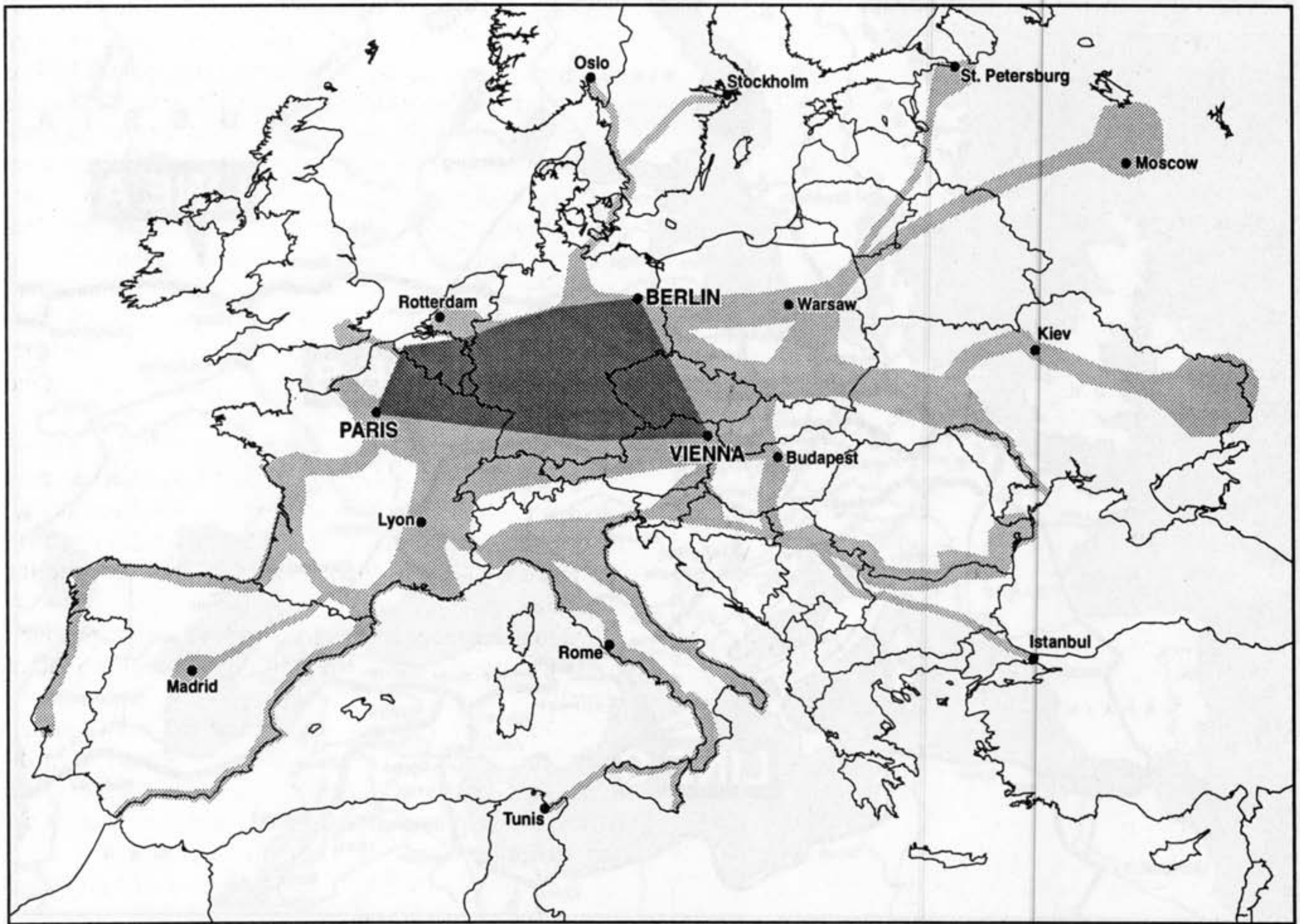
4) Infrastructural development of the Black Sea area, providing for improved rail and sea links to the industrial centers of Ukraine, via the "Danube arm" (Line C on the map) to Europe's Productive Triangle, and through the Caucasus.

5) Improvement of sea and pipeline connections between Sicily and North Africa (Tunisia), with the eventual option of a tunnel.

