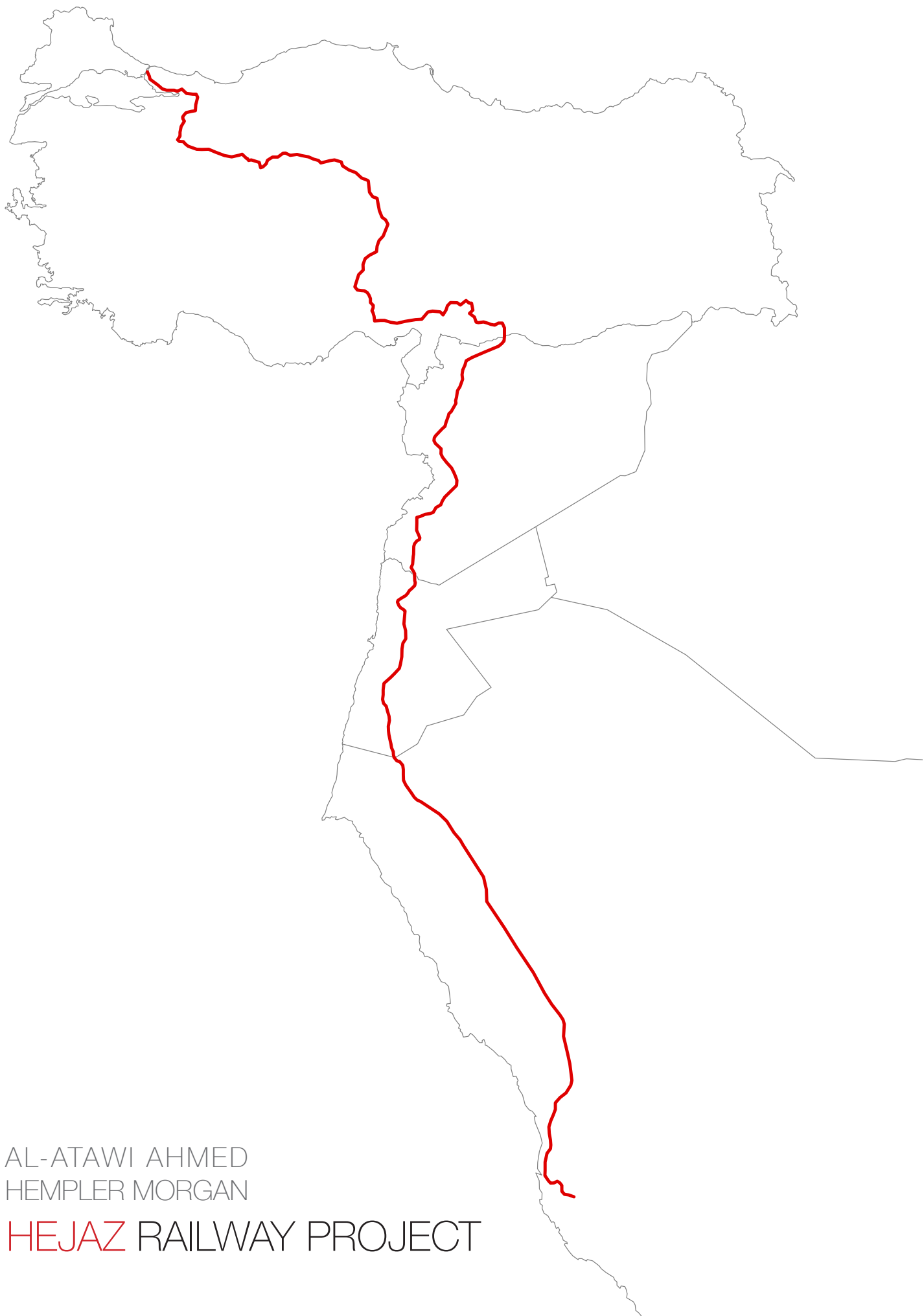




AL-ATAWI AHMED
HEMPLER MORGAN

HEJAZ RAILWAY PROJECT

ABSTRACT

The theme of this thesis is the result of a journey made in the summer of 2014 in Jordan and the UAE. During this tour, we were able to experience and feel a socially omnipresent ancestral culture that fades gradually in favor of an international standardization that results of an oppressive globalization. This is palpable at several scales in this region which is shared between morals inherited by a rich history coming directly from the foundations of Islam and a will of the upper classes to take as an example the world powers.

What struck us during our trip, was the overall disunity of the different peoples that we could meet. Despite a common culture, there was no solidarity between countries while at the individual level, every person we had met and with whom we could discuss, cared much about the miseries that affects the neighboring and distant Muslim populations. Therefore, there was some kind of a schizophrenia in those countries that was preventing them from uniting. It was also interesting to notice that Arabs, somehow, lost faith in their heritage. Indeed, being obsessed with the power coming from the west, they completely denied their local strength and interacted more with the West than with their country. The rich people send their childrens to the best reknowned Western universities and they copy, often far too literally, European and American way of life.

As an example, we had the chance to be invited to what they called a “modern marriage”. Without emitting any value judgment, we must admit that what we saw there was not at all natural. The staging seems taken from a 1980s soap opera where the whole ceremony was filmed and where actors were playing their wedding ceremony. The wedding took place in a five star hotel and all the guests of the banquet were dressed in tuxedos and evening dresses as if we were invited to a typical high class western wedding. Without questioning whether it was good or bad, we can’t but agree on the fact that nothing in this ceremony seemed natural.

Besides that, we could have a glimpse of what looked like a more traditional wedding. Made with few resources, a tent in the garden and some fireworks, anyone was free to pass by and present the congratulations to the married couple. The ceremony was framed by many traditional habits and the atmosphere was more liberated and festive.

What must be noticed from this small analysis of the marriages, is the bipolar atmosphere in these countries. They often lose their rich tradition to make a fake copy of what is happening elsewhere.

With this observation came a first desire to find a project that federates through the Arab world to restore the unity and confidence it seems to have lost with time.

A project that would allow the Muslim peoples to converse with each other again and to

ABSTRACT

realize that their common culture makes them stronger than they think. A project that eventually would let them create international class schools that stand for their traditional values and rich heritage. All this in order to form the Arab brains of tomorrow according to their history and culture, rather than sending them to countries with different principals. We are not affirming that it would be bad to do so but we are in the process of campaigning for the affirmation and preservation of the differences between the peoples of the world and the maintaining of the diversity of humanity.

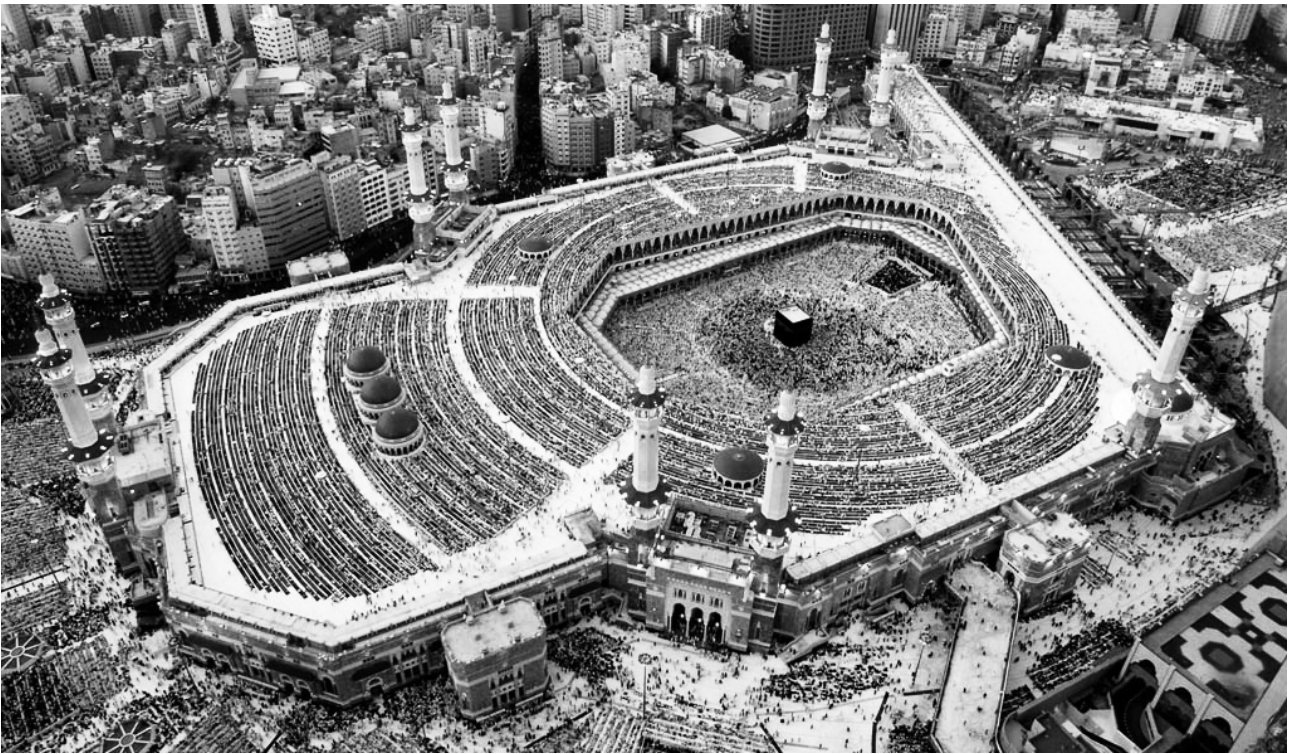
Alongside all this social analysis that concerned us on this trip, we were confronted with another problem. We have furrowed many roads in Jordan and the UAE, and we realized that the network was extremely deficient. In both countries, the national scale infrastructure was reduced to a single highway line with a North-South direction in Jordan and East-West in UAE. The only way to get around was by car for those who own one or by bus for the low and middle class people. Arising out of this observation and of the social analysis mentioned previously, our souls of utopian architect raised with the high humanist, radical and dreamy, projects of Le Corbusier, led us to the idea of an international rail infrastructure project. A project that would place Damascus at 1h of all the inhabitants of Amman while connecting Mecca to Istanbul.

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Mecca, Mosque, 2011

A | THE MIDDLE EAST : A FRAGMENTED REGION

INTRODUCTION

I | A UNIQUE CULTURE

1. THE RELIGION
2. THE LANGUAGE
3. PATTERNS OF LIVING

II | A TROUBLED HISTORY

1. THE OTTOMAN MIDDLE EAST
2. BRITISH AND FRENCH COLONIALISM

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A | THE MIDDLE EAST : A FRAGMENTED REGION

The term “Middle East” commonly refers to the region that stretches from the Atlantic Ocean in the west, to Afghanistan in the east. This region is extended over a distance of approximately 5,600 kilometres and has a total population of 300 million people. It encompasses the countries of Morocco, Algeria, Tunisia, Libya, Egypt, Israel, Lebanon, Syria, Jordan, Saudi Arabia, Kuwait, Bahrain, Qatar, the United Arab Emirates, Oman, Yemen, Iraq, Turkey, and Iran. There are also some African countries such as Mauritania and Sudan that are considered to be within the “Middle East” region.

The use of the term “Middle East” had increasingly come to replace the more conventional use, which divided the area into two regions: the Middle East and North Africa. The term “North Africa” referred to the Arab countries of Morocco, Algeria, Tunisia, and Libya; while, the Middle East referred to Egypt (which is geographically located in North Africa) as well as, the rest of the Arab countries to the east including Israel, Turkey and Iran. For the purpose of this study, we will use the conventional usage of this term.

Nevertheless today, the terms “Middle Eastern” and “Middle East” have been adopted by the people of this entire region to either refer to themselves or to that part of the world, in the same way as the terms “Europe,” “Central

Asia,” and “Southeast Asia” are used to broadly identify highly complex and culturally diversified regions of the world.

I | A UNIQUE CULTURE

1. THE RELIGION

The most important factor of communal identity in the region is probably related to religion. The majority of the middle-eastern population is Muslim. Islam originated in northern Arabia when Prophet Mohammed (A. D. 570-632) succeeded in converting the animist and pagan tribes of the Arabian Peninsula to a new religion. Following the death of Prophet Mohammed, Arab-Muslim armies swept out of Arabia in a series of military expeditions that pitched the Muslims against the Christian Byzantines and the Sassanids (Persian empire). Defeated by the Muslims, the Byzantines were forced to withdraw their armies from Jerusalem and Damascus into the heartland of Anatolia, closer to Constantinople, their capital. The Sassanids were routed out of Iraq and Persia, which later became provinces of the newly formed Arab-Muslim state, based first in Damascus and later in Baghdad. Almost a hundred years after the Prophet's death, the borders of the Muslim Empire had reached the Pyrenees in the west and Afghanistan in the east. The conquest of this vast and heterogeneous territory was accompanied by



Middle East Countries

1 - Lebannon

2 - Israël

3 - Jordan

4 - Arab United Emirates

5 - Qatar

6 - Kuwait

mass conversions to Islam.

During his lifetime, Prophet Mohammed had recognized the Jews and Christians as “People of the Book,” recipients of a valid but incomplete revelation. As such and unlike the pagan Arabs, the small Jewish and Christian communities in northern Arabia were not forced to convert to Islam; they were accepted and given a special status within the larger Muslim community, or *umma*, as “protected” people”.

This rule was followed by all the Muslim successor states; the Jews and the various Christian sects were allowed to practice their faith and retain their institutions and customs. They were, however, required to pay a special poll tax and were not allowed to serve in the army. This method was later adopted by the Ottomans and applied to a large number of non-Muslim communities, including the Armenians and the Druze. Known as the “*millet*” system, this rule constituted the basic principle of Ottoman administration and it became very useful at the turn of the twentieth century, when seventeen different communities were recognized. This practice was, to a large extent, responsible for the encapsulation and the survival of religious communities as inherent components of Middle Eastern social structure. Concomitantly, it also helped to reinforce the social and political significance of sectarian identity. (cf. D.III.Social Layer)

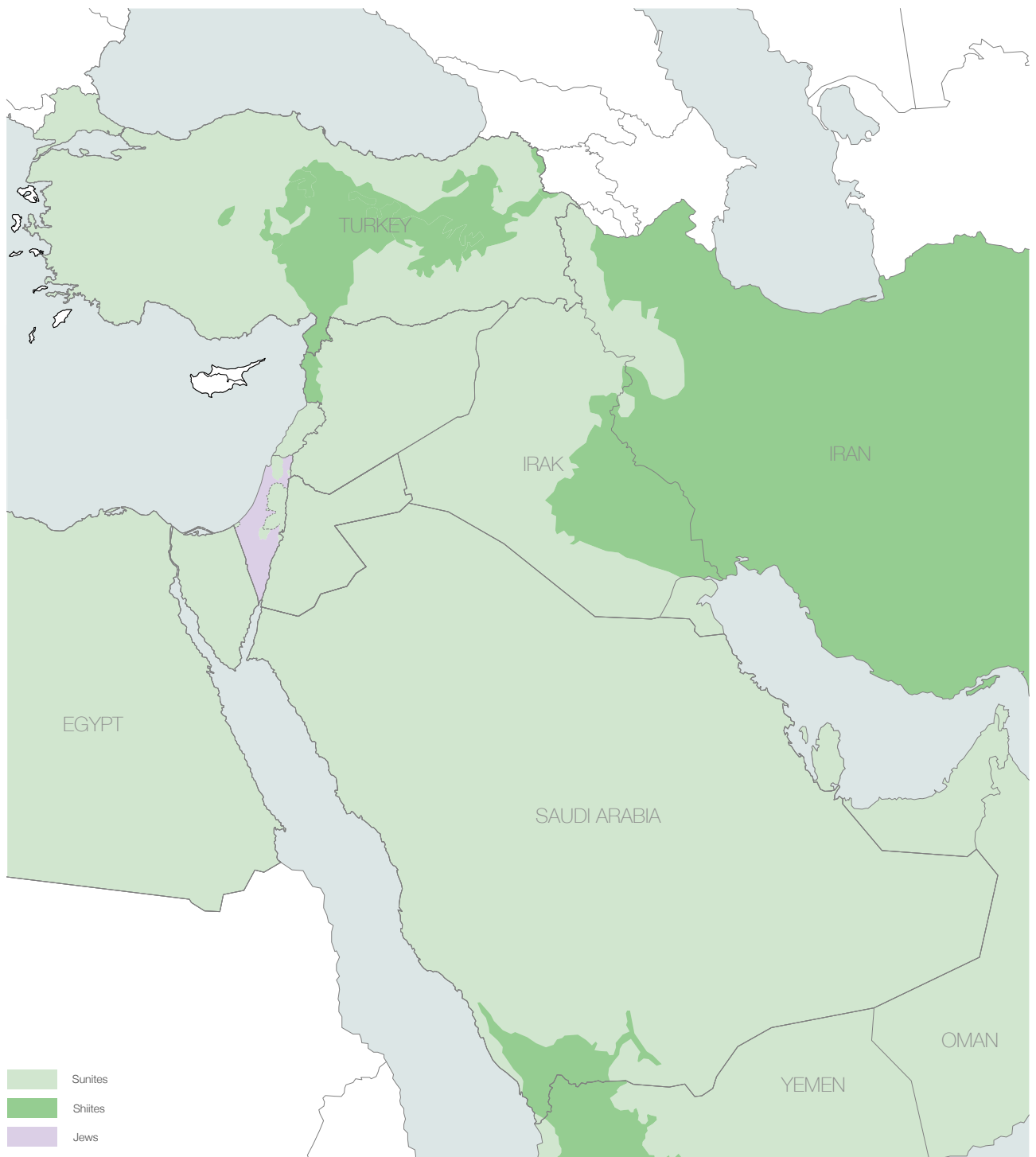
2. THE LANGUAGE

The four major language families in the region are Indo-European, Semitic, Altaic or Turkic, and Afro-Asiatic.

Persian (Farsi), Kurdish, Luri, Baluchi, and Armenian are Indo-European languages. Arabic and Hebrew belong to the Semitic Family. Turkic languages include the modern standard Turkish, Azeri, and Turkmen. Hebrew, Persian, and Turkish are the national languages of Israel, Iran, and Turkey, respectively. Arabic is the national language of all the other countries in the region.

Persian is written in Arabic characters and its vocabulary includes a large number of Arabic words. Under the Ottoman empire, Turkish was written in Arabic characters until 1928, following the defeat of the Ottomans in World War I, and as part of the effort to modernize Turkey, a state edict replaced Arabic with Roman characters.

The most widely spoken language in the Middle East is Arabic, which. Arabic has a variety of dialects and people who speak one version of it fluently may have difficulties understanding and adapting to another one. Despite the differences, the bases for the language are the same, and written Arabic remains the same. Arabic is also the language of Islam, and many Muslims read and recites the Holy text (Qur'an) in Arabic, even if it is not their main language.



3. PATTERNS OF LIVING

Following the challenges posed by the climate, topography, and limited water supply, the people of the Middle East have, from the beginning of recorded history, pursued three different but related living patterns: urban, rural, and nomadic. The juxtaposition of the city, the village, and the nomad's camp is a distinctive feature of the Middle East as a cultural area.

The region hosts some of the oldest cities in the world, such as Damascus and Istanbul. Middle Eastern cities have been and remain the centre of political, religious, economic, and intellectual life. They dominate and overshadow the rural countryside where, until recently, the majority of the population lived as peasants, working on land owned or controlled by absentee urban landlords. In 1900, it was estimated that no more than 10 % of the region's population lived in an urban dwelling. By 1970, the proportion had grown to 40 %. Although there is no agreement concerning the definition of a "city" or an "urban settlement," scholars agree that, on the whole, slightly over half the inhabitants of the Middle East today live in centres of more than 20,000 people. As is the case with other parts of the third world, this accelerated urban growth, which is largely the result of rural-urban migration, has generated severe problems in housing, employment, schooling, and services. Given that the majority of the region's population is below 20 years of age,

it is not surprising that cities and towns, with their growing slums, are hotbeds of political conflict and activism.

In contrast with urban and rural populations, nomadic pastoralists have always constituted a small minority of the region's total population (and in the late twentieth century, no more than an estimated 1 %). Although conditions affecting nomads vary from one country to another, there has been a decline of nomadic pastoralism since the turn of the twentieth century. For example, in 1900, in Iraq, nomads were estimated to represent about 35 to 40 % of the population; by the 1970s, their proportion had declined to 2.8 %. In Saudi Arabia, nomads constituted approximately 40 % of the population, a figure that had declined to about 11 % by 1970. This decline was vastly accelerated in the 1950s, with the establishment of the modern nation-states and the influx of oil wealth into the region. Actually, nomadic pastoralists have been increasingly brought under the authority of central governments. In Saudi Arabia, the once proudly independent "noble" camel-herding Bedouins are now members of the Saudi Reserve National Guard or labourers in the oil fields. In Iraq, Jordan, Syria, Iran, and Egypt, land-reform measures, changing patterns of land use, and the availability of wages have combined to undermine the nomads' traditional way of life by hastening their integration into the national culture.

Nomadic pastoralists, who account for a small part of food production in the region (when compared with peasants), have a historical

and cultural significance that far outweighs their number and economic contribution. This is generally true for all tribally organized nomadic populations, be they Arab, Berber, Turkish, Kurdish, or Persian speakers.

It should be noted that Western scholars have, on the whole, overemphasized the sectarian and cultural differentiation in the Middle East, thereby projecting a picture of a highly fragmented society torn apart by opposed primordial loyalties and ancient animosities. However, when compared with other parts of the world such as Russia, Eastern Europe, and Southeast Asia, the Middle East exhibits remarkable coherence as a culture area.

There are various factors that account for this coherence. First of all, aside from Turkey and Iran, the majority of the inhabitants of the region are Arabic speakers. Despite national and regional variations in dialect, they all share a standard written version of Arabic. It is also the language taught in school and used over the radio and in the newspapers. Secondly, the region is predominantly Muslim and has been so for over a millennium. Thirdly, the tripartite division of the population into urban, rural, and nomadic segments is a universal feature throughout the area defined here as the Middle East.

Claiming a relative cultural coherence to the region is not to deny the cultural diversity that exists; in fact, each country in the area contains groups or minorities that are distinct from the larger population in terms of cultural “marker” that is recognized by themselves and

others as the hallmark of their identity. These ethnic or communal markers include religious affiliations, language, tribal membership, racial variations, and local customs. The two most important markers of ethnic and cultural identity in the Middle East are language and religion.

It is important to note that the recognition and acceptance of ethnic and communal differences have traditionally been a fundamental principle of social organization in the Middle East.

II | A TROUBLED HISTORY

1. THE OTTOMAN MIDDLE EAST

For nearly 400 years, the Middle East was part of the Ottoman Empire and the Ottomans united the region under one ruler since the reign of the Abbasid Caliphs of the 10th century.

The Arab Middle East, that became entirely Ottoman in 1534, was placed under the direct administration of the “Sublime Door” (the imperial government). It was divided into eight provinces all under the authority of Pashas, four in Iraq, those in Basra, Baghdad, Mosul, Kirkuk; four in Greater Syria (Syria, Lebanon, Palestine) those of Acre, Sidon, Tripoli, Damascus and Aleppo. These pashas and judges called “kadi” were appointed by the sultan to represent the central government

and overlooked different areas except the army, which was subject to its own leaders.

Arabs endured their colonization by the Ottoman Empire, despite the difference of culture, since they were still mostly united by the same religion and moral (which did not apply to minorities, such as Christians), in addition to the large internal market, formed by the Empire, extending from the Tigris to the Danube and the facilities it gives to trade with the world.

The prestige of the Arabic language was preserved, through its use in liturgy, and they endured very little Turkish influence, making it easier to accept their political weakness, as their cultural freedom was protected.

Therefore, trends to autonomy are not less vivid in the region, with the example, of occasional ethnic, tribal or military rebellions in Iraq and Syria, (i.e. Baghdad from 1603 to 1607 or Aleppo from 1780 to 1798). However, it is mainly in the 19th century, at the time of Ottoman decline, that insurrections took their full extent. The most terrible one was the Druze's rebellion in 1860, which spread from one area to another, and eventually inflamed the whole of Syria, leaving tens of thousands of human casualties. According to history, Christians were the main victims and some five hundred churches and monasteries were looted and destroyed.

The First World War brought a general insurrection of Arabs who were supported by the British Empire. In the 19th century, the

majority of the Arab world, under Ottoman rule, weakened until it was called the "sick Man of Europe". The great European powers took advantage of this decrease in power and started settling in and spreading their influence.

2. BRITISH AND FRENCH COLONIALISM

In the 19th century, the Middle East, poorly protected by the "Sublime Door", was the scene for clashes between imperialist European powers, including the delimitation of spheres of influence. The English were primarily interested in the control of the route to India. They sought to control the land between the Mediterranean and the Indian Ocean, and beard their efforts on the Arabian Peninsula. As for the French they extended their influence through the Catholic protectorate.

Since the 18th century, France granted an exclusive right to consular protection of religious Catholics sent by the Ottoman Empire, and extended its influence consecrated by the close relationship with the Maronites of Lebanon. The First World War, precipitating the Ottoman Empire in an irremediable loss, transformed in a lasting manner the situation in the Middle Eastern political system.

After months of hesitation, the Ottoman Empire joined the Central Powers camp (November, 1914) and then directly threatened the Suez Canal in Egypt (The first country to have fallen in favour of the British colonialism in 1914).

England soon realized that the security of the Canal Zone and the route to India is only possible through the control of the Middle East. This implied reconciliation with France with serious consequences for the entire region.

The British strategy was to play the card of Arabism against the Ottoman Empire, and engaged in alliances with Arabs. Evidently, Arab nationalists saw the opportunity to break with the Ottomans and restore a large independent state. With the beginning of the War, they engaged, in secret contacts with the allies, whom support they needed in order to win a conflict against the Ottoman Empire.

As an answer to the call of jihad launched by the Ottomans, initiating a fight against the allies, the British relied on the Sharif of Mecca Hussein (the most powerful Arab leader in the region). The correspondence between Sharif Hussein and Mac Mahon, the British High Commissioner for Egypt protectorate started in 1915, when the latter explained that if the Arabs were willing to go to war against the Ottomans, London would establish an Arab kingdom comprising most of the Arab regions of the Ottoman Empire: the Arabian Peninsula, Palestine, Syria and Mesopotamia. But for the British, the promised independence is neither more nor less than a local autonomy under a British protectorate, or even under direct British administration. Therefore, if the Arab revolt that broke out on June 5th 1916, caused a major disruption of the Ottoman

order and opened the way for the rise of national movements, it would not in any way, challenge the colonial system.

Meanwhile, despite the British government's promises to Sharif Hussein for the establishment of an Arab kingdom, the European governments proceeded in great secrecy to the division of the Middle East under the Secret Sykes-Picot agreement.

France intended to strengthen its presence in Syria, which was a territory regarded as belonging inherently to them. People even began speaking of a "Levantine France", which provoked the British, although they eventually ended up recognizing the primacy. Before the end of the war, Syria however was not a concern for Paris but more part of a "race to the colonies".

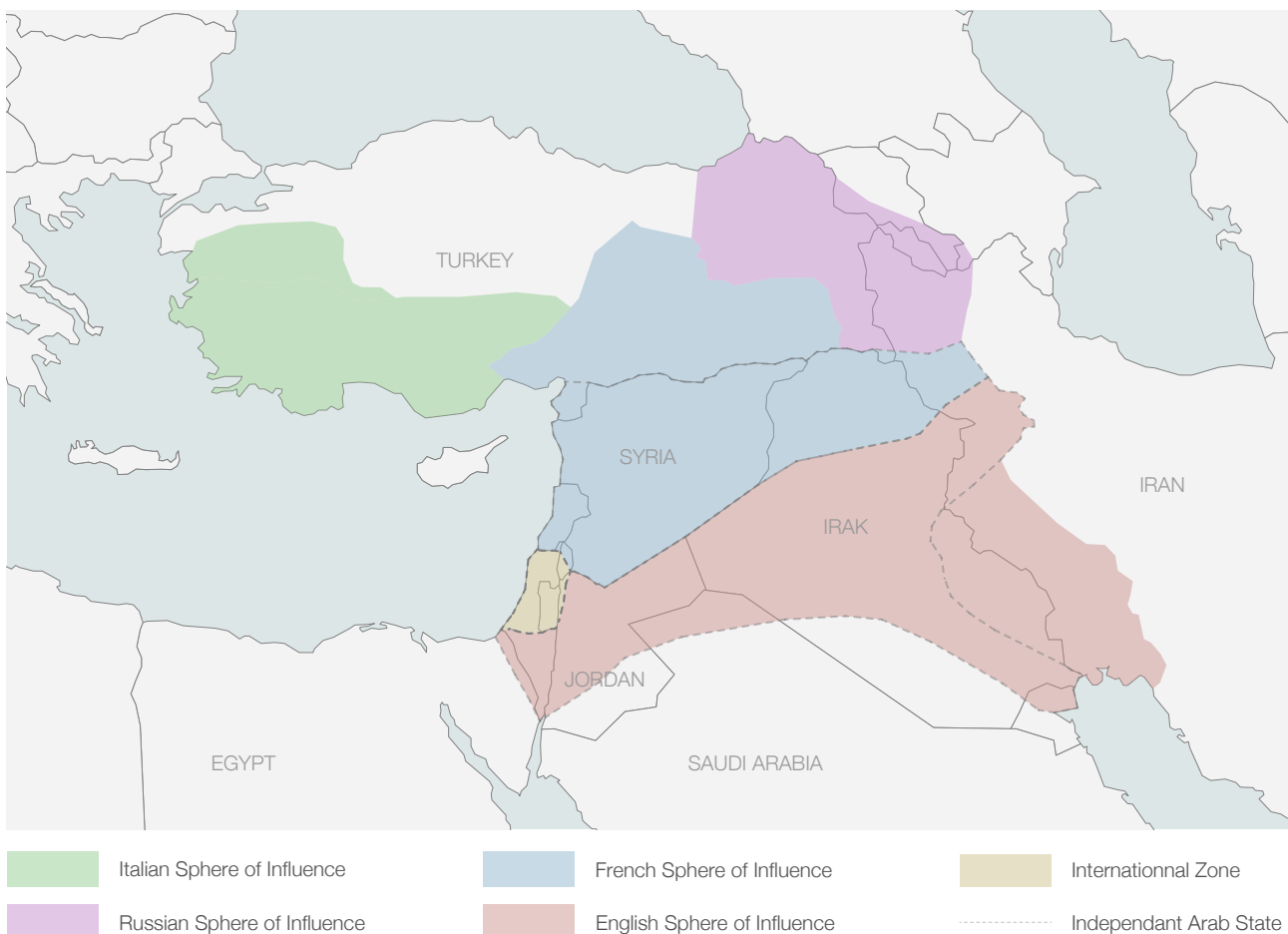
The English were pushing their interests on the side of the Hejaz and already saw themselves as masters of Middle Eastern Empire. Following a lengthy exchange of letters between Paul Cambon, Ambassador of France in London, and Sir Edward Grey, Secretary of State at the Foreign Office, a top secret agreement was reached on May 16th 1916, between Sir Mark Sykes representing the British, and François Georges-Picot representing France. This agreement, which already prefigured the warrants, was the equivalent to a division of the territory between the Black Sea, the Mediterranean sea, the Red Sea, the Indian Ocean and the Caspian Sea. Unfortunately as a part of the competition for access to oil resources, between/among the powers.

MIDDLE EAST | TROUBLED HISTORY

From the beginning of the 20th century, the French, British and Germans were looking to take position in regard to the future exploitation of the mineral wealth of the Middle East. The demand for petroleum products increased significantly when the First World War made oil a major strategic issue and a key element in the definition of European policies. The Sykes-Picot agreement divided the region into several areas:

The Arabs were not at all aware of the Sykes-Picot agreement. In fact, it remained a secret until the documents were found in Russia in January 1918, following the Bolshevik

Revolution, and it was only then that the content was discovered by the Ottoman government. The Balfour Declaration was also part of this power race for the region. It takes the form of a letter sent in November 1917, by Lord Arthur Balfour, Minister of Foreign Affairs to Lord Rothschild, President of the Zionist Federation of Great Britain. This document suggested the creation of a Jewish National Home in Palestine while ignoring the presence of Arabs, described as “non-Jewish communities” and depriving them of political rights.



Sykes-Picot Map, 1917

III | THE CURRENT SITUATION

The Middle East is a region of the world where tensions and conflicts are frequent and most of the time, unpredictable. It is the paradox of a region with a cultural heritage of great diversity and great wealth, which has key strategic resources such as oil. These potential advantages have been often transformed into sources of conflict, in particular following the geopolitical status of the region since the end of the First World War that has made it extremely complex.

1. AN OVERVIEW OF THE POLITICAL AND SOCIAL SITUATION

The wave of decolonization of the Middle East began with Egypt in 1922 and ended with Bahrain, UAE and Qatar in 1971. This period was marked by civil and military revolts, translated internationally by large-scale movements such as the birth of pan-Arab movements, political reconciliations and the Arab-Israeli conflict's birth, along with the wars and international economical consequences. The pan-Arab movement was an attempt to unite the Arabs, headed by the notorious Egyptian leader, Nasser. He was also the ruler of Egypt during the Suez Canal crisis, one of the important confrontations of the two blocs of the Cold War.

During the Cold War, certain states sided West and others sided East, while other countries chose to remain neutral. This generation of

different blocs added to the rise of sectarian tensions between Shiites and Sunnis, as well as instability in oil, became a geostrategic challenge for the West and eventually led to the three Gulf wars and increasing dualism between Iran and Arab states led by Saudi Arabia.

Since the 1970s, oil changed the dynamics of the Middle East: the rise in financial and political power of conservative regimes in the Arabian Peninsula, mainly supported by the US, reduced the influence of socialist ideology breezes. During the oil boom, the regimes of the Arabian Peninsula received over \$ 1000 billion in revenues. Egypt, Jordan, Syria and Turkey, which are the poor parents of this "windfall", instituted new social and economic policies to express their openness to Western interests. We also noticed an Improvement of living and hygiene standards with a dramatic population increase: 117 million inhabitants in 1960 and 240 million in 1990.

The end of secular Arab nationalism and rising oil and gas prices, in addition to the failed "war on Iraq" in 2003, have all led to profound changes in the region. From Damascus to Dubai, from Tel Aviv to Tehran, a new Middle East is now emerging.

Former Middle East was built on the borders of political identities created by the European powers after the fall of the Ottoman Empire in 1918. It was powered by a European-inspired secular nationalism that aimed at a

MIDDLE EAST | CURRENT SITUATION

political and social modernization and initiated by government action. This “Arab socialism”, reached its peak during the Cold War, when he could count on the military, political and economic support of the Soviet Union. All this ended with the collapse of the Soviet Union and the region remained petrified into authoritarian corrupt military and ineffective dictatorships.

Gradually, the nationalist regimes have lost their legitimacy in the eyes of their people, creating a vacuum that has now largely been filled non-state actors. The reports of ideological forces and the currency of power have also changed, with the most vibrant example of political Islam that is replacing secularism while skilfully integrating social issues and revolutionary anti-Western nationalism.

By the end of 2010, popular protests occur in many countries of the Arab World and they are called the “Arab spring”, “Arab revolutions”, “Arab revolts” or “Arab awakening.”

These events started in December 2010 with the revolution in Tunisia (called Jasmin Revolution) that led President Ben Ali to step down. Other peoples also used the slogan “Get out!” which became the symbol of these revolutions. Besides the destitution of the dictators and the establishment of a democracy, protesters demanded a better distribution of the wealth that would provide them with better living conditions, employment and dignity. While the Egyptian revolution led to the departure of President

Hosni Mubarak and a democratic transition, other movements did result in a transition: for example in Libya, events took a magnitude of civil war between forces that are loyal to the regime of Colonel Kaddafi and insurgents supported by foreign intervention under NATO mandate; in Bahrain, a Gulf country with mainly Shiite population but ruled by a Sunni dynasty, the protest movement failed due to the counter-revolutionary solidarity of the Gulf monarchies. In Syria, the repression led by the regime of Bashar al-Assad caused thousands of deaths, which continues to increase today (2014), triggering a civil war that is nowhere near ending. All other Arab countries except Qatar have been affected, but the magnitude of demonstrations and their consequences were less noticeable.

2. THE ECONOMIC SITUATION

The Middle Eastern economy is as diverse as the countries that compose it. The production and export of oil and raw materials is still the primary source of wealth in the region, particularly for the Arabian Peninsula, Iraq and Kuwait. Other countries such as Lebanon, Jordan or Turkey or some emirates have turned their economy into other activities such as tourism, trade, agriculture and high technology. A more recent phenomenon is the investment of petrodollars via Arab private and public funds in international finance and economics.

In 2012, the parity GDP purchasing power in the region was of \$4436 billion, or over 5%

of global GDP. In terms of GDP per capita, countries vary widely, ranging from more than \$80,000 per year per capita in Qatar (which is similar to that of the Luxembourg) to \$2500 for Yemen (similar to Moldova).

For the majority of countries of the Organization of the Petroleum Exporting Countries (OPEC), oil, and more broadly hydrocarbons, generate at the same time wealth, labour, foreign investment, a geopolitical strength and a power pledge on the international stage. For example, 45% of government revenues in Saudi Arabia, 55% of its GDP and 90% of its exports are directly or indirectly related to the exploitation of its oil fields.

During the past few years, most countries in the region have made efforts to diversify their economy. The “Abu Dhabi Investment Authority” is now the world’s largest sovereign wealth fund; it manages 875 billion of US dollars and is responsible for investing oil revenues worldwide, to develop it. On the other hand, some emirates and monarchies in the region have chosen to turn to the post-oil era, using their windfall to lead their countries to the level of the developed countries, and even surpass them by focusing on eco-towns like Masdar City in UAE or new cities like King Abdullah Economic City in KSA. Other Arab countries have also chosen to reinvest their oil revenues directly in their own territory. Therefore we can see huge architectural projects in Dubai such as “Palm Islands”, Burj Khalifa or Dubai Marina. These national and international investments aim to develop

non-oil dependent activities and prepare the Gulf countries to the after oil era. In January 2009, the Oil and Gas Journal estimated that the MENA (Middle East and North Africa) countries (8 of them are also part of the OPEC) held 60% of world oil reserves (810.98 billion of bbl.) and 45% of world reserves in natural gas (2 868.886 thousand G.m3).



Masdar City, 2014

Turkey and Egypt, have benefitted from the development of European and North African tourism. They both include touristic, cultural and historical sites, heliotropism and investments made to develop tourism activities helped make this region one of the most touristic and attractive in the world.

In some Middle Eastern countries, agriculture still occupies a prominent place in the employment of the workforce. The Fertile Crescent (Iraq, Syria, Lebanon and Turkey), the Nile in Egypt have ensured food security for economic development of the Mediterranean countries before developing service activities. The commercial and financial activities have

MIDDLE EAST | CURRENT SITUATION

also taken a major boom, thanks to the easily controlled navigation paths (Sea of Marmara in Turkey and the Suez Canal in Egypt) and the importance of import-export activities of goods, including raw materials, detached parts and manufactured goods from East Asia, Southeast Asia, India and the Middle East to the European Union and North America.

Some countries in the Arabian Peninsula, led by Saudi Arabia have decided to come together to form the Gulf Cooperation Council, the political and economic profit structure has already allowed to set up a common market and to develop partnerships between riparian countries in matters of economic, energy, military or transport exchanges.

Turkey, Syria, Jordan and Lebanon have agreed to form a market of free movement of both goods and persons called Samgen.. In the near future, this cooperation will also include other countries in the region such as Iraq, the Gulf Cooperation Council and Iran.

There are many cooperations projects between Arab countries and other countries in the Middle East that are set by different governments. To name a few, on January 1st 2005, a free trade area between some countries of the Arab League was established under the name of the Council of Arab Economic Unity. Moreover in the 2000's and in the framework of the Euromed partnership, a regional trade agreement among countries of the European Union and the Middle East took place followed

by a Union for the Mediterranean, with mainly economic and maritime purposes.

Also, the Gulf Railway is a 1 940 km long line project running along the western coast of the Persian Gulf from Kuwait to Muscat linking all capitals and other major cities in the region.

CONCLUSION

For hundreds of years, the Middle East has been an immense geographical and human crossroad, which handles a large number of exchanges mainly cultural, technological, spiritual and commercial. A geographical crossroad because it is endowed with land and sea borders revolving around three continents: Asia, Africa and Europe. It is also a human crossroad as it composed of a vast mosaic of peoples and cultures.

This region, where the three great monotheistic religions of Judaism (Palestine), Christianity (Palestine) and Islam (Saudi Arabia) were born, is therefore not only rich spiritually speaking. In fact, its underground hosts the largest known reserves of hydrocarbons in the world (oil and natural gas). This resource made the Middle East (especially the Persian Gulf) a strategic priority area for all rich countries (United States, European Union, Japan...), but also for the emerging states such as China and India.

The wealth of the region, in every sense, makes it prone to conflict but also to great cooperation. Indeed, the division of the area is part of its political history, however, culturally speaking, the Middle East still brings together many countries of similar mentality and there is good reason to expect a strong cooperation in the future. During the rule of the Ottoman Empire, an idea of cooperation was initiated through the shape of a railway linking principle cities of the Middle East. This commercial but

also symbolic will to link the countries of the Middle East was interrupted and abandoned following the division of the area by different conflicts. The railway project was brought up again, recently, and there is reason to hope that it might be accomplished.



Hejaz, Ma'an Station, 1900-1920

B | THE HEJAZ RAILWAY

INTRODUCTION

I | HISTORY OF THE PROJECT

1. THE PURPOSE OF THE PROJECT
2. THE DIFFICULT CONSTRUCTION

II | THE PILGRIMAGE TO MECCA AT THE TIME OF THE HEJAZ RAILWAY

1. A RELATIVE IMPROVEMENT OF THE PILGRIMS JOURNEY TO MECCA
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CONCLUSION

B | THE HEJAZ RAILWAY

Al-Hejaz (or Hejaz) is the region located in the western part of today's Saudi Arabia, it includes the provinces of Tebouk, Medina, Mecca and Al Bahah. Its capital is Jeddah, but it's mainly famous for the holy cities of Mecca and Medina.

In Arabic, "Hejaz" means "barrier" and it refers to the mountainous area formed by the mountains of Hejaz (located in the northern part of Sarawat Mountains). This region is parallel to the shore of the Red Sea and extends from Aqaba to Mecca. (c.f. D.4. Saudi Arabia)

The Hejaz railway first became famous during the First World War, through the stories of the Arab revolt and sabotage carried out by Emir Feisal's troops and led by Colonel T.E. Lawrence. This railway, that linked Damascus to Hejaz, appears most often in its strictly military and strategic dimensions even though its primary purpose was religious. It was however also built with political considerations, especially following the difficulties encountered by Ottoman troops facing revolts in Yemen and Arabia in 1898-1899. A report made by Izzet Pasha, the adviser to Sultan Abdel Hamid II, envisioned the construction of a railway as a mean of restoring the authority of the Door (Ottoman Empire) on these inland provinces. This proposal, issued several years earlier, was accepted by the Sultan who charged his advisor with its coordination.