War against the desert

The process outlined here can be usefully thought of as a "war against the desert," with the goal of attaining eventual "final and complete victory." Fresh water is the immediate ammunition, and the "frontline soldiers" are the construction workers and corps of engineers who build the canals, towns, industrial complexes, and railways, and the farmers who work the irrigated land "conquered" from the desert. "Behind the lines" are the industrial workers and engineers who provide the "armaments" for the "war": steel, concrete, piping, desalination and power equipment, bulldozers and tractors, and prefabricated housing. Each new piece of territory won from the "enemy" must be consolidated, colonized, and converted into a base for

FIGURE 3
Spiral arms extending from the European 'Productive Triangle'



further assaults on the "enemy." The measure of firepower is the amount of useful energy which can be applied per square kilometer and per capita, in terms of intensities of agricultural, industrial, and infrastructural activity.

Just as with real armaments, increasing the firepower is a question of the level of technology. In the face of such a formidable enemy as the deserts of North Africa and the Middle East, we would be foolish not to employ the most modern arms available—"nuclear weapons," such as the high-temperature reactor, combined with advanced desalination technologies and so forth.

The ability to use these weapons of modern technology depends on the education, training, and moral qualities of the soldiers and those who must supply and maintain such weapons. To these are added the scientists and engineers who must constantly develop and perfect new weapons in the course of the war. Ultimately, it is the productive power of society, the expansion of its economic base, which determines whether or not the protracted war against the deserts will end in victory.

Social infrastructure

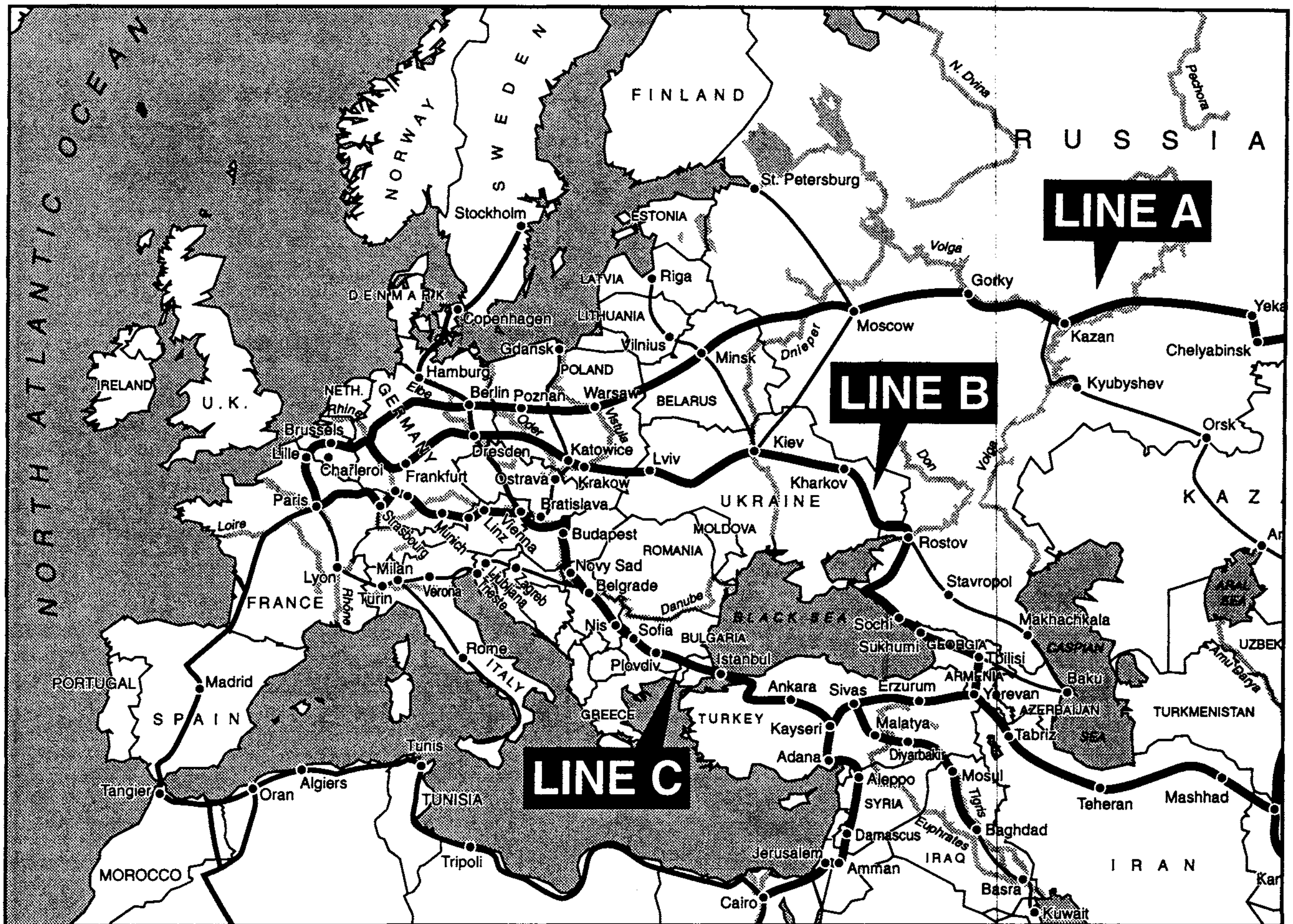
Ranking equally with the need for water in the region is the need for provision of housing, health care, education, cultural and religious centers, and all manner of social infrastructure. Despite strife and economic hardship, several local examples of new town development show the way.