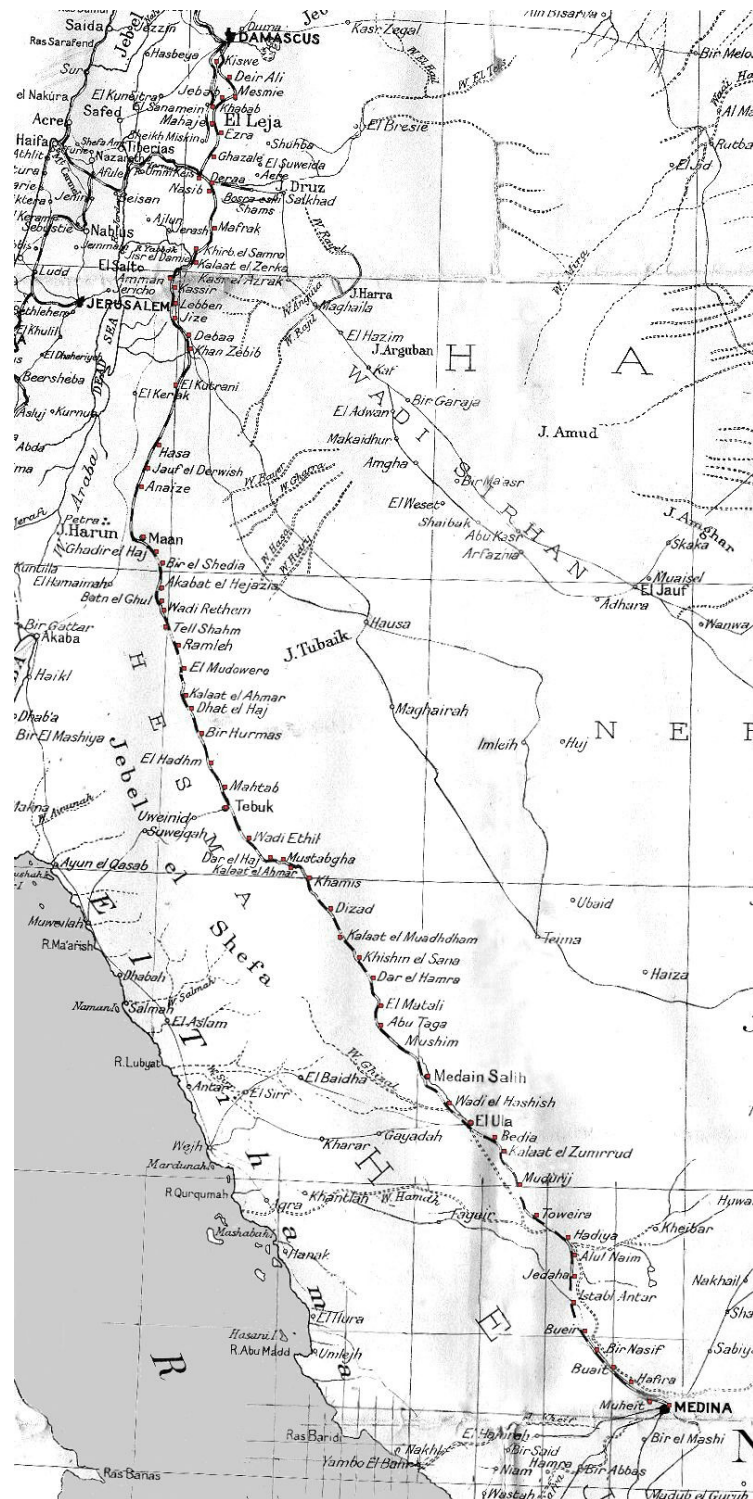
The construction of the Hejaz railway would not have been possible without the religious solidarity generated by the official propaganda and strongly marked by the pan-Islamic ideology of Sultan Abdel Hamid II (1876-1909). The first objective displayed by the Ottoman power in the construction of this line was indeed to facilitate the access of Muslim pilgrims into the holy cities of Mecca and Medina. Fund raising campaigns made it possible to finance the operation without involving Western capitals and to present the Hejaz railway, whose achievement in Medina was celebrated on September 1st 1908 (to mark the 33rd anniversary of the accession to the sultan-caliph's throne), as an exclusively Muslim institution.

This railway had two remarkable features. First there was no debt to be paid at the end of its construction and second, the route was several kilometres below sea level.

I | HISTORY OF THE PROJECT

1. THE PURPOSE OF THE PROJECT

Prior to the construction of the railway, it took pilgrims, who travelled on camels, about 40 to 50 days to get to Medina or Mecca from Damascus. This long journey was difficult and put them at the risk of attacks by robbers, or even encountering floods and epidemics. It's for those reasons that Sultan Abdel Hamid thought of establishing a railway that would create a safer route for travellers.



Ottoman Empire's Hejaz Project Map, 1908

HEJAZ RAILWAY | HISTORY

The project's main purpose was to establish a connection between Istanbul, the Ottoman Empire's capital, and Mecca, the holiest city of Islam and the destination of the annual pilgrimage or "Hajj". The railway was not only made to facilitate and shorten pilgrims' journey but it was also made to improve the economic and political integration of the distant Arabian provinces into the Ottoman state.



Ottoman Empire, 1912

The Hejaz railway is considered to be the last great religious institution of the Ottomans. Suggested in 1864, it ran from Damascus to Medina (1300 km) through the Hejaz region in Saudi Arabia including a branch line connecting Haifa in Palestine. It was ordered as an extension of the Ottoman railway network that already connected Istanbul to Damascus with the Bagdadbahn. It was supposed to reach Mecca but the construction was interrupted due to World War I. The train did not go

further than Medina. Under German advice and support, the construction was funded by a subscription throughout the Islamic world.

2. THE DIFFICULT CONSTRUCTION

In order to find reasonable funding, Sultan Abdel Hamid addressed a call to Muslims over the world to donate money for the construction of the railway. The estimated cost of the project was at 5 million Ottoman Golden Lire (4 million sterling pounds) and it was soon discovered that the donations were not going to be sufficient. It is for those reasons, that the Ottoman Empire established a financial strategy, based on the selling of stamps and the collections of a tax specifically dedicated to increase revenue and hence finance the construction of the Hejaz railway.

The Hejaz Railway was built between 1901 and 1908, with the assistance of European engineers and under the direction of a German, Heinrich August Meissner, until Medain Saleh station, which marks the boundary of the sacred territory, and from which the Muslim engineers took over. The workforce was, as promised to donors, composed exclusively of Muslims, mostly Ottoman soldiers, which ensured the protection of the workers against Bedouin assaults.

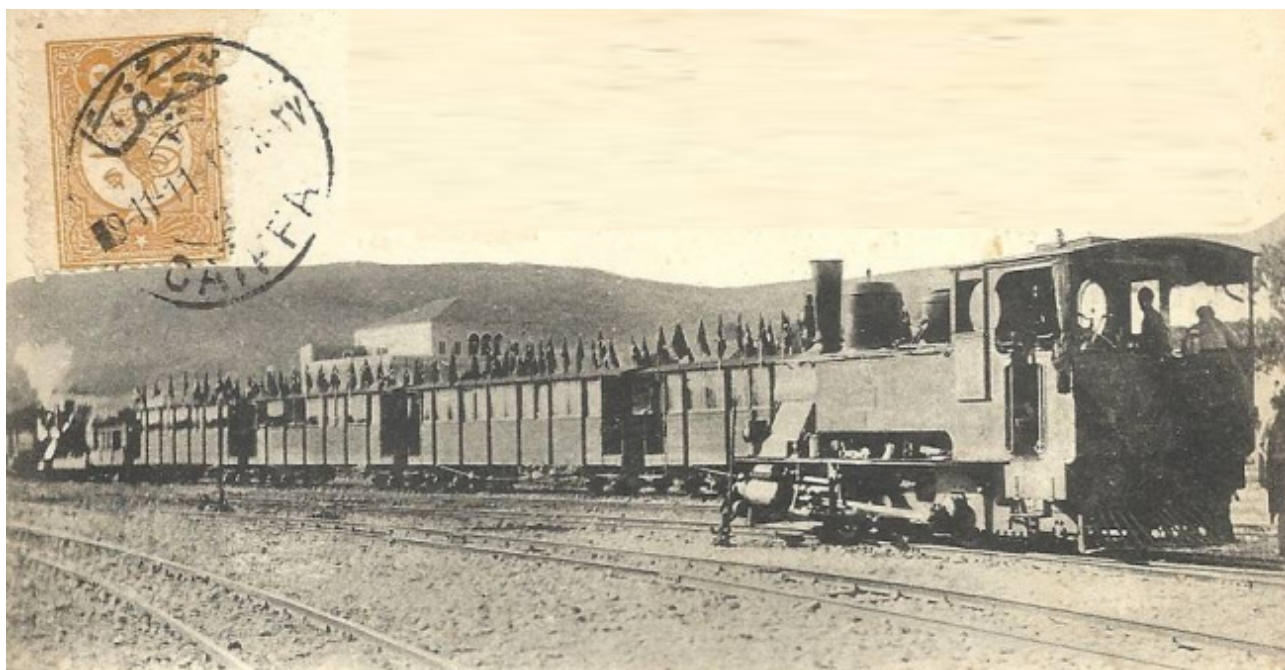
On September 1st of each year, the opening of a new section was celebrated: Mzérrib-Deraa (1901), Deraa-Zerka (1902), Damascus-Deraa and Zerka-Qatrana (in 1903) and



Overcharged stamps, 1907



Overcharged stamps, 1905



Hejaz inauguration, Postal Card, 1908

HEJAZ RAILWAY | HISTORY

Qatrana-Maan (1904), Maan-Moudawwara (1905), Moudawwara-Tebouk (1906), Tebouk Medain-Saleh (1907), and finally, Medain Saleh-Medina (in 1908). The route of the railway followed roughly the caravans road, but the journey from Damascus could now be performed (in theory) in seventy-two hours, ten times faster than before, for the modest sum of 3 sterling pounds. Moreover, pilgrims coming by sea and landing in Haifa or Beirut could go to Medina in four days.

There are several factors that have helped save costs, such as the use of army members in the setting of the project, the participation of various volunteers in the building work and the donation of materials from the adjacent areas. (cf. D.I.4. Saudi Arabia)

It took 5000 Ottoman soldiers to build, maintain and monitor the railway. Despite an overall good organization, the project experienced some difficulties such as the attack of Bedouins, in the southern areas who initially opposed the construction; high temperatures, which led to the death of some workers; the unavailability of close water resources and finally, the difficulty to transfer materials to the working area. In addition, the soil was very soft and sandy in some areas while in others it was rocky and solid which complicated the construction. Similarly, the weather included extreme heat periods, sandstorms and floods destroying everything in the path.



Construction of the Hejaz Railway, 1904

II | THE PILGRIMAGE TO MECCA AT THE TIME OF THE HEJAZ RAILWAY

The 1908-1909 pilgrimage was an opportunity for thousands of Muslims to use the Hejaz railway for the first time. Gradually linking Medina to cities on the Mediterranean coast (i.e. Beirut, Haifa, and soon Tripoli, Lebanon), the big cities of the Syrian interior (Damascus and Homs, Hama and Aleppo) by connecting with the network of the French company “Damas-Hauran-Prolongement” (DHP), and finally Istanbul, the Hejaz railway allowed to drain thousands of pilgrims to the home of their religion in a few days.

Far from arousing widespread enthusiasm, this mini-revolution in transportation raised several objections, in fields as varied as the local economy, public health, the relationship between the Ottoman government and Cherifian Power of the Hejaz, and in the relations of the Ottoman Empire with the European powers involved in the region (mainly France and England).

1. A RELATIVE IMPROVEMENT OF THE PILGRIMS JOURNEY TO MECCA

Throughout the years and in the collective imaginary, the pilgrimage to Mecca has long been perceived as a long and perilous path, coming originally from bushings cities travel literature. During this “voluntary migration movement”, the pilgrim ran significant risks and earned a kind of prestige on his return.

Actually, dying during the Hajj was even considered an honour. The commissioning of the Hejaz railway was a new step in the modernization of transport to the places of collective rituals of Islam, improving the conditions of the journey; the pilgrimage lost a part of its fascination. However, the line experienced, since its commissioning, large crowds inflows, thanks to the Ottoman propaganda that surrounded its construction. It was even a victim of its own success, as shown by the difficulties encountered by the company of the Hejaz, in the early years, to transport pilgrims returning from Mecca.

Unlike the boat trip to Jeddah, the Hejaz railway also allowed the pilgrims to escape the maritime quarantine Tor (located at the southern tip of the Sinai), famous for being long and humiliating, to visit Damascus (other important place of Islam), and for Muslims from North Africa, to violate the prohibition of the French government to travel to the Hejaz region (pretext of health risks linked to cholera epidemics). The connection of the line to the DHP and the Bagdadbahn networks, allowed the connection of Medina to Istanbul, and therefore facilitate the pilgrimage of Muslims of the Caucasus and Central Asia region.

In the early days of its commissioning, the line of Hejaz experienced a large inflow:

Year	1909	1910	1911	1912
Number of passenger	14 965	25 079	29 105	27 823

It is at the return from Mecca that pilgrims were the most numerous, indicating the use of combined routes. Pilgrims preferred to take the boat to go directly to Jeddah, to first reach Mecca and then take the train after visiting the Prophet's tomb in Medina, to regain more quickly and comfortably Mediterranean ports where their ships had preceded them.

The example of this type of journey, combining both modern transportation, is given by the Egyptian Khedive (Pasha) Abbas Hilmi, who made the pilgrimage of 1909-1910 with his parents. Arriving by yacht in Jeddah, they went to Mecca and then went by sea to El-Wedj in the north, where a caravan took them to Medina. The mother of the Khedive, tired from the trip, preferred to take the train to Haifa and from there return to Egypt by sea.

The pilgrims have adopted the railway, sometimes adapting it to their habits, such as those Bedouins and peasants who preferred to pitch their tents on the train platforms than traveling in the compartments. It was so successful that in 1912, the Hejaz Company

offered half-price tickets for pilgrims wishing to travel to Medina for the celebration of the birth of the Prophet (Mawlid an-nabi).

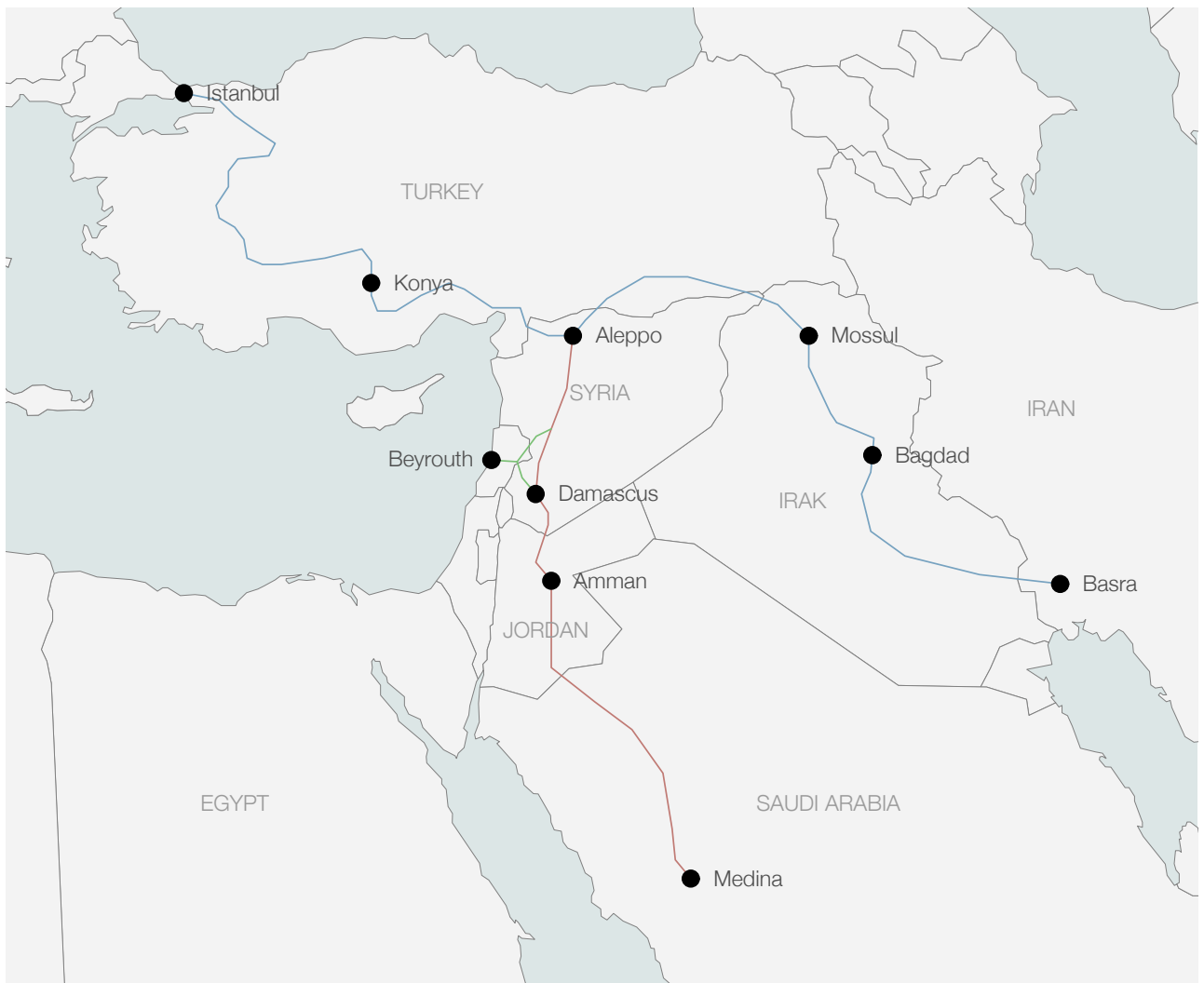
In 1908, the Ottoman authorities implemented the lazaretto (an institution for those with contagious diseases) of Tebouk, designed to accommodate up to 4,000 pilgrims at a time when they return from Hejaz. Gradually, water points multiplied on the line to avoid the risk of epidemics related to poor hygiene. Despite these early successes, the line of Hejaz did not fully meet users satisfaction.

2. THE SUCCESS LIMITS OF THE HEJAZ LINE

Despite the favours it did to the pilgrims, whose journey gained in speed, comfort and security, the line of Hejaz did not fit the hopes of those who had financed its construction and thought to see it reaching Mecca. This "incompleteness" of the line kept the pilgrims in a situation of dependence vis-à-vis the carriers that guided the camel caravans between Medina and Mecca. The Bedouin



Caravan of bedouins during pilgrimage, 1902 (By Cl. Philby)



- Bagdad Bahn
- Hejaz Railway
- Damas Hama Prolongement

HEJAZ RAILWAY | POLITICAL ISSUES

tribes continued to take a right of way or to cut them off.

The insufficient train numbers into service and the limited capacity of the Lazaretto of Tebouk, or the traffic interruptions due to attacks by Bedouins forced the pilgrims to wait sometimes two weeks in Medina (as in 1911) before returning home. Part of these potential users preferred then to go to the port of Yambo to go by boat, causing a loss to the company of Hejaz.

Finally, some pilgrims continued to follow the traditions of travelling by land, which can be explained by a rejection of this new “less meaningful” transport. The ease with which the pilgrims were taken to the Hejaz region disconcerted the people of Damascus and Medina.

3. LOCAL ECONOMIC CONSEQUENCES FROM THE RAILWAY ARRIVAL

The Ottomans tried to present the railway as a lucrative business for everyone even for Bedouins. The evidence lies in the propaganda led by Muhammad Arif, a notable Damascus member of the Education Council. Entitled “The eternal happiness of the railway line of the Hejaz”, the book was written during the construction of the railway and gave quantitative estimations of the benefits that Hejaz inhabitants would make after it was in service. In fact, it is mainly the towns along the railway line that could develop in the years

before the First World War. For example Haifa became an important port since it became more accessible for the goods traffic.

In Hejaz, only the city of Medina, that was wedged so far, could benefit from the railway, as pilgrims came in greater numbers than before, and the goods were directed there much more easily.

But for those living from the transportation of pilgrims by camels or in some cases by boat, the construction of the railroad announced a less bright future; when the train would directly link Damascus to Mecca and Jeddah, as planned, the pilgrims would use it massively and the activity of the carriers would be reduced until it disappeared. Actually, the tribes that once lived from the rights of way or from looting caravans suddenly found themselves deprived of their source of income. As for marine carriers, that embarked pilgrims from Jeddah or Yambo when they returned from the holy cities, to go to the ports of the Mediterranean, they experienced severe competition from the train since 1908.

III | THE HEJAZ RAILWAY POLITICAL ISSUES

The pilgrimage to Mecca and Medina also concerned the European powers who administered the Muslim countries, such as, England (in India and Egypt), France (in Algeria and Tunisia, and Morocco from 1912), Holland (Indonesia), Austria-Hungary (in

Bosnia and Herzegovina from 1908), and Italy (in Libya from 1911), to the extent that they organized the transport of pilgrims by boat, administering some maritime quarantine and controlled most of the shipping companies.

These powers were concerned with the Ottoman Empire's affairs, where they accounted different moral and material interests on the eve of the First World War. The construction and commissioning of the Hejaz railway attracted the attention of some of them, both because of new health risks that this line presented and by its real or perceived economic and political consequences.

France was probably the country that was most preoccupied with these questions, mainly because of the competition that the Hejaz railway made to the French railway DHP (Damas-Hauran-Prolongement) and because of its colonial policy in North Africa.

1. INTERNAL STAKES OF THE TRANSPORT OF THE PILGRIMS

According to the 1910-1911 pilgrimage report, 90 062 pilgrims arrived to Jeddah by ship, 39 765 of them came from the north (44%), as can be seen in the table beside.

Overall the total pilgrims transported to Jeddah by ship, almost three-quarters were by English companies, while the Ottoman ships only supported the twentieth part of the pilgrims arriving by sea. The absence of French companies can also be noted and it

is due to the ban of Muslims from Algeria and Tunisia to perform the pilgrimage to Mecca in that year.

Vessels origin	Number of steam vessel	Number of sailboat	Transported pilgrims	Share in the pilgrims global traffic (maritime)
Great Britain	121	1	65 831	73 %
Russia	17	-	11 327	12.6 %
Holland	10	-	6 563	7.3 %
Ottoman Empire	9	37	4 563	5.1 %
Italy	2	6	1 395	1.6 %
Germany	2	-	383	0.4 %
Total	161	44	90 062	100 %

Number of pilgrims transport by ships, 1910-1911

It goes without saying that the pilgrims preferred to use the railway, especially to return from Mecca and Medina, and this could result in significant losses for these companies. The number of those who borrowed this new means of transport remained limited until 1914. However, the extension of the railway to Mecca and connection of the line to the DHP network presaged the final abandonment of ship transport by pilgrims from Syria, Anatolia and Russia. As for the pilgrims coming in from Egypt, Northern Africa and the Balkans, they could have chosen to combine the two modes of transport. They could take the boat from the Syrian ports, which would have caused the ruin of the maritime companies, forced to return to the Mediterranean coast empty

HEJAZ RAILWAY | POLITICAL ISSUES

from Jeddah. Only companies covering the countries of the Indian Ocean and Persian Gulf would be spared by the diversion of traffic on the Hejaz railway.

That economic risk may have prompted some companies to put pressure on their governments to limit the use of the railway to Muslim citizens. Actually, England, Russia and France exercised authority over the pilgrims coming from their respective regions and partly organized travel of pilgrims to Mecca, establishing individual authorizations, controlling transport by boat, passing by the infirmaries, and sometimes ensuring the repatriation of destitute pilgrims with no return ticket. This framework gave them the power to ban the pilgrimage, as the French did several times (including three consecutive years, from 1910 to 1913), but also to control the routes of the pilgrims, and in particular to prevent their return by railway.

2. THE RESISTANCE OF THE SHARIF OF MECCA

The railway quickly emerged as a potential threat to the authority of the Hijaz Sharif. A first sign of political transformations induced by this faster means of transport, able to easily route the Ottoman troops in Arabia, had been given by the Medina detachment of the Vilayet of Hejaz, sometime after the completion of the railway in the city, and its attachment to the Ottoman Interior Ministry under the pretext of its connection to the telegraph network. Sharif

Hussein used the fears of Bedouin tribes to lose the benefits of the passage of pilgrims through their territories, to set them against the extension of the railway south of Medina.

A last attempt to impose the railroad to Sharif of Mecca took place before the First World War. Talaat Pasha addressed a proposal to Hussein Abdallah's son stipulating that, in exchange for accepting the railway, Sharif Hussein would be granted control of the line and a portion of its resources. He would receive a sum of 250 000 Turkish Liras for the tribes, and would retain its authority and that of his descendants on the Hejaz. If the Sharif refused this proposal, he would be removed. Hussein, suspicious, managed to postpone until the outbreak of World War I.

During the First World War, under the authority of the Sharif, Arab tribes allied with the Allies to participate in sabotage operations (led by Thomas Edward Lawrence known as Lawrence of Arabia) of the line believing that once the Ottomans were defeated, an independent country would be waiting.



Hejaz Railway, A train sabotaged by Lawrence of Arabia, Saudi Arabia (By Richard Desomme)

CONCLUSION

In the late 19th century, railway expansion was a symbol of modernization. Actually, Britain, Germany and France built railways at important speed and reaped great commercial benefits. In the Middle East, railways were no less important and the Ottoman Empire's Hejaz Railway was the first great industrial project of the 20th century. The route running from Damascus to Mecca was longer than the line from Berlin to Baghdad and was designed to function as the heart of the Arab world linking Istanbul to Arabia. Built by German engineers, and initiated by Sultan Abdul Hamid II, the railway was financially crippling for the Ottoman state. Its eventual stoppage, 250 miles short of Mecca (the railway ended in Medina), was symbolic to the fall of the Ottoman Empire's economic and diplomatic fortunes.

For pilgrims, the Hejaz railway was a significant improvement in terms of the journey to the holy cities. The journey that was once long, perilous, costly and dangerous became easier and bearable.

From the Bedouin tribes' perspective the railway was a threat because they earned their living from the transport or ransoming of pilgrims passing through the Hejaz area. Therefore, to preserve the operating system of Muslim pilgrimage, the Bedouins focus was on destroying the railway line, which was increasingly perceived as a foreign intervention despite its religious dimension.

The conjunction of oppositions to the Hejaz

railway will probably play a role in the early abandonment of this communication channel, severely damaged by sabotage actions of Arab troops fighting alongside the Allies. Especially since the new territorial division of the region, resulting from the First World War, shared control of the line between the three states (Syria, Jordan and Palestine) soon with conflictual relations.

During the First World War, the line was damaged several times particularly due to attacks of Arab tribes led by Lawrence of Arabia. After the collapse of the Ottoman Empire, the Hejaz Railway was never put into operation south of the border between Jordan and Saudi Arabia.

An attempt to reopen the line was made in the mid-1960s, but it was quickly abandoned due to the Six Day War in 1967.

There are two connected sections of the Hejaz Railway that are still in service. The "Hejaz Jordan Railway" and "Chemin de fer de Hejaz Syrie", from Amman to Damascus, and the "Aqaba Railway" from the phosphate mines located near Ma'an to the Gulf of Aqaba. Many of the original locomotives have been restored; nine of them are in Syria and seven in Jordan, all of them are in working order. Those sections are mainly used for the transportation of merchandise and also as touristic destinations.

On February 4th 2009, the Turkish Transport Minister Binali Yildirim announced in Riyadh, regarding the plans to rebuild the railway line:

“The plan envisions the restoration and modernization of the railway line by the Turkish government within its territory, while it calls on Syria and Jordan to rebuild their sections of line. On the Saudi side, they do have an ambitious plan to set up railway projects. That said, when these four countries (Turkey, Jordan, Syria and Saudi Arabia) come together, the entire project would be completed”.

Even though, no time frame was provided for the implementation of this multinational project, Yildirim speculated that it could be completed within five years. A contract to convert the narrow-gauge line to a standard gauge was signed in Jordan in 2008, where a portion of the rail line is still in use in the southern part of the country.

Unfortunately, in 2010, the uprising of revolutions in the region, commonly known as the Arab Spring has halted the discussion around the railway project.



Orient Express, Leaving Paris Station, 1920s



Orient Express, Leaving Brussels Station, 1920s

C | THE TRAIN : STILL A PROMISING TRANSPORT MODE

INTRODUCTION

I | PASSENGER TRANSPORT COMPARAISON

1. CONVENIENCES
2. ECONOMY
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1. AN OVERVIEW OF THE CHINA'S RAILWAY NETWORK
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CONCLUSION

C | THE TRAIN : STILL A PROMISING TRANSPORT MODE

The train had always been chosen by the great nations to represent their power. The aim of this part is to show how this mean of transport can be efficient nowadays. To do so, we compared the characteristics of different transports mode : the car, the train and the plane. Then, we explain how a railway network is defined and how it can be applied to a given territory. The third part lead us to explore what were the incomes of legendary project on a personal and state level trough two past exemples. The last section is a case study of 21st century's most developped network.

I | PASSENGER TRANSPORT COMPARISON

1. CONVENIENCES

The purpose of this study is to find the most convenient mean of travel for a person in a given time. Three means of transportation were chosen: a plane, a car and a train. The travelling distance is calculated from the moment the traveller reaches the transportation departure point. The time of travel is divided into several steps:

A ---- B ---- C ---- D ---- E ---- F

A - B: the time taken by the traveller between the arrival to the departure point of the

transport (airport, train station, motorway) and the departure of the mode of transport. In this section of the time the distance travelled equals to zero.

B - C: The time that the transportation means needs to accelerate and reach its optimum speed. We considered this section of time and the distance travelled in it as constant.

C - D: The time of travel at optimum speed.

D - E: The time needed by the transport to decelerate and arrive to destination. We considered this section of time and the distance travelled in it as constant.

E - F: The time needed by the traveller to get out of the arrival point (airport, train station, motorway).

In every case AB, BC, DE and EF are constant. So we need to find the value of CD to define the distance travelled.

Knowing that A - E is the time of the trip.

The distance travelled:

$$CD = AE - (AB + BC + DE + EF)$$

$$\text{Distance} = (CD \times Vop.) + BC_{dist.} + DE_{dist.}$$

Vop. : Optimum speed in Km/h

BC_{dist.} : Constant distance travelled during acceleration in Km

DE_{dist.} : Constant distance travelled during deceleration in Km

BY TRAIN

In order to respect all the parameters of this study region, the average speed of the high-speed train is based on the performance of two trains traveling in the same condition, which potentially a train in the Middle East could have. The first is the Talgo 350 operated by Haramain HSR in Saudi Arabia, which has an optimum speed of 290 km/h. The second is the TGV Duplex operated by the ONCF in Morocco with an optimum speed of 310 km/h. Therefore, for this study we will consider an average speed of 300 km/h.

A - B: From the arrival to the Railway station, it takes, in general an average of 10 minutes (0.16 h) to get into the train. Usually, there's no check in and less security procedures.

B - C: Studies show that high-speed trains need an average of 15 km to reach their optimum speed. For the purpose of the study, we will consider a linear acceleration of the train that allow us to define an average speed of 150km/h. Which means that the train needs 6 minutes (0.1 h) to reach its optimum speed.

D - E: Studies show that high-speed trains need 4.7 km to decelerate from 300 km/h to 0 km/h. As we did for the B - C time section, we will consider a linear deceleration and a speed of 150 km/h. The train needs 2 minutes (0.03 h) to stop.

E - F: In general, it takes 5 minutes (0.09 h) to get out of the train station once the train has stopped.

For AE = 2h

$$CD = 2 - (0.16+0.1+0.03+0.09) = 1.62$$

$$\text{Distance} = (1.62 \times 300) + 15 + 4.7 = 521.9 \text{ km}$$

For AE = 5h

$$CD = 5 - (0.16+0.1+0.03+0.09) = 4.62$$

$$\text{Distance} = (4.62 \times 300) + 15 + 4.7 = 1405.7 \text{ km}$$

For AE = 10h

$$CD = 10 - (0.16+0.1+0.03+0.09) = 9.62$$

$$\text{Distance} = (9.62 \times 310) + 15 + 4.7 = 2905.7 \text{ km}$$

BY PLANE

For this part of the study, we will use the settings of an average flight. The optimum cruise altitude is 33 000 feet or 10 km. It is the cruising altitude used by most of the commercial planes for safety and economic reason. Typical cruising air speed for long-distance commercial passenger flights is 475–500 knots and we will consider an average of 482.5 knots that is 893.6 km/h.

A - B: In all airports of the world, it is requested that the traveller comes to the airport 2 hours before the flights departure. The latter is considered necessary, since the traveller needs time to check in and to reach the gate, which can be placed at the far end of the airport. Based on personal experiences, the time needed before departure is considered to be 1.5 hours.

THE TRAIN | COMPARISON

B - C: Studies show that the average time needed by an airplane to reach a cruising altitude would vary between 15-20 minutes and the average speed during the climbing is 250 knot (463 km/h). We will consider an average of 17.5 minutes or 0.3 hours at a speed of 463km/h. The distance travelled would be 138.9 km (0.3×463)

D - E: At a cruising altitude of 33 000 feet (10 000 m), the deceleration and the descent of the plane begin at about 175,5 km ($3 \times$ altitude in thousand feet + 10 miles = $3 \times 33 + 10 = 109$ miles) at an average speed of 463 km/h (250 knots). Which means that the plane would need 23 minutes in other terms 0,38 hours to stop ($175,5/463$).

E - F: In general, the time needed to get out of the plane, get a visa, if required, and to collect luggage at the carousel is estimated to be an hour based on personal experiences.

For AE = 2h

$CD = 2 - (1.5 + 0.3 + 0.38 + 1) = \text{Impossible}$
Distance = 0

In other terms for a given time of a 2h trip by plane, the traveller couldn't leave the city of departure.

For AE = 5h

$CD = 5 - (1.5 + 0.3 + 0.38 + 1) = 1.82$
Distance = $(1.82 \times 893.6) + 138.9 + 175.5$
= 1797.8 km

For AE = 10h

$CD = 10 - (1.5 + 0.3 + 0.38 + 1) = 6.82$
Distance = $(6.82 \times 893.6) + 138.9 + 175.5$
= 6408.8 km

BY CAR

The average car speed on the motorway is considered to be the average of motorway speed limits in the region: Turkey (120 km/h), Syria (110 km/h), Jordan (100 km/h), Saudi Arabia (120 km/h).

The average car speed is therefore 112.5 km/h.

A - B: Since there is no infrastructure needed to use a car, this time section represents the time needed by car to reach the motorway. As it is very hard to define precisely the time needed to do so, so based on personal experiences, we will consider that a traveller needs 10 minutes to reach the motorway from the city centre.

B - C: In this case, the time to reach the maximum allowed speed by car is negligible.

D - E: In this case, the time needed to decelerate to the city speed is negligible.

E - F: To define the time needed to reach the city from the motorway, we will consider the same conditions of the departure: 10 minutes (0.16) to get to the city.

COMPARISON | THE TRAIN

For AE = 2h

$$CD = 2 - (0.16 + 0 + 0 + 0.16) = 1,68$$

$$\text{Distance} = (1.68 \times 112.5) + 0 + 0 = 189 \text{ km}$$

For AE = 10h

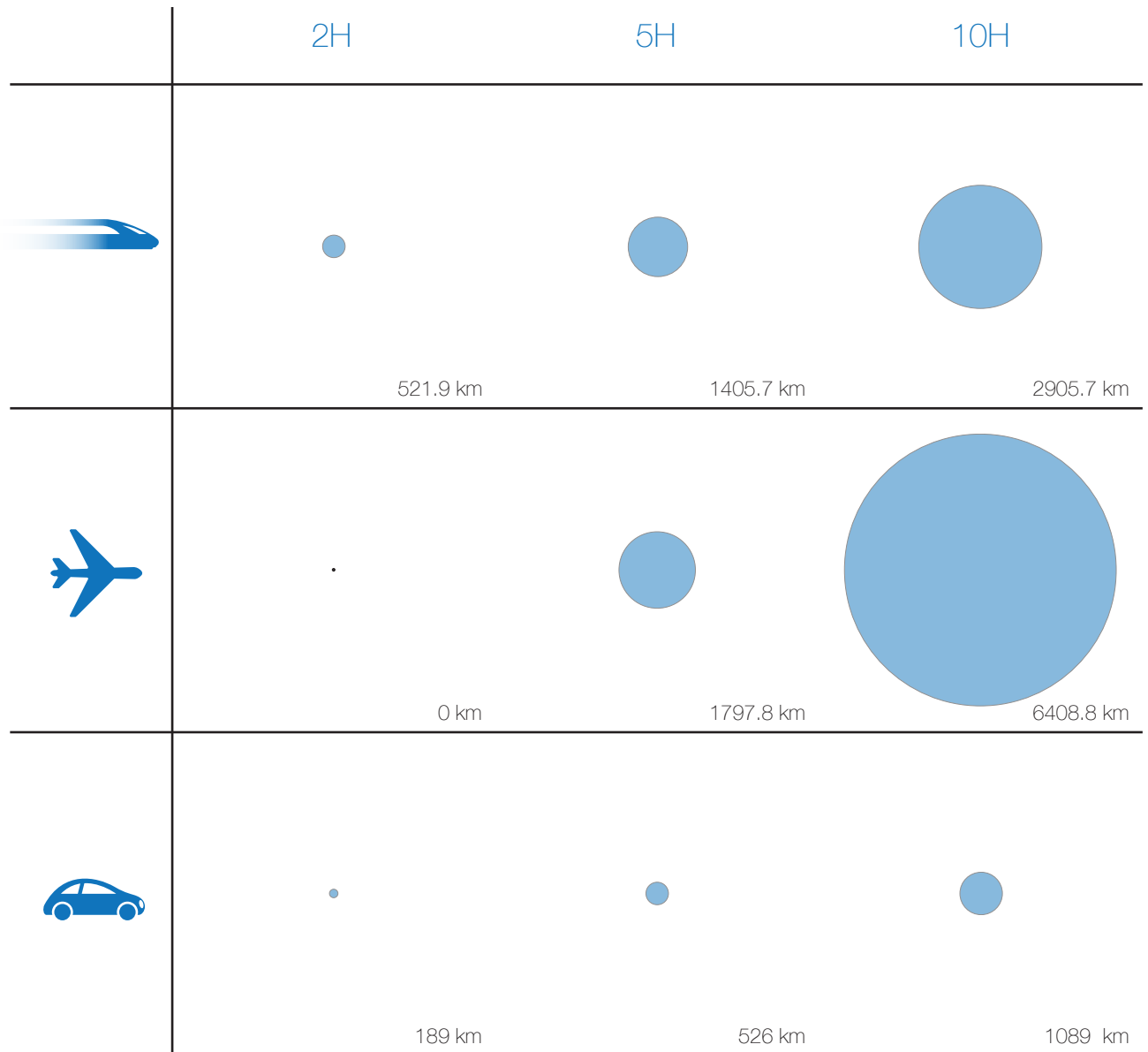
$$CD = 10 - (0.16 + 0 + 0 + 0.16) = 9,68$$

$$\text{Distance} = (9.68 \times 112.5) + 0 + 0 = 1089 \text{ km}$$

For AE = 5h

$$CD = 5 - (0.16 + 0 + 0 + 0.16) = 4,68$$

$$\text{Distance} = (4.68 \times 112.5) + 0 + 0 = 526 \text{ km}$$



Distance travelled within a given travel time.

THE TRAIN | COMPARISON

Calculus of the time in which the high-speed train and the plane run the same distance:

X is the time of travel sought

Y is the distance sought

$$\begin{aligned} \text{CD}(\text{train}) &= X - (0.16 + 0.1 + 0.03 + 0.09) \\ &= X - 0.38 \end{aligned}$$

$$\begin{aligned} \text{CD}(\text{plane}) &= X - (1.5 + 0.3 + 0.38 + 1) \\ &= X - 3.18 \end{aligned}$$

$$\text{CD}(\text{train}) \times 300 + 15 + 4,7$$

$$\begin{aligned} Y(\text{train}) &= \text{CD}(\text{train}) \times 300 + 15 + 4,7 \\ &= \text{CD}(\text{train}) \times 300 + 19.7 \end{aligned}$$

$$\begin{aligned} Y(\text{plane}) &= \text{CD}(\text{plane}) \times 893.6 + 138,9 + 175.5 \\ &= \text{CD}(\text{plane}) \times 893.6 + 314.4 \end{aligned}$$

$$Y(\text{train}) = Y(\text{plane})$$

$$X = 4.1\text{h}$$

$$Y = 1136\text{km}$$

This research demonstrate that until a journey of 4.1h (1136km), the high-speed train is the most convient transport mode. (cf. p.47)

2. ECONOMY

To make a reliable comparison, we decided to consider the price per kilometre paid by a user for different means of transportation.

BY TRAIN

Revenues from long-distance trains and traffic of millions of p.km (passenger per kilometre) were provided by the UIC (international Union

for railway). It shows an average cost of € 0.11 per p.km for the High-Speed trains.

BY CAR

For transportations by plane, costs have been assessed using data supplied by Air France-KLM, supposedly representative of the traditional airlines, as well as, Easy jet and Ryanair, the leading low-cost companies. The average cost of use of the aircraft is € 0.12 per p.km.

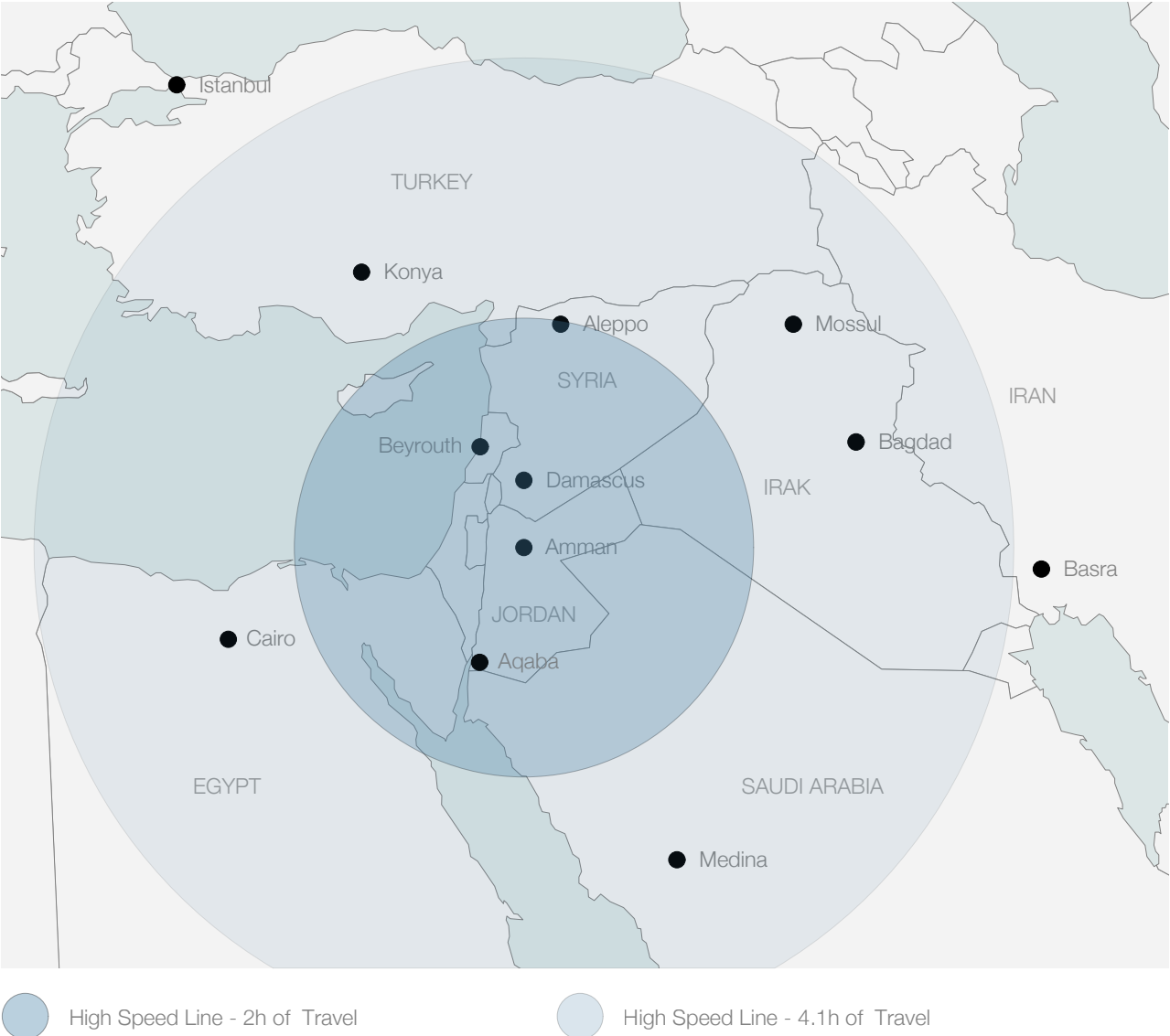
BY PLANE

All distances considered, the average full cost of the car is € 0.24 per p.km. Given the higher fill rate of the vehicle on long journeys (1.74 against 1.28 for occupants near trips), it is € 0.19 only for journeys of more than 80 km of which 6.5 cents for the marginal cost (fuel + tolls). Since we are comparing the prices for long journeys, we will consider € 0.19 per p.km to be the average cost.

To have a clearer idea, we will compare the costs of travel for each mean of transportation for different distances.

	100 km	300 km	500 km	700 km	1000 km
	11 €	33 €	55 €	77 €	110 €
	12 €	36 €	60 €	84 €	120 €
	19 €	57 €	95 €	133 €	190 €

As we can see in the table, travels by High-Speed train are the cheapest. It is followed



Time-Distance ratio from Amman on a straight line travel

THE TRAIN | COMPARISON

by planes and then by cars. It appears that travels by car are approximately 2 times more expensive than the other transport modes.

Independently of the chosen transport mode, any passenger travelling is not paying the entire cost of his travel. Passengers pay the cost of the fuel, the maintenance (or the possession) of the vehicles, the cost of the infrastructure, the salary of the crew, etc.

They however don't pay the cost of noise, accidents, climatic change (etc.), caused by their travel which are meant to be paid by the Society. These costs not paid by the passengers but by the Society are called "External Costs". (Graphic 1)

With approximately € 24 (\$ 30) per 1000 passenger per kilometre, the HS train is the transport mode that has the lowest external costs.