For example, in the east Egypt desert, in the 1980s, agriculture complexes were created from the ground up, located at chosen sites convenient to new experimental agriculture development zones. Power was supplied for pumping groundwater. Where for the past 5,000 years only desert brush grew, water was supplied, and soils "created" by a scientific sequence of cropping, resulting in humus formation and good yields.

Wholly new towns were designed and built for the new residents, accounting for dwellings, schools, shops, religious and cultural centers, and with special attention provided to the architectural features. Now the design and construction of new towns becomes the foremost Great Project of the accords.

FIGURE 4

Eurasian rail system would link up with the Mideast



The great trans-Arabian railway

Any effort to stabilize the Middle East by economic development must begin with the construction of a trans-Arabian railway grid that links the entire region to the transport infrastructure and industrial power of central Europe. **Figure 4** shows selected major links of the proposed Eurasian rail grid interlinking the Productive Triangle region with the Mideast and North Africa.

The basic concept needed for the Middle East rail grid is still the same as that which was worked out 100 years ago and proposed by Germany under Otto von Bismarck. The projected rail grid ultimately connected Berlin with Baghdad, and led to the planning of the great railway projects of the central routes Istanbul-Baghdad, Damascus-Mecca, and Caspian Sea-Persian Gulf.

The first segment of the Berlin-Baghdad connection—the Anatolian route from Istanbul to Konya which was completed in the record time of only six years between 1888 and 1894—proved the effectiveness of the new rail link in promoting industrial production and commerce in the western part of what was then the Ottoman Empire. The volume of grain transports along the Eskisehir-Konya route increased from 12,200 tons in 1895 to 106,700 tons in 1897; and the volume of minerals grew from only 15 tons in 1896, to 26,072 tons as early as 1900. The availability of the new route led to a visible rise in production and density of population along the railroad within only a few years.

The successful development of the Anatolian mineral deposits generated the concept of a similar rail link from the mineral-rich areas on the Dead Sea and south of it, to the port of Aqaba. This intention of the government in Istanbul, however, met as much opposition from British Empire interests, which feared competition to their monopoly on Suez Canal transit revenues, as did another plan to continue the Anatolian route to Baghdad via Adana and Mosul. Construction on the Konya-Baghdad route was interrupted in 1904, and on the Amman-Aqaba route in 1906, after threats of military action by the British Empire.

A compromise route from Damascus to Medina through Amman, the so-called Hedjaz Pilgrimage Railroad, was unwillingly accepted by the British on condition that the Aqaba port project and the continuation of the rail line from Medina to Mecca and the Red Sea port of Jiddah be stopped. This one-track route had great potential for development into a rail link for mass transport of commodities on the western rim of the Arabian Peninsula. The railway's economic potential—and of course its military implications—caused the British in 1916 to have their agent, T.E. Lawrence "of Arabia," destroy the tracks of the Hedjaz route and thereby block transport along the entire route over a length of 844 kilometers from Mecca northwards. Various efforts to restore the route have not succeeded to this day.

In the twentieth century, there were repeated initiatives for rail projects, and repeated obstructions. Each mile was an achievement. The construction of the first trans-Iranian railroad, from Bandar Shah (currently Bandar-e Torkeman) on the Caspian Sea to Bandar Shahpur (Bandar-e Khomeyni) on the Persian Gulf, was begun in 1927 under the first Shah Reza by German and American engineers—over British protests—and completed in 1938.