3. ECOLOGY

Among all sectors, the transportation sector is the only one in which emissions are continuing to increase in spite of all the technological advances. Actually, transport emissions in Europe, increased by 25% between 1990 and 2010. By contrast emissions from the industrial and energy sectors are decreasing. Reducing transport emissions is therefore one of the most crucial steps in combating global warming and securing our future. (Graphic 2)

CO2 EMISSIONS

As we can see in the graphic 3, the train is the less pollutant mode of transport.

ENERGY EFFICIENCY

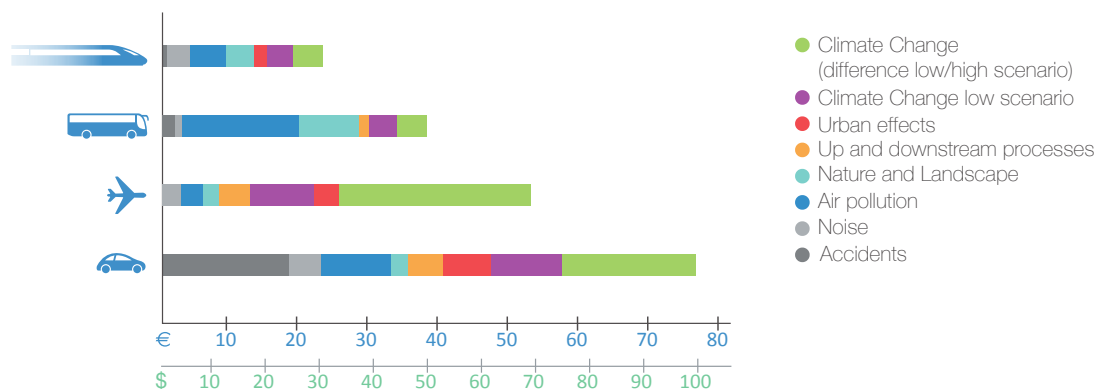
As we see in graphic 4, with the same energy, a train can transport more than four times more the number of passengers a car can carry and nearly eight times the plane capacity.

LAND USE

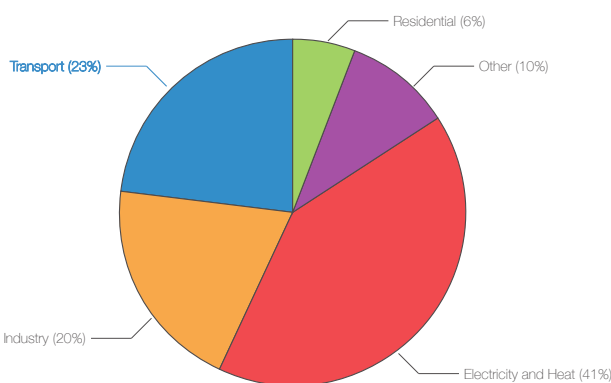
High-speed rail has a high transport capacity yet it uses less land (Graphic 5). As an example, an average high-speed line uses 3.2 ha/km (0.032km²/km) while an average motorway uses 9.3 ha/km. The high-speed rail line uses three times less land than a motorway. We can also reduce the impact on land if we install the high-speed rail lines in parallel to an existing motorway.

A high-speed railway can transport more passengers in one hour with less effort and land impact than a motorway.

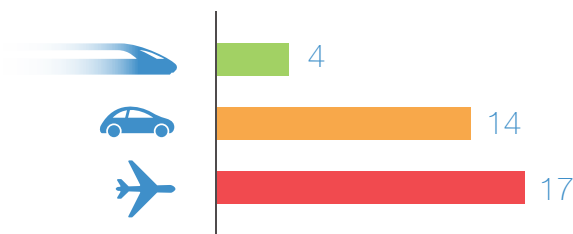
On all levels, we can see that the high-speed train is more eco-friendly than the others transport mode.



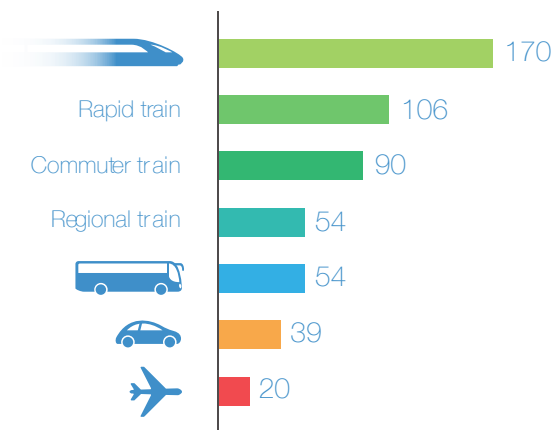
1. Average external costs per transport mode (per 1000 passenger-kilometre)



2. Distribution of CO2 emissions in the world by activity sector-2007



3. Kilogrammes of CO2 emissions per 100 passenger-kilometres.



4. Passenger-kilometres carried per unit of energy (1kwh)

MOTORWAY	HIGH SPEED RAILWAY
2 x 3 lanes 75m	Double track 25m
1.7 passenger / car	666 passengers / train
4,500 cars per hour	12 trains per hour
2 X 7,650 PASSENGERS / H	2 X 8,000 PASSENGERS / H

5. Comparison in land use.

THE TRAIN | IMPLEMENTATION

II | IMPLEMENTATION STRATEGY

1. FREIGHT TRANSPORT

Around the world, the rail is mainly used for the transportation of goods. Generally, countries invest in a railway track line to ease the freight transportation before thinking about the human transport. Close to 60% of Middle Eastern countries have a railway infrastructure and the total length of the different networks is estimated to 22 739 km (as per August 2007). The railway in the region is mostly used for freight transport. These lines can be used to transport passengers, but it would take a higher speed for the trip to be profitable and in addition to this, there should be compatibility between the different national networks.

2. RAILWAY GAUGE SYSTEMS

In most countries of the world (about 60% of world railway lines) the track gauge (the distance between the inner sides of the two rows of rails) is precisely 1435mm or 4 feet 8 inches and a half. This spacing is spreading more and more to unify the worldwide network and railway equipment. For example, since they entered Europe, Spain and Portugal, with gauge standards of 1674 mm and 1664mm, launched a vast restructuring plan of their network to ensure its compatibility with the rest of Europe.

We speak of the broad gauge when the distance is greater and narrow gauge when it is less (metric gauge for 1 m distance).

The standard gauge is also called “international gauge”, “UIC gauge”, or “UIC track gauge” and all high-speed lines use it.

In the Middle East most railway tracks have a standard gauge. It is only in Jordan, that one can find a narrow gauge track inherited by the Hejaz railway.

3. RAILWAY GAUGE CONVERSION OR UPGRADE

Gauge conversion is the process of converting a railway track gauge to another, by the change of the track. An alternative measure for the conversion is a dual gauge track, or the gauge conversion of railway vehicles themselves.

If the spacing should be reduced, sleepers could be reused with some modifications. If the channel must be expanded, sleepers previously used might be too short, and at least some will be replaced by larger ones. A similar problem could be met on the rails that are too light to support the new charges that a wider spacing allows. It is these problems, which sometimes, require a track of two gauges. Another problem concerns the rails built after the 1930's: if sleepers are not made of wood, it is difficult to drill the mounting holes for the new gauge. Therefore some concrete sleepers are already provided for several spacing, in case of a conversion.

For example, in 2005, Pakistan Railways launched the conversion of 128 km of the

line of Mirpur Khas to Khokhrapar. The initial line gauge was 1000 mm (metric gauge) and the plan was to convert it to a 1676 mm one (broad gauge). The cost was 1.8 billion Pakistani rupees (€ 21 946 000), slightly more than 171 000 € per kilometre. A new high-speed line costs 12 to 13 000 000 €.

Even with similar gauges, normal lines need consolidation and electrification to welcome a high-speed train. And even with major upgrades, conventional lines are unable to run at more than 230 km/h. This train speed can bring major economic changes in any region that can make new high-speed tracks affordable in a long-term vision.

III | TRAIN JOURNEY : BETWEEN POETRY AND EFFICIENCY

Train travel is a routine and jubilation. The charm of the machines, the warm or gloomy atmosphere of the stations or the numbness of a crowded compartment refers to the immediate moment and calls upon the diffused memories of a traveller's life. Whether you are alone or in a group, in a railcar or on a high-speed train, rail routes naturally imposes its time and space, transforming the landscape in duration, contracted or expanded depending on the speed. Train travel is also instinctively a regain of habit, it raises the question of the presence of the other, sharing more or less imposed upon one's privacy. Meetings,

projections, and dreams about great mythical lines: the train seems to be inherently one of the best stimulants of the imagination.

1. THE ORIENT EXPRESS

In the early morning of October 8th 1883, an Austro-Hungarian steam boat entered the Bosphorus before docking peacefully in Constantinople (Istanbul) on the Golden Horn. On board were 24 passengers, all armed men, who were advised to carry a gun, just in case. They just completed a historic journey. They left under the cheers of Strasbourg's train station (the old name of the East Railway Station in Paris) in the afternoon of October 4th, they crossed Europe by train to Bucharest, then borrowed a boat on the Danube and joined another special train in Bulgaria to win the shores of the Black Sea before boarding the *Espero* (steam boat) and make the best entry that is into the capital of the Ottoman Empire. Their journey lasted less than four days knowing that until then, the fastest trip from Marseille to Istanbul couldn't take less than fifteen days: the achievement was resounding. They were the first passengers of "l'Express d'orient", that soon the world called "Orient Express".

The prime contractor of this unconventional expedition was a Belgian engineer, Georges Nagelmackers. Son and grand-son of wealthy bankers, the flamboyant entrepreneur brought the project at arms. It was all perfectly in tune with the times at the end of the nineteenth

century, it is time for new roads and gigantic projects: Ferdinand de Lesseps completed the Suez Canal in 1869, Gustave Eiffel's engineering structures disrupted the French landscape, Europe is now covered by railroad tracks. The opportunities seemed endless for inventive and daring spirits.

Nagelmackers had the capitals to undertake a simple idea, brought from the United States: import in Europe the principle of night trains popularized for long journeys across the north American continent by another genius engineer, George Pullman. But the businessman also had a vision that seemed unattainable to most reasonable observers: allow these "sleepings" (how Nagelmackers used to call the sleeping cars) to cross the borders of Old Europe, despite technical and diplomatic difficulties. He founded on December 4th, 1876 the International Society of sleeping cars (Compagnie internationale des wagons-lits).

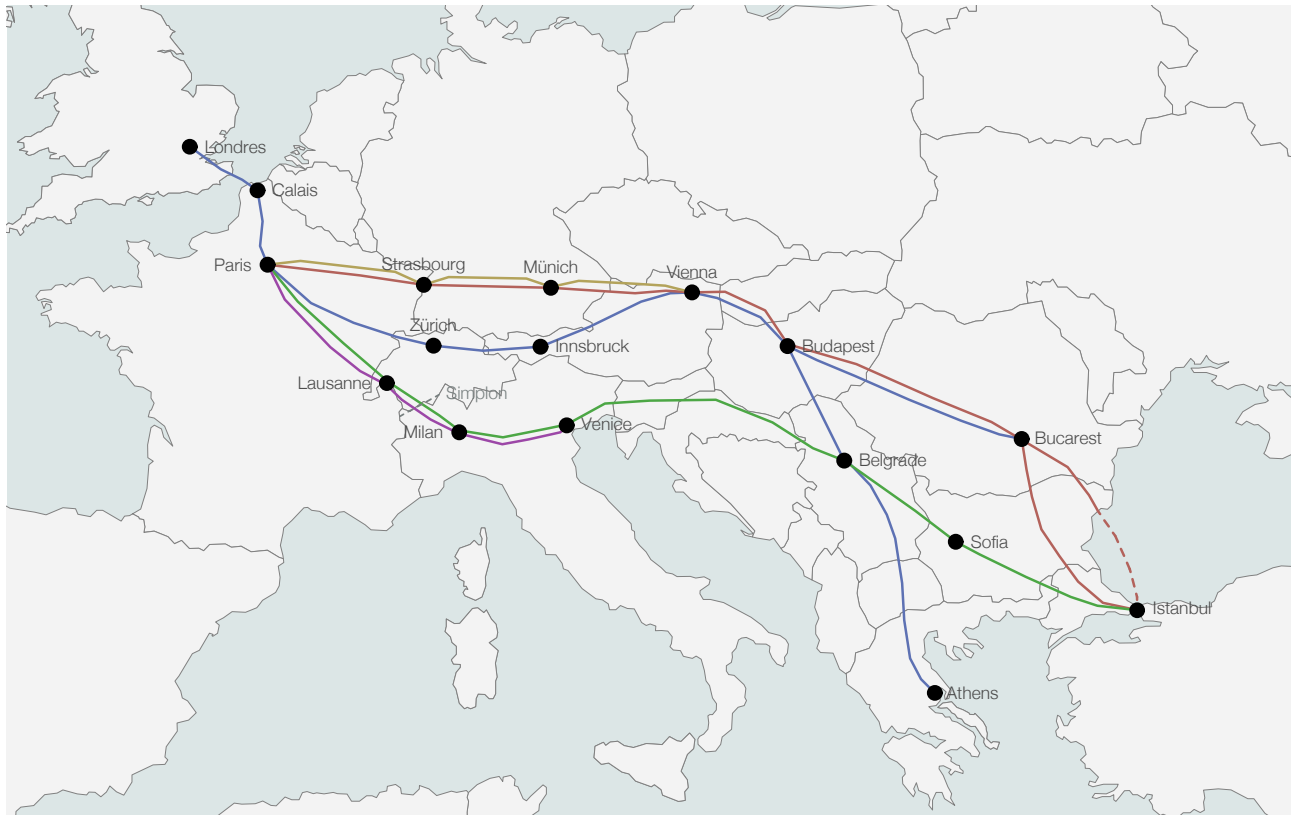
In painting as in literature, the popularity of Orientalism had not ebbed, and the European elites dreamt to be confronted to this so close elsewhere, both decadent and barbaric, miserable and refined. The luxurious train dreamed by Nagelmackers will need to be up to the fantasies of the triumphant bourgeoisie, eager for speed and novelty, but also comfort. From a technical point of view, the solution adopted by Nagelmackers for the problem of border crossing is simple: at each railway network change, the train uses a new locomotive, without anyone having to get out

of the train. The success of the company, assured by a very effective promotion (the enthusiasm of journalists from BBC and the British Times, invited to the inaugural voyage, will do much to the commercial start of the line), is immediate.

Since 1885, trips from Paris to Vienna were on a daily basis. In 1889, the completion of the last missing links allowed the arrival by train in the heart of Abdülhamid II Empire, after a luxurious sixty hour journey through Sadi Carnot's France, Otto's Bavaria, Franz Joseph's Austria, Alexander's Serbia, Ferdinand's Bulgaria and Carol's Romania. All without hassle or paperwork, the Company undertook to submit the documents at each border crossing. The East has never been so close to Paris.

In a few years, the Orient Express became a major way of communication in Europe. The Balkan wars of the early 20th century and World War paralyzed the traffic for a while, without destroying the line. The armistice between France and Germany was signed on November 11th 1918, in Rethondes in a dining car of the Orient Express requisitioned by the army. And the passage of the train was even the subject of specific provisions in the margins of the Treaty of Versailles.

The period between the two wars will be the apogee of the Orient Express. In 1919, a second track opened, that quickly supplants the original route, from the Alps to the Simplon tunnel, drilled in 1906, to reach Milan and



- Orient-Express (1883-1914, 1919-1939, 1945-1962, with connection over the black see until 1889)
- Simplon Orient-Express (1919-1939, 1945-1962), then Direct Orient-Express (until 1977)
- Arlberg Orient-Express (1930-1939, 1945-1962)
- Venice-Simplon Orient-Express (1982-2005)
- ÖBB Orient-Express (Paris-Budapest 1977-2001, Paris-Vienna 2001-2007, Strasbourg-Vienna 2007-2009)

Venice. It was known as the Simplon-Orient-Express. The ride was a bit shorter, but the train bypassed Germany, which was essential.

Because of World War II, in the West, most of the links ceased in September 1939.

After the Second World War, the Orient Express was somehow restored, and ran through a Europe that was cut in two by the Iron Curtain. Popular democracies of the West resented this Eastern invasion on their territories and increased the harassment. As for the old hardware, it wasn't fancy anymore. The last direct train to Istanbul left from the "Gare de Lyon" train station in Paris on May 20, 1977 in the general indifference.

Taking the Orient Express was sitting in the forefront of a theatre. As the countries succeeded one another, as the landscape was transformed, wealthy travellers formed a micro-society where adventurers and lounge lizards coexisted. It was a favourable place for seduction, spying and even murder. It is why the Orient Express inspired writers and many other artists like Agatha Christie (*Murder on the Orient Express*), Guillaume Apollinaire or Ian Fleming (the creator of James Bond). Even Le Corbusier took the Orient Express on his "Voyage vers l'orient".

2. THE BERING STRAIT TUNNEL

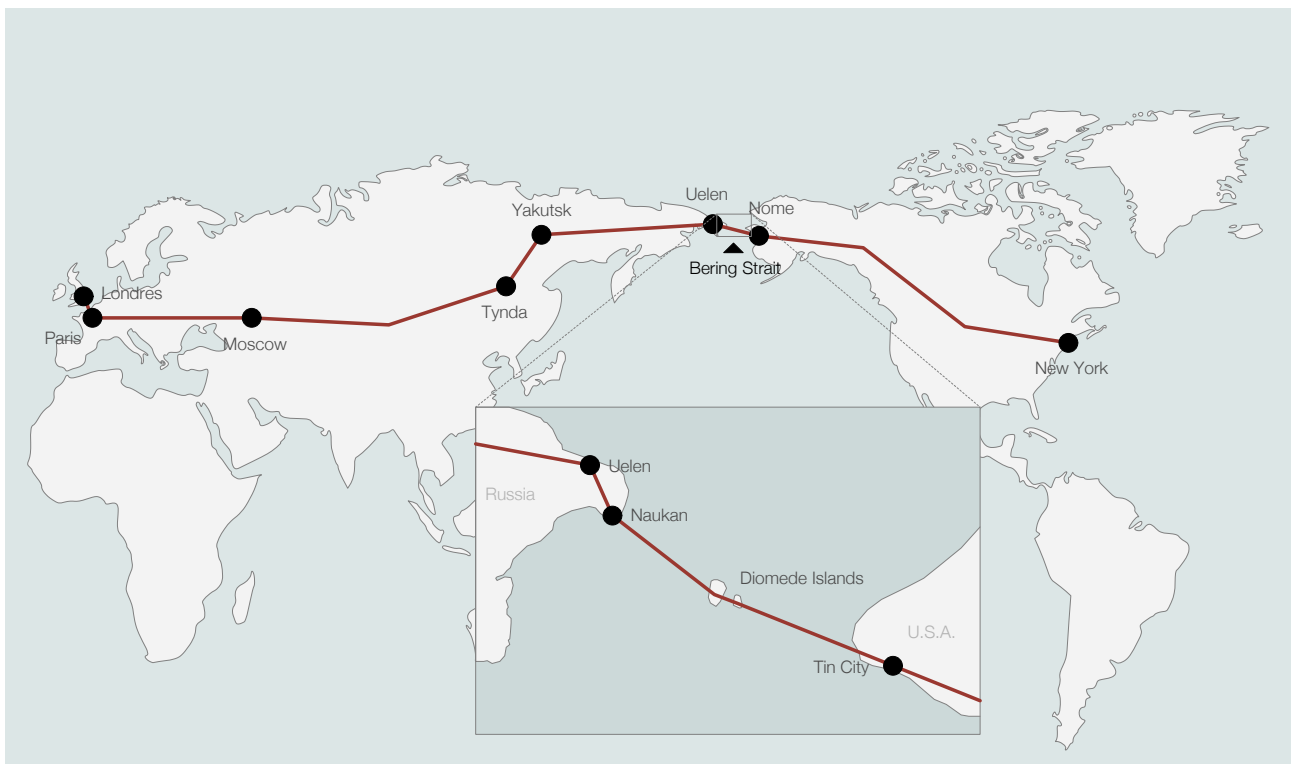
Recurring since the nineteenth century, the ambitious idea of a rail tunnel under the Bering Strait resurfaced at the conference "Mega-projects of the Russian East", which

was held in Moscow on the 24th of April 2007. The project got materialized in August with the approval of the Russian government in the tunnel construction plan. Twenty years after the end of the Cold War, the two former ideological enemies, the US and Russia (former USSR), seemed to agree on a colossal bilateral and highly symbolic program, that would link Chukchi Peninsula (Russia) and Alaska (USA).

During the Cold War, the Bering Strait was neither more nor less than the border between the United States and the Soviet Union. The island of the great Diomedé, which was in the USSR, was only at a distance of four kilometres from the island of the small Diomedé in the United States. Traditional border crossings by indigenous Peoples (to take part in seasonal festivals or trade) were prohibited during that time. Therefore, the border was nicknamed "ice curtain" ("Ice Curtain"). The reference to the term "iron curtain" was clear: the Bering Strait was a highly symbolic place, because it materialized the East-West confrontation back then.

This project was not new, since it goes back to the 19th century. But it was only in that time, at the end of the Cold War and at the time of advanced technologies that it was materialized.

The tunnel would have a length of 100 to 110 kilometres (twice the length of the one under the English Channel) and linked the approximate Uelen (Chukchi Peninsula in Russia) and Wales (Alaska, United States).



Bering Strait Tunnel

It would need between 15 and 20 years to build it. According to an estimation made in the 1990s, the realization of this project would cost \$ 65 billion (€ 48 billion), because it would build a total of 6,000 km of railways. It is indeed necessary to build a link to connect the Russian side of the tunnel with the Trans-Siberian line further south and another link connecting the US side of the tunnel with the continental grid. Crossed regions are deserted for now and without large industrial sites that could justify such an investment. Supporters of the project argue that it would allow the development of these areas and the tunnel also would also contain a pipeline and a power line.

According to the Council for the Study of Productive Forces in Russia, the return on investment would take 30 years beginning from the time when the transcontinental railroad would reach the expected yield of 70 million tons transported per year, which is comparable to the goods traffic of Panama and Suez channels, which represent 3 % of world traffic. But this estimation of traffic is disputed in Russia itself. The CEO of UPS (United Parcel Service) in Russia, Ivan Chatskikh, said that such a number was a “joke”.

Even if at first glance such a goal may seem unrealistic, it must be noted however, that the shortest route between the United States and China, which is the world's leading exporter to the United States passes through the Bering Strait.

The idea of a train line linking Asia to North America is part of the railway plan of the Chinese government, which relies, in part, on this mode of transport for the future of its economic development but also to ease goods trade with the rest of the world. A “new Silk Road” as it is sometimes called, is also emerging with the construction of a vast high-speed rail network connecting China to Europe. The line to the Americas completes the Middle Kingdom's vision.

In August 2011, the Russian government had approved the project, announcing a budget of € 70 billion for the construction of the tunnel. The tunnel could open in 2045. It remains to be seen whether Russia could finance such an ambitious project, but it opens up the possibility of a breath taking train journey through picturesque Siberia and Alaska.

Such a tunnel could allow a London-New York or a Beijing-Montreal rail trip.

IV | CHINA : TODAY'S RAILWAY NETWORKS

In China, the Ministry of Railways (MOR) supervises the sector, combining strategy, policy and regulatory functions and administering China Rail (CR), the network of infrastructure and transport services operated by the 18 regional rail authorities (RRAs). The MOR has overall control of policy, technical

standards, planning and investment, finance and system-wide train and rolling stock dispatching. But the RRAs are responsible for daily management and delivery of railway infrastructure and rail transport services.

1. AN OVERVIEW OF THE CHINA'S RAILWAY NETWORK

In 1949, China had more than 22,000 km of poorly maintained and war-damaged railway lines, of which less than 1000 km were with double track, and not one was electrified.

Since then, the government has more than tripled the network length and has completely transformed the quality and capacity. China is the only country suffering from a substantial expansion of the density of its railway networks. The reasons are obvious in view of its relatively small network but very used.

China and its economy are well suited to rail traffic, which can move massive volumes of people and goods over long distances.

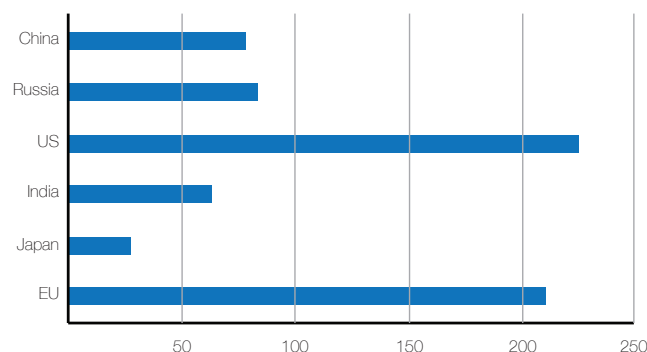
	1990	1995	2000	2005	2009
Route-km*					
National (OR)	53378	54616	58656	62200	65491
Local	4522	5034	4813	4775	N/A
Joint Venture	-	2738	5181	8462	N/A
Total	57899	62389	68650	75438	85518

*All Chinese lines are standard-gauge except for 661 km Kunming-Vietnam line and some short distances of Russian-gauge line in the border areas.

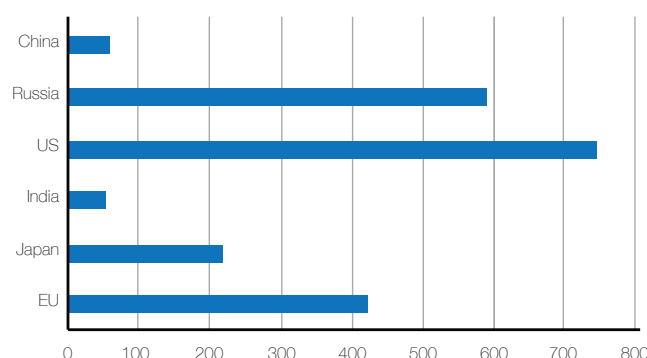
Chines Rail Network Characteristics 1990-2009.

China's economy is heavily dependent on coal and coke, iron and steel, petroleum products, grain, fertilizer and other bulk products

transported economically by rail. The average distance of transit of China Rail freight is around 852 km, a relatively high distance to world averages. The Chinese railway system

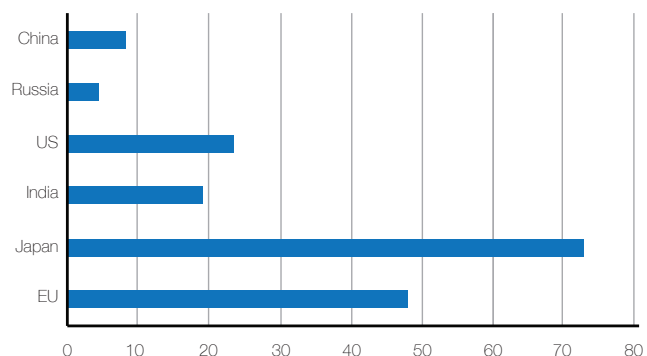


Network Length (x1000km) in 2007



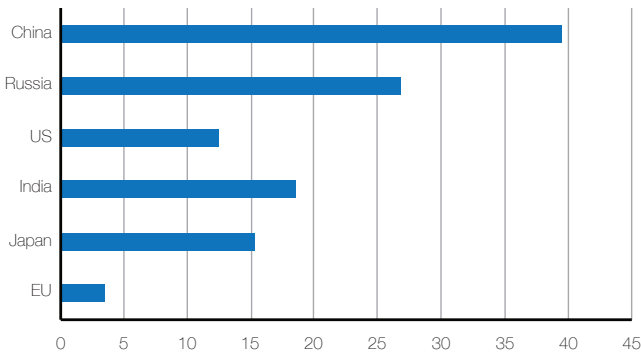
*Data is for all railways for each country other than industrial railway.

Route-km per million-population in 2007



Network-km per million km² in 2007

THE TRAIN | CHINA



Traffic units per Route-km (millions) in 2007

probably handles two thirds or more of the inland national long distance freight (+ 500 km) (including inland waterways but excluding coastal shipping).

In addition, China has a high density of population in developed areas and in many major cities. The Chinese rising purchasing power allows them to travel, which results in some of the most intense flow of intercity passengers of the world, and creates a strong demand for suburban and regional services in major conurbations. Since before 1990, passengers have preferred road transport for short distances, partly because of better short and medium distance bus services, but also because of a China Rail policy of actively discouraging passenger services for short distance to free up capacity for long distance travel. On the national rail system, the average distance of passenger trips has almost doubled since 1990, from 275 km to 534 km by March 2008. Most of the long distance travel is by air or rail, and for more than 500 km trips, the share of railways is about two-thirds of the market.

Rail traffic has rapidly increased. In the past decade, passenger traffic (passenger-km) increased by 70% and freight (ton-km) of 60%. China is the world's second largest cargo carrier (after the first class system of the United States) and the largest passenger carrier. When the traffic of passengers and freight are combined, China Rail is now the busiest railway in the world.

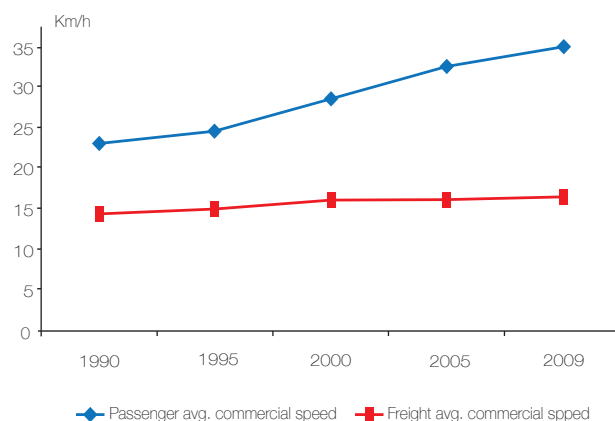
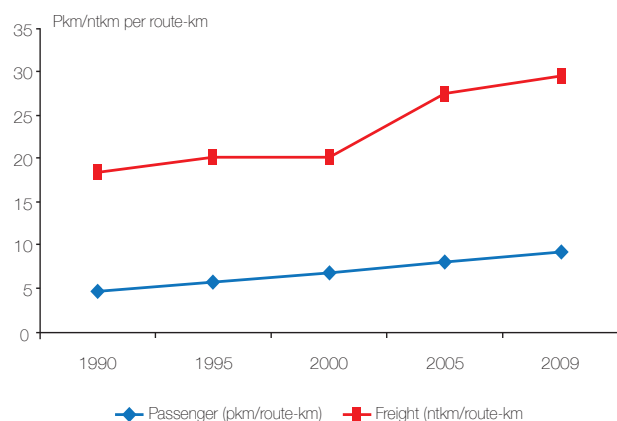
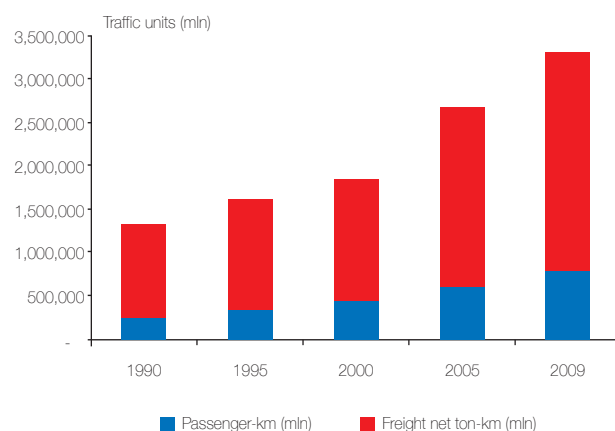
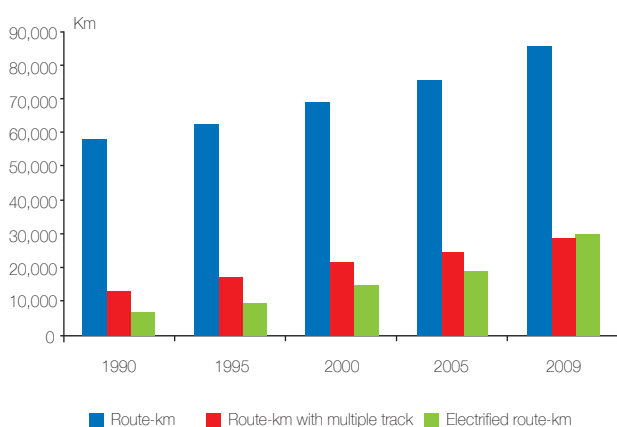
For mixed-use railways, the equipment and the labour productivity of China Rail is among the highest in the world. In aggregate terms, since 1990, the average speeds of passenger trains have increased by over 50% and passengers per vehicle-km more than 70%. In the freight sector, the average size of trains has increased by 40% and the freight locomotive productivity by 50%. In 2005, fast passenger services (200 km / h) were already operating on certain lines, with examples of heavy bulk freight trains of up to 20,000 tons. In 2007, electric trains operating at 200-250 km / h were introduced on several routes. In January 2010, the first high-speed line with more than 350 km / h speed, opened between Wuhan and Guangzhou (96 km).

In China, most of the lines carry a mixture of heavy freight trains and express passengers, except for new lines reserved for high-speed passenger services. Typically, such lines operate with headways of seven to eight minutes, and routinely manage the equivalent of 120 pairs of passenger trains and up to 140 pairs at peak periods such as the Spring

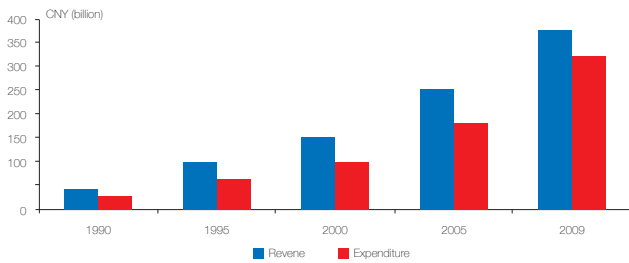
Festival, which is equal to, or very close to their theoretical capacity. (Graphics 6)

Basically, China Rail is a self-funded organization that receives no operating subsidies from the national budget and only modest support for capital investment for lines to remote areas, less than 10% of capital funds during 2000-05, and declining since. In 2005, China Rail adopted the joint venture (JV) model, which is an important development in funding new lines. A typical “new” JV is funded 50:50 by debt and equity. The equity comes from MOR (ministry of railways) and

third parties, typically provinces and potential customers, and the joint venture will raise the debt from local banks. Often, provincial equity is provided in the form of cleared land (and associated resettlement costs) but provinces can also contribute funds, normally through a Provincial Rail Investment Corporation. The JV model is now used for almost all new construction and upgrading projects, despite many question marks about how to get the right balance between railway system co-ordination/integration and protecting the interests of individual JV investors. (Graphic 7)



6. China Rail Operating Indicators 1990-2009.



7. China Rail Transport Revenue and Expenditure 1990-2009

2. CHINESE HIGH-SPEED LINES

In China, the high-speed rail network serves 100 cities, and carries about 54 million passengers per year, or about as much as air passengers in the United States. In 2014, this transportation was used twice as more than air assets.

The rail network in China is one of the largest in the world, with 98,000 km of network; it ranks second in the world after the United States. But the high-speed network, in 2013, is the first in the world rankings with 11 000 km (half of the world's high-speed network).

In 2013, China has more than 4,800 km of network where trains can travel at 300 km/h, more than France (2036 km) or Japan, pioneer of high-speed, which has only 393 km in account for such speed. For example, the high-speed line Beijing-Shanghai, which is 1318 km long, puts Shanghai at less than 5 hours from Beijing against about 10 hours before.

The longest high-speed line in the world is the line connecting Beijing and Guangzhou and was inaugurated on December 26, 2012.

Eight major axes development are planned. The completed network will feature services at up to 350km/h speed based on four North-South and four East-West corridors and by 2020 will have 16,000 route-km, more high-speed rail line than the rest of the world put together. These eight axes are as follows:

> 4 North-South axes: Beijing in the North (Harbin), the Northeast (Dalian, Shenyang), and South (Shanghai, Guangzhou, Nanjing, Shenzhen, Fuzhou, and Hong Kong).

> 4 East-West axes: Qingdao-Taiyuan, Xuzhou-Lanzhou, Shanghai-Kunming and Shanghai-Chengdu.

Most new lines follow existing roads and are only designed for the passenger traffic. They are known as the passenger-designated lines (PDL). Several sections of the national grid, specifically along the Southeast corridor, will be built to connect cities that have no rail connection yet. These sections, carrying passengers and cargo, are sometimes incorrectly referred to as PDL. High-speed trains can reach 300 to 350 km/h on PDL, against 200 to 250 km/h in HSR (High-speed rail). This ambitious national network project is planned for 2020.

To understand how the choice of cities has been made for connexion in PDL let's see if we can find a principle.

As we can see on the table above, most of the connected cities have nearly 1.5 million



- North-South Lines**

 - Jingha : Beijing - Harbin
 - Jinggang : Beijing - Honk Kong
 - Southeast Coastal : Shanghai - Shenzhen
 - Jinghu : Beijing - Shanghai
- East-West Lines**

 - Xulan : Xuzhou - Lanzhou
 - Qintai : Qingdao - Taiyuan
 - Huhanrong : Shanghai - Chengdu
 - Hunkun : Shanghai - Kunming
- Standard Lines**

 - Rongguang : Chengdu - Guangzhou
 - Hefu : Hefei - Fuzhou
 - Lanxin : Lanzhou - Ürümqi

inhabitants. Compared to other cities in China, these ones are the main of each regions.

Chinese railways are unique for their fast developmental phase. In other large countries such as Argentina, Australia, Brazil, Canada, India, Russia and the United States, the national railway systems were already established by the 1950's, which was just the beginning of China's era railway building. China's era of rapid development continues in freight and passenger transportation, under a heavily centralized structure that is prevented from being completely monolithic by the participation of JV railways, industrial networks, and local railways.

Centralized railway sector administration has been effective in developing China's rail transport industry. First, MOR-administered RRAs (regional rail authorities) execute railway network management and train operation with consistently high discipline and efficiency. Second, for years, MOR has successfully delivered the biggest railway system development program in the world. Clearly, a single point of concentrated responsibility, authority, and financial resources has been critical to the rapid and comprehensive development of a long-term national program.

CONCLUSION

What stands out this study is the fact that the high-speed train is profitable in terms of time for a 1000 km radius. The high-speed track is the most economical infrastructure for the user as well as for the society. Ecologically speaking, it is by far the best transport mode in terms of CO2 emissions, energy consumption and land use.

Train networks can be enhanced step by step in order to host faster train and these modifications are most of the time cheaper than building a new high-speed line. The changes that can be brought to a normal line are able to increase the speed to 230 km/h, which can activate an entire region.

While in one hand the train is conceived as an efficient economic infrastructure, in another hand it has a powerful symbolic status. Train travel is fascinating for most of the people as we saw with the Orient-Express.

Train networks are also capable of bringing different Peoples together. The Bering Strait illustrates how the dream of “connecting” can erase the old conflicts.

China illustrate perfectly that some countries, today, counts on the high-speed train to develop their economy.

A high-speed line is very expensive (€12 millions per kilometer) but, thanks to its economical and ecological characteristics, it

can easily pay for itself. Moreover, once the line built, the network can be undefenitely extended with ease.



Deserted Hejaz Station, Saudi Arabia (By Jerry Miller)

D | THE POTENTIAL OF A NEW HEJAZ LINE

I | HEJAZ COUNTRIES

1. TURKEY
2. SYRIA
3. JORDAN
4. SAUDI ARABIA

II | NORTH AFRICA

1. MAGREB
2. EGYPT

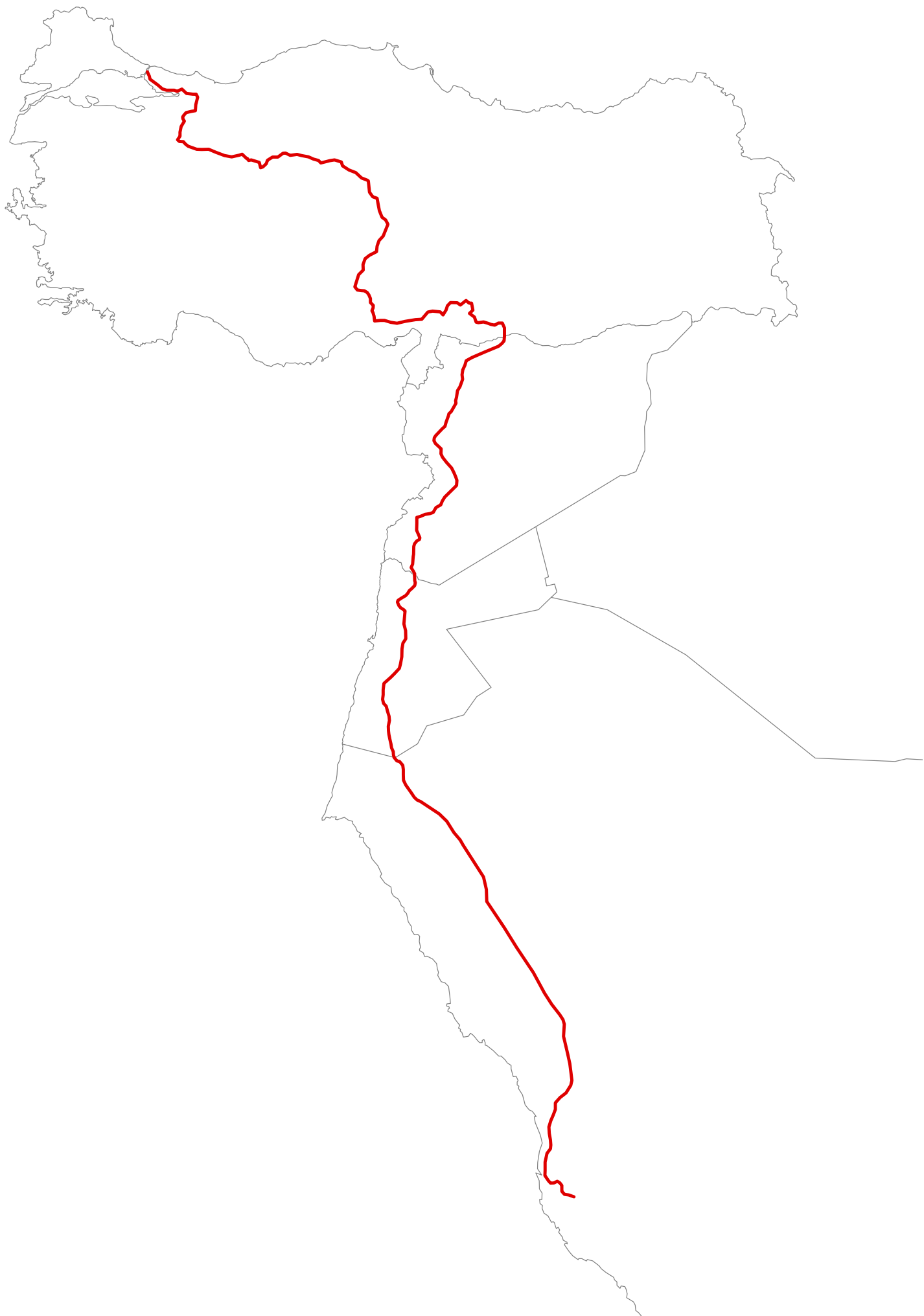
III | SOCIAL LAYER

D | THE POTENTIAL OF A NEW HEJAZ LINE

Given the informations collected on train and on the history of the Middle East. This part aims to give a global understanding about the old Hejaz Line's countries.

To do so, we set a specific strategy of study. Firstly, we explained in detail the characteristics of each countries crossed by the old Hejaz Line : Turkey, Syria, Jordan and Saudi Arabia. Secondly, we demonstrated how the renewal of this line would have a potential that exceeds the Middle East region and could become a link between the European, North African and Asian networks.

We propose three layers of reading for each Hejaz Line's country : Geography, cities and road network and finally railway network.



TURKEY | GEOGRAPHY

Turkey has a strategic geographical position as it is at the crossroads between Europe and Asia. It has borders with Greece and Bulgaria to the East and with Georgia, Azerbaijan, Armenia, Iran, Iraq and Syria in the west. The Mediterranean Sea in the south and the Black Sea in the North define the rest of its border. The two seas are connected by cutting the country between Dardanelles Strait and Bosphorus Strait.

With only 3% of its area in the European continent, it takes full advantage of its crossroads capacity as it is at the intersection of the axis Russia - Mediterranean and Balkans - Middle East, while also being on the famous Silk Road.

Concerning the relief, almost entire eastern Turkey is on the Anatolian tectonic plate (a micro plate which includes Turkey, Cyprus and far-west of Syria). This geological situation makes the country among the most seismic of the world. This phenomenon also explains the very mountainous character of its landscape on the west. Two major peaks can be noted: the Ercitas Dagi (3916m) at the top centre of the plateau formed by the Anatolian plate and Mount Ararat (5165m), which dominates the western mountain range.

Western mountains are the source of two famous rivers that are the Tigris and the Euphrates. Both rivers cross Turkey from the south and eventually flow to the Persian Gulf.