However, the outbreak of World War II again halted the big railway projects. Construction on some of the routes was not seriously considered for lack of funds before the late 1960s, and only gained new momentum after the 1973 oil crisis which gave various Arab governments increased revenues from oil sales.

Railway designs in the 1970s

New plans for big trans-Arabian railroad projects were worked out by the governments of Egypt, Jordan, Syria, Saudi Arabia, and Iraq, and were presented in the mid-1970s in the Arab League's Guidelines for Railroad Projects in the Middle East. This included:

- The completion of the Baghdad-Basra-Kuwait rail link plus another 1,550 miles of inner-Iraqi routes at the cost of approximately $20 billion.
- The Damascus-Homs-Palmyra link in Syria at the cost of $2-3 billion, the restoration and change from small gauge (1,050 mm) to the European standard gauge (1,435 mm) on the entire old Hedjaz route, plus the branch westward to Aqaba in Jordan and Saudi Arabia at the cost of $5-7 billion.
- A trans-Saudi rail route from Dammam on the Persian Gulf to Mecca-Jiddah on the Red Sea at a cost of $10-12 billion was planned, and another, parallel trans-Saudi route, proceeding north of the first one from Riyadh to Medina via Buraydah, were projected as well, at $8-10 billion.
- In Egypt, two rail links leading to the planned Qattara Depression reservoir project, one from Alexandria southward, the other westward from Heluan through the oasis of Bahariyah with its rich neighboring minerals and iron ore reserves, were worked out, also at projected combined costs of several billion dollars.

The basic idea behind these trans-Arabian projects was to utilize the increased revenues from crude oil sales to the industrial nations of the West, for industrial, agricultural, and urban development in the second half of the 1970s and the entire decade of the 1980s. This development era never occurred.

Let's complete the projects!

Now these projects must be pursued. An immediate goal is to complete the rail lines along the main routes of Istanbul-Baghdad-Basra-Kuwait, Aleppo-Damascus-Amman-Jiddah-Mecca, Alexandria-Qattara, and Heluan-Bahariyah-Qattara, is more urgent than ever.

Since the conceptual work done by the Arab governments in the 1970s, additional useful projects have been envisaged. Resuming work on the Syrian-Jordanian segment of the old Hedjaz railroad, in connection with a Jordan Valley development project with extended operations at the ports of Tripoli, Haifa, and Aqaba and with the modernization of rail links between these ports, would create a joint region of rapid economic growth that could define mutual, sound interests in peace between Israel and its Arab neighbors.

Furthermore, direct cooperation between the Suez Canal and the port of Aqaba could serve the development of a riparian urban culture along the western rim of the Arabian Peninsula, from Aqaba to Jiddah and Aden, and launch a mirror development on the western rim of the Red Sea, along the eastern African coast from Suez to Djibouti.

The natural extension westward of Egypt's Qattara development project would be the construction of a trans-Maghreb rail route from Alexandria to Oran to Tangier, along the Mediterranean coast of northern Africa, and the construction of another rail link from the Nile to the Lake Chad development project in northern Central Africa.

The creation of a rail ferry link from southern Italy and Sicily to the Libyan port of Tripoli, plus the drilling of two rail tunnels below the Strait of Gibraltar in the west and beneath the Dardanelles in the east (modeled on the Channel Tunnel project under construction between France and Britain), would establish three central connections of modern transport infrastructure among Africa, the Middle East, and the envisaged Productive Triangle in central Europe.

Generally speaking, the main trans-Arabian rail routes should be laid out in a two-track mode, at least, and eventually even in three or four tracks, to provide a basic, future-oriented rail grid that could last for the next 100 years. Electrification and broadening of many old tracks from the 1,000 mm gauge to the European standard gauge of 1,435 mm width is necessary to link the entire rail infrastructure of the North African and Middle Eastern regions to the modern rail grid of Europe.

If done properly, concentrated investments in the transport infrastructure, with emphasis on modernized and high-speed railroads, could lay the groundwork for a great region of economic cooperation among Europe, Africa, and the Middle East that would, after a long period of war and conflict, manipulation, and imperialist ventures, finally make the Mediterranean a lake of peace and development.