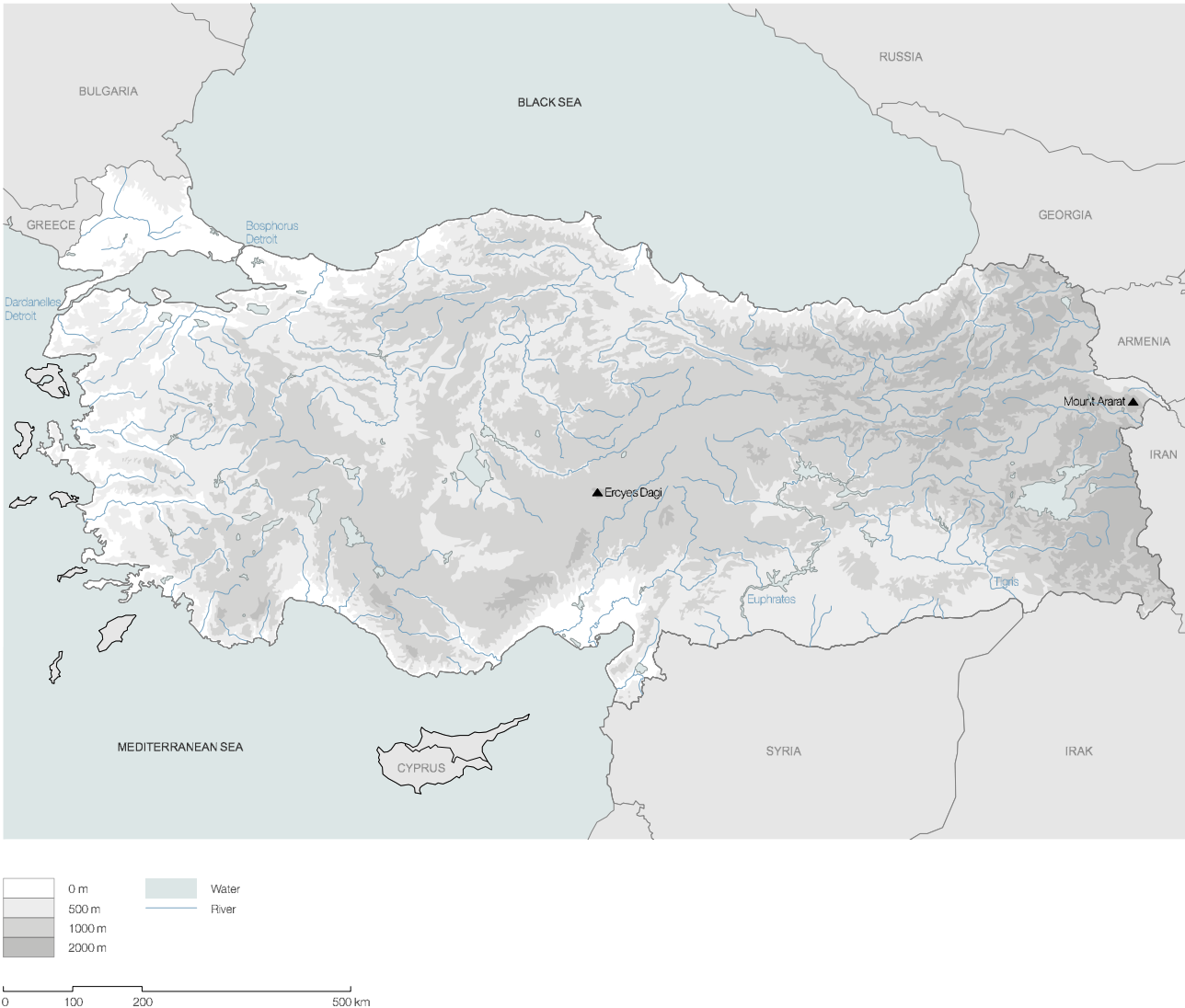
As for the climate, Turkey follows two different regimes. The Mediterranean and Aegean

coasts are subjected to long hot summers and mild but rainy winters. The average temperatures are 0 ° C in January and 23 ° C in August.

The central plateau of Anatolia has a continental climate with warmer summers and cold winters on the coasts. The average temperature are 5 ° C in winter and 23 ° C in summer.

The mountainous region has a longer more stringent winters than those of the plate, sometimes reaching extreme temperatures such as -30 ° C with snow during 120 days per year. In contrast, the south is the warmest region of Turkey with a summer average temperature of 30 ° C.

The growth of the industrial sector in Turkey has led to significant air pollution. Moreover environmentalists worry much about water pollution caused by active agriculture. A large Mediterranean action project is being studied to reduce pollution in the country.



In Turkey, two cities have an international influence: Istanbul and Ankara.

Ankara is the political capital of the country. With 4.4 million inhabitants, it is the second most populated city in Turkey. The city is very old and was once controlled by Romans, Sassanids and Ottomans from whom it has a rich heritage. It became capital instead of the famous Istanbul because of its central geographic location as well as a desire to break away from the imperial symbolism of St. Sophia's city during the creation of the republic in 1923. The main business sector of the capital is the administration, which represents three quarters of the workforce. This is explained by the fact that the industry is very developed there.

As for Istanbul, it is the largest city in Turkey. The city is the cultural capital due to its rich history. It was the capital of the Eastern Roman Empire under the name of Constantinople and the Byzantine Empire under the name of Byzantium and finally the Ottoman Empire. It is officially called Istanbul since the introduction of the Turkish republic. With 14.2 million inhabitants Istanbul is the second most populated city in Europe after Moscow. Located around the Bosphorus Strait, this strategic position gives it a strong economic power regarding maritime and land trade since it is the direct interface between the European and the Asian continent.

The Turkish road network is widely developed and covers all of its territory. This network is almost entirely composed by national roads

with only three motorway sections for a total length of 2000 km. The first motorway in the North connects Edirne to Ankara via Istanbul. The second most important is in the south and connects Mersin to Sanlurfa through Adana with extensions to Iskenderun and Eregli. The third section of the motorway is located on the west coast around Izmir.

The government is currently conducting a development policy of its motorway network. It wants to Triple the motorway length with an extra 5000 km. The idea is to build a West-East axis, from Izmir to Erzurum, reaching the Iranian border, as well as a North-South connection between Ankara and Adana.

Regarding other means of transport, turkey has three international ports that are Izmir, Antalya and Istanbul, and close to 44 airports for internal and local flights. Four of them are international: Istanbul, Ankara, Izmir and Antalya. They perform, alone, nearly 80% of the country's air traffic.



With its roots going back 155 years ago, Turkish State Railways (TCDD) has a long-standing history. During the Ottoman period, around 8500 km of new line was built. 4000 km of it was within the borders of Turkish National Pact of 1920. Realizing the importance of railways during the Independence War, Atatürk launched a campaign for railway construction. In twenty years between 1926 and 1946, four thousand kilometers line, eighty percent of which were located in harsh geographic conditions, was constructed.

After 1950s, investments in road became important in parallel with the developments across the world. Between 1950 and 2003, only 1.700 km of new line was built.

The year of 2003 became a milestone for the Turkish railways. As a consequence of the political and financial support of government, 80 projects were produced in 8 years including the high-speed line projects, modernization of the existing lines, and development of advanced railway industry on the basis of being restructured to be a more dynamic institution.

Since 2003, the railways as the prioritized sector among the state economic enterprises have been allocated the highest funds.

Ankara-Eskisehir, their first high-speed line was commissioned on March 13, 2009 and Ankara-Kony, the second High Speed Line on August 23, 2011. Thanks to the triangle of Eskisehir-Ankara-Konya, the economic, social and cultural life in the surrounding cities has become more dynamic.

The construction works for the second phase

of Ankara-Istanbul High Speed Line Project. Eskisehir-Istanbul and Ankara-Sivas High Speed Lines are going on. When both stages are completed, the travel time between Ankara and Istanbul will be reduced to three hours as will the travel time between Ankara and Sivas. Kars-Baku-Tbilisi Railway Project is a significant step in the international railway transportation. We aim at having a share from the freight potential estimated to be 75 billion dollars between Asia and Europe.

In addition, the construction works for Ankara-Izmir and Bursa-Bilecik YHT lines are going on.

Highly important decisions for railways were taken and the map of transportation system was drawn in the 10th International Transport Forum. In the context of these decisions, of the total amount of 350 billion dollars to be invested in the transportation sector until 2023, 45 billion dollars will be allocated for railways. Within this framework, it is targeted to construct 10 thousand km of new high-speed line and 4 thousand km of new conventional line till 2023.

Additionally, they aim to realize the project of “Restructuring and Strengthening of Turkish Railway Sector” since 2012. They desire to have a railway law.

Today, Turkey, the railway sector of which is developing, is getting more involved in the railway investments in the Middle East and neighboring countries and becoming a leading country in the development of railway sector.



Turkey is not only a geographical crossroad; it is also a political and economic one. Since the founding of modern Turkey under the leadership of Mustafa Kemal Atatürk in 1923, the country often seeks for Western connections. For example, it is a part of various cooperative organizations like NATO, the European Council or the G20. The country is an official contender to enter the European Union since 1963 (then called European Economic Community) with which it has concluded the customs union agreement in 1995. On the other hand, Turkey has kept very close links with the countries of the Middle East by participating in the Organization of the Islamic Conference and the Economic Cooperative Organization.

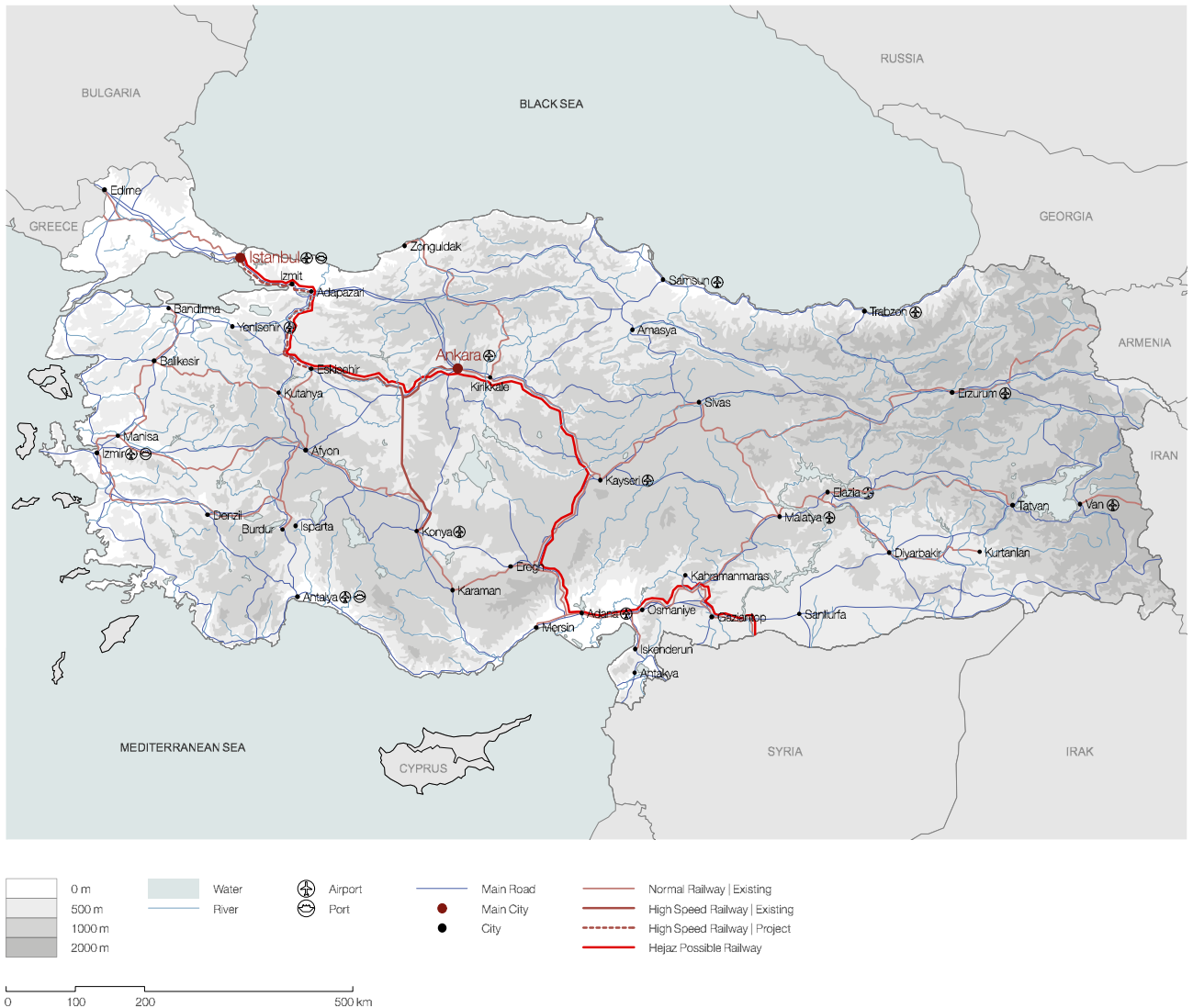
It is important to notice that Turkey is a major interface between Europe and the Middle East, from a political as well as economic perspective.

With the Marmaray tunnel project in Istanbul, which has just been completed this summer (2014), two continents were connected. It is possible now to travel by train from London to Damascus continuously. The project is estimated at approximately \$ 3 billion and was financed by the Japan International Cooperation Agency and the European Investment Bank.

The current situation demonstrates the willingness of Turkey to position itself as a leader in the development of railway networks. Primarily, it wants to be connected to the European network but it also wants to develop

its network in the South to the Middle East.

The Hejaz project, even if it is not named like this, is in the future plans of TCDD (Turkish State Railway). Connected to Europe through Greece, it will cross Turkey via Istanbul and Eskisehir when the connection will be completed. It will go through Ankara with an already existing line. The continuation of the high-speed line section is not yet built or even Planned. But the large connections with the South are in the TCDD leaders mind; the requalification of the following lines is predictable. Hejaz railway line could therefore go through Kayseri and Adana before reaching the Syrian border.

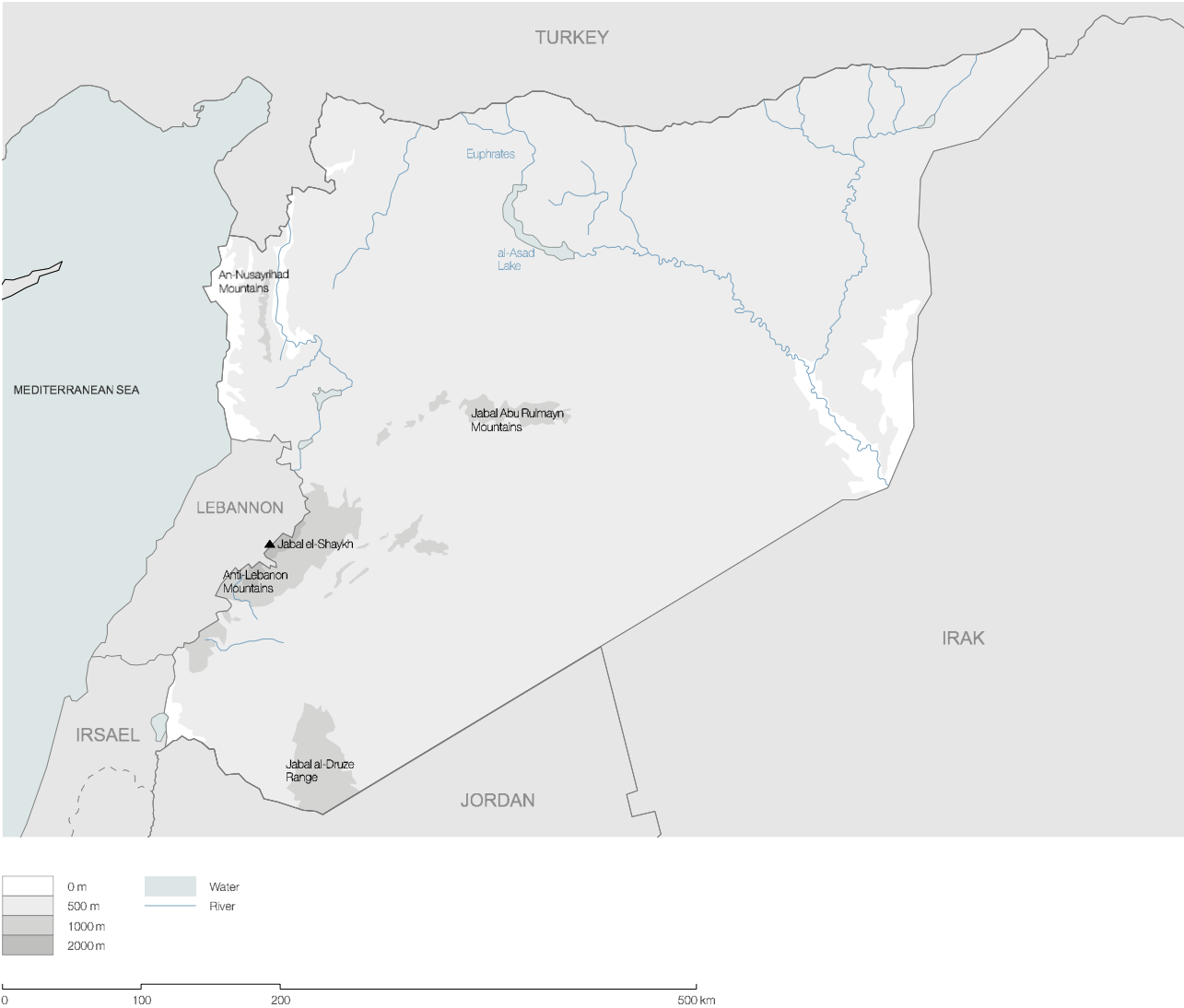


Syria has borders with Turkey to the North, Iraq to the East and Jordan, Israel and Lebanon to the Southwest. To the west, the coast on the Mediterranean Sea is 183 km long.

The territory of Syria consists mainly of a large limestone plateau with some ancient volcanic landforms on the west. This mountain range with a North-South orientation has an average width of 32 km and an altitude of 1200 m. In the north there is the mountain chain An-Nusayriah that cuts the continental plains of Syria from the continental plateau. In the South, the largest mountain range in the country is the border with Lebanon and thus is called Anti-Lebanon. In this relief there is the highest peak in the country, Jabal el-Sheikh, which rises to 2814 m. Regarding the rivers, the Euphrates flows through the northwest plateau from Turkey to Iraq in the Southeast, the whole forming the Al-Assad lake in the North. Boundary of the North-Eastern tip of the country is defined by the Tigris river. Other minor rivers flows from the Turkish mountains in the north, and Anti-Lebannon mountains in the southwest.

In climate terms, Syria has two different regimes, Mediterranean on the coast and continental arid on the plains. The country becomes warmer as one moves eastward. Rainfall is five times higher on the coast than the plateau while in the mountains it is twice as high as the coast. Water is a critical resource for the country because the exploitation of the country's groundwater exceeds almost

twice its renewal capacity. The major water infrastructures are dams on the Euphrates, which contains almost 12 km³ of water and generates 40% of the electricity resources of the country. Techniques of irrigation being archaic, the evaporation of water is consistent and promotes the growth of the salt level in the land, which makes it difficult to cultivate. This water shortage problem is the main concern of the government.



The General Establishment of Syrian Railway is Syria's national rail operator. It is subordinated to the Ministry of transports since 1958 and has its headquarters in Aleppo.

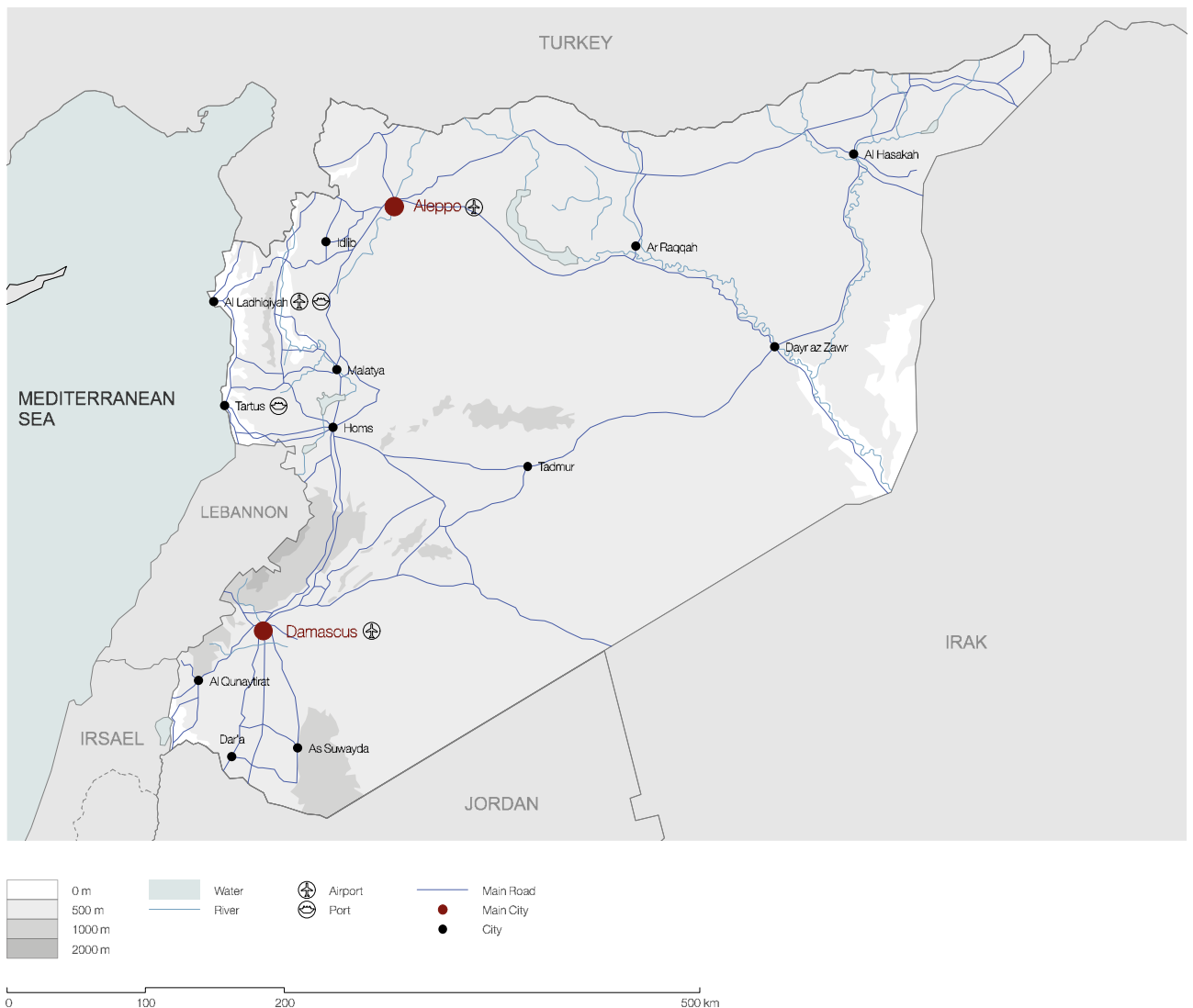
The entire network is over 3000 km long with, as we have seen with the road network, a main North-South axis between the Turkey and Jordan. Aleppo and Damascus are the structuring poles of the network and divide it into three main sections. The first is the connection between Aleppo and the Turkish network. The second between Aleppo and Damascus, and the last one links Damascus to the Jordanian borders. A loop form section between Aleppo and Homs connects the two ports of Tartus and Al-Ladhiqiyah to the network. An East-West line, inherited from the famous Bagdadbahn, connects Aleppo to the rest of the country's eastern plains until the Iraqi borders. Another route links Homs to Lebanon.

The network allows the transport of people but the main activity of the rails is the transport goods such as the track between Homs and Tadmur that is used for the transport of phosphate extracted from Tadmur mines to the port of Tartus.

All Damascus Northern network is now built with the standard gauge of 1435mm while in the south, on the section from Damascus to Amman in Jordan, there is a narrow gauge of 1050mm (the Hejaz railway gauge). The difference gauges is currently a problem for the network fluidity within the country. The Northern network is connected easily with the Turkish network (Turkish network also with a

standard gauge), the Southern narrow gauge requires a change of trains in Damascus, whether for goods or people. Before the Civil War, the state has begun projects that aimed to ensuring the continuity of gauges between the north and south of Damascus by replacing the gauge of 1050mm by 1435mm standard.

The modernization of the railway network has been identified as a priority of the government. In 2003, they invested € 9 billion in the network as well as an investment of € 12 billion until 2020 for future projects. These projects are in collaboration with consultants of structural operation's office JICA (Japan International Cooperation Agency). No high speed line is planned, but an update of the network has been considered before the Civil War to increase the speed of trains on the network to reach 250 km / h. In addition to the increase transit speed, The General Establishment of Syrian Railway plans to expand its network to strengthen its international connections.



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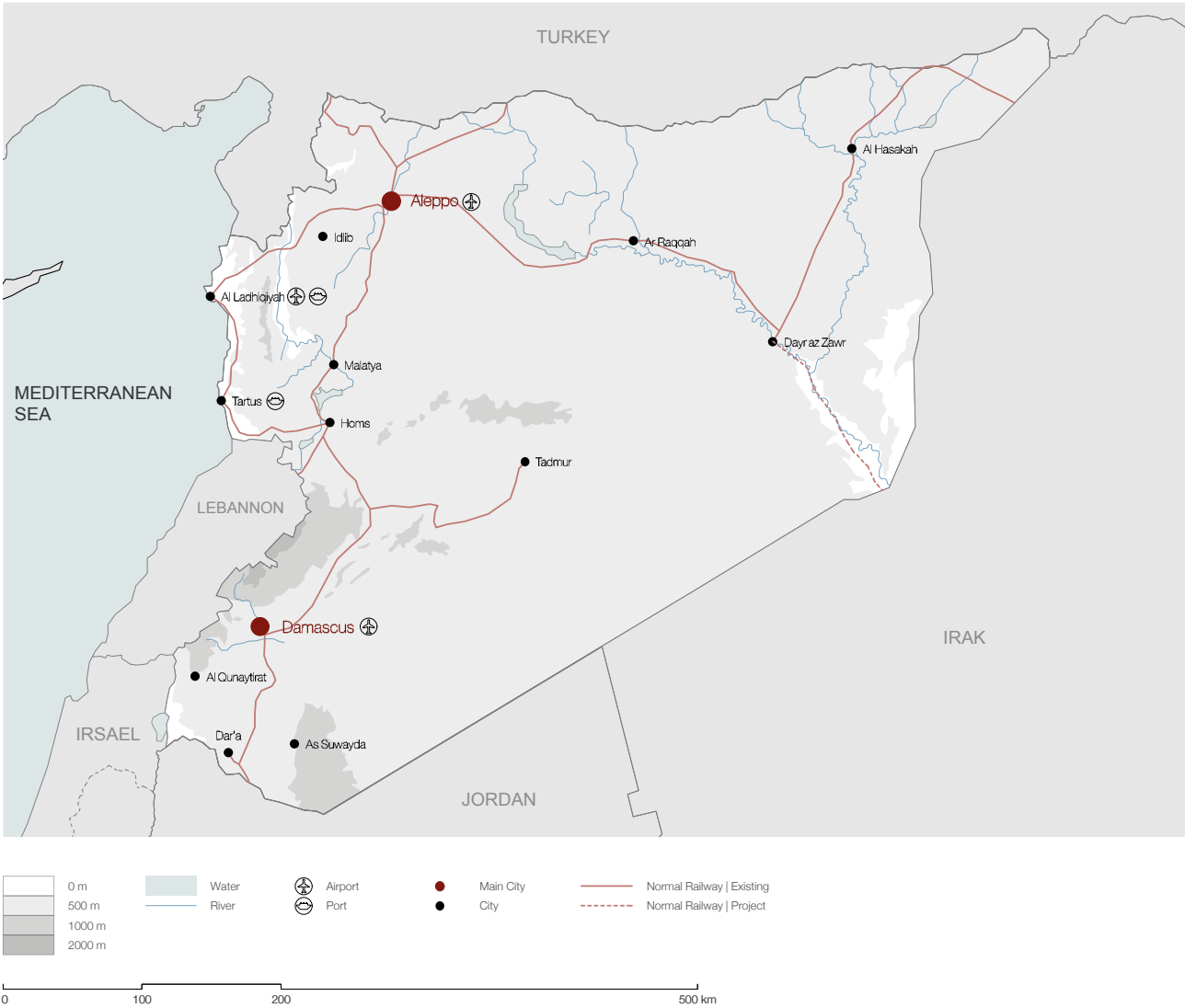
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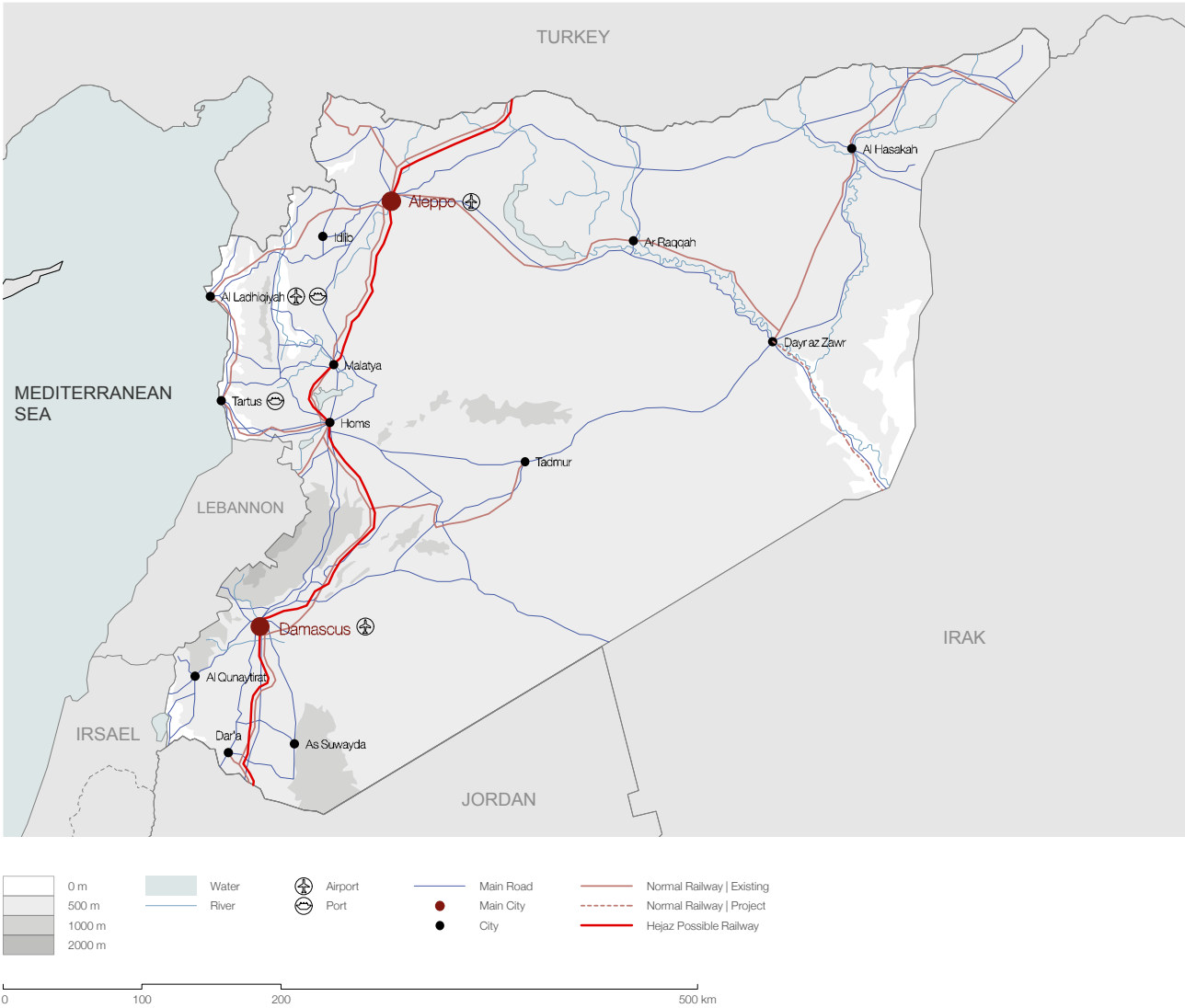


Due to its geographical location, with a sea to the West and arid plains to the East, Syria has developed in a North-South dynamic. It is, and has been for centuries, the edge between Europe and the Middle East. Being for a long time the last step of the Silk Road in the Middle East, Syria knew how to take advantage of this position for the development of its infrastructure. The country used its infrastructure for its primary activity of raw material extraction (phosphate mine) and for the expansion its craft sector as well as to structure its industrial centres.

Despite the dark times Syria is witnessing since 2011, it remains a country with a great emerging potential. When the country will get out of the current instability, the development of transport infrastructure will clearly become a prior investment sector as shown by the Ministry of Transport before the war started

The North-South rail network is well developed. The installation of an eventual Hejaz Railway (high-speed rail) could be facilitated. The connection to the Turkish network is already done with a standard and common gauge to Damascus. Southern part of the network would, however, undergo a restructuring to achieve continuity and fluidity of traffic. With an upgrade (electrification and solidification), standard rail could allow a train to move at a speed of 250 km / h. A trip from Aleppo to Ankara would take only 3h40 versus 11h by car and traveling between Aleppo and Damascus would take 1h40 versus 3h40 by

car. If in the future a high-speed line would be built, Aleppo would be 2h50 away from Ankara and 1h10 away from Damascus.



JORDAN | GEOGRAPHY

Jordan is a young country founded in 1946. It is bordered by Syria to the North, Iraq to the West, Saudi Arabia to the South and Israel and the West Bank to the East. It has 26 km of coast along the Red Sea in the south. The country has no land border with Egypt but it is visible from the coast of the Red Sea. Jordan is at a geographical crossroads as it ensures the land link between northern Africa and Asia.

Most of the country consists of a desertic plateau. Low mountain ranges rise in the west of the country. The highest point is Jabal Umm ad Dami, which peaks at 1854m on the border with Saudi Arabia. A famous peak is Mount Nebo to the west. This is the place from which, according to the texts of the ancient Testament, Moses overviewed the lights of Jerusalem.

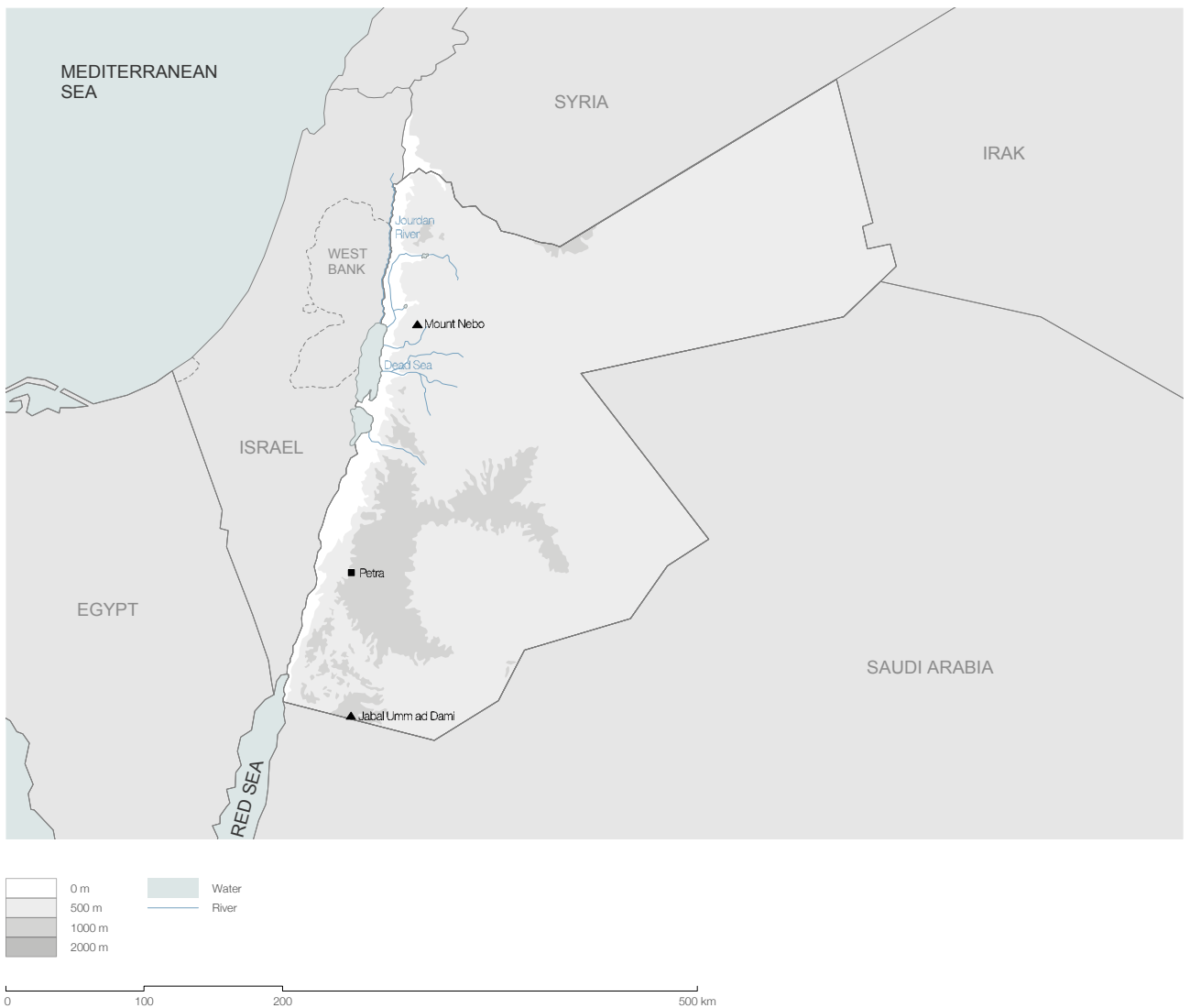
The only river in the country, Jordan River, where John the Baptist baptized Jesus Christ, has its source in the mountains of the Anti-Lebannon in Syria and defines the North-Western border of the country until it flows into the Dead Sea. The Dead Sea is the sea having the highest salinity of the world, which makes it unsuitable for life.

The few available water resources makes Jordan one of the most water-poor country in the world. To overcome the water problems, the government compulsively extracted water from aquifers. As a result, the speed of absorption of the aquifer water is twice higher than its regeneration. In July 2013 there was the inauguration of a pipeline that connects the capital with an aquifer situated at the

Saudi Arabia border, which covers 30% of the city consumption. Despite this, water is the main problem of the country.

Jordanian climate has two seasons. A warm season, from May to October, and a mild season, from November to April. The West benefits of a slightly warmer climate than the East, which is extremely arid. The average temperature of Jordan is 14 ° C in January and 34 ° C in July. It rains 350 mm per year in the country's mountains and only 50 mm in the desert of the east. The very low rainfall prevents a proper agriculture and provides irrigation for only 750 km² of land.

Jordan has one of the seven wonders of the ancient world: the ruins of Petra troglodyte the city. It is naturally a centre of tourism for the country.



Today, Jordan has about 6.7 million inhabitants, 4.4 million live in the capital, Amman. Jordan was the main host country for the refugees during the various conflicts that happened in the area. Almost 2 million Palestinians have found refuge in the country for several migration waves. Half a million of Syrians have left their country since the beginning of the civil war and most of them immigrated to Jordan. Therefore refugees represent around 40% of the population.

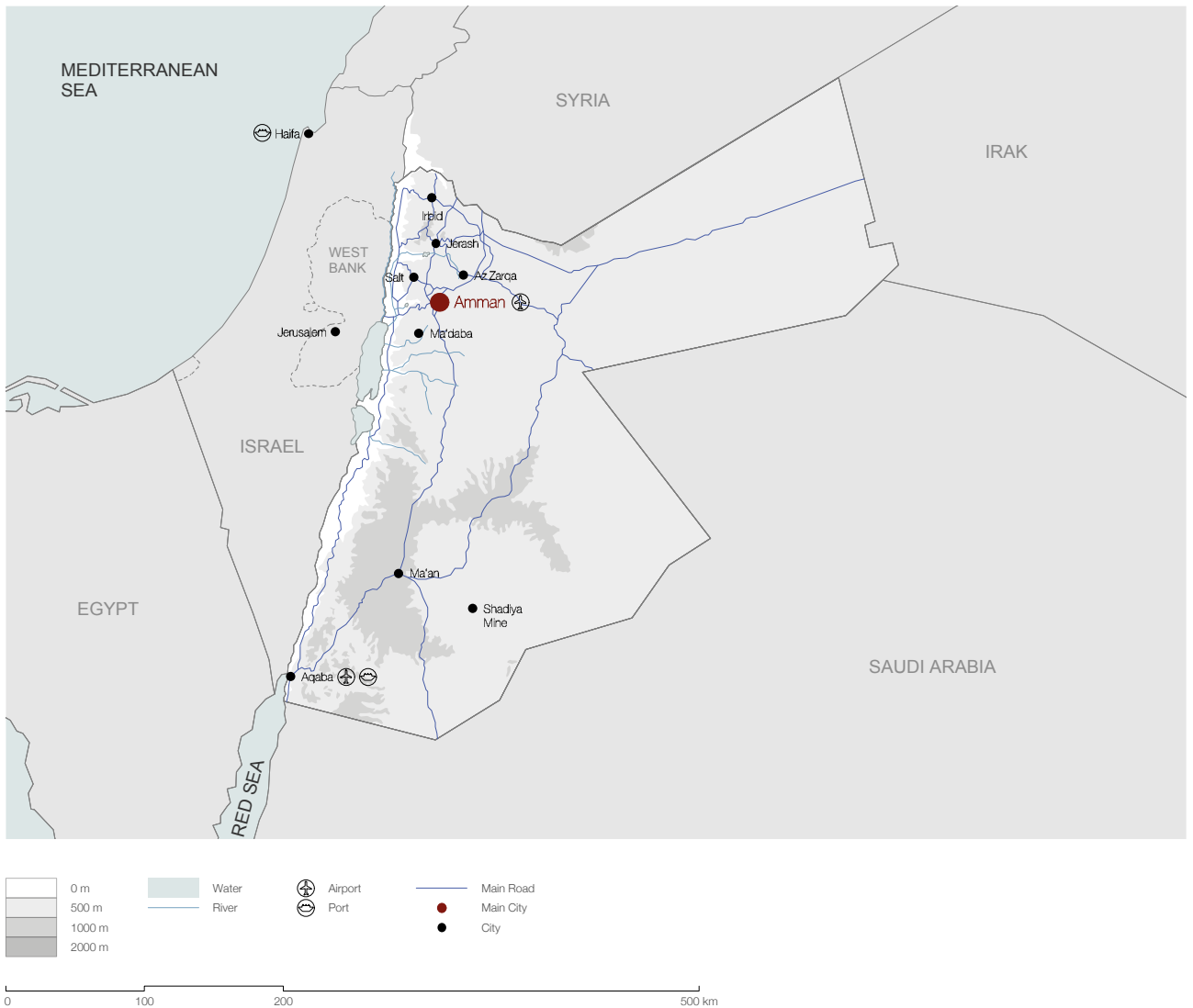
Amman is the political, cultural and economic capital of the country. Like Damascus and Aleppo, it is one of the oldest cities to be continuously populated. Originally known as Philadelphia, it appears in the Bible as Rhabbat Ammon. Like Rome, it was originally built on seven hills although now it extends over 19 hills. At the international level, Amman is an emergent city. A report by Dunia Frontier Consultants states that Amman with Dubai and Doha is one of the principal investment hub in the Middle East and North Africa. A brand new business district, Downtown Adbali, is currently about to finish. In the Middle East, Amman wants to position itself as a leader in the service activity as shown with the headquarter of the Arab Bank (One of the most important bank of the Middle East) and Aramex (the biggest transport company in the Middle East).

Despite its poor international influence, the city of Aqaba in the South is also important for the country economy since it is the only port in Jordan. It is a very important commercial port for the region, which allows the local economy

to be extremely dynamic.

The road network in Jordan is very underdeveloped. The main reason is the central character of Amman. Bringing together almost all responsibility and country activities, connections between the other cities is very limited and therefore the road network is small. Like Syria, a North-South axis stands out. The main motorway of the country, the airport road, crosses the country from Syrian to Saudian borders through Amman and Ma'an. Another motorway connects Aqaba to Ma'an. Aqaba is also connected to Irbid in the North by the Dead Sea motorway along the West of the country. Finally the North has a network that connects the capital with Irbid, Jerash and Az Zarqa. Another motorway crosses the Jordanian desert in the East to reach Iraq.

Regarding air traffic, Queen Alia airport in Amman is the only international airport. Aqaba has its own airport intended for national flights.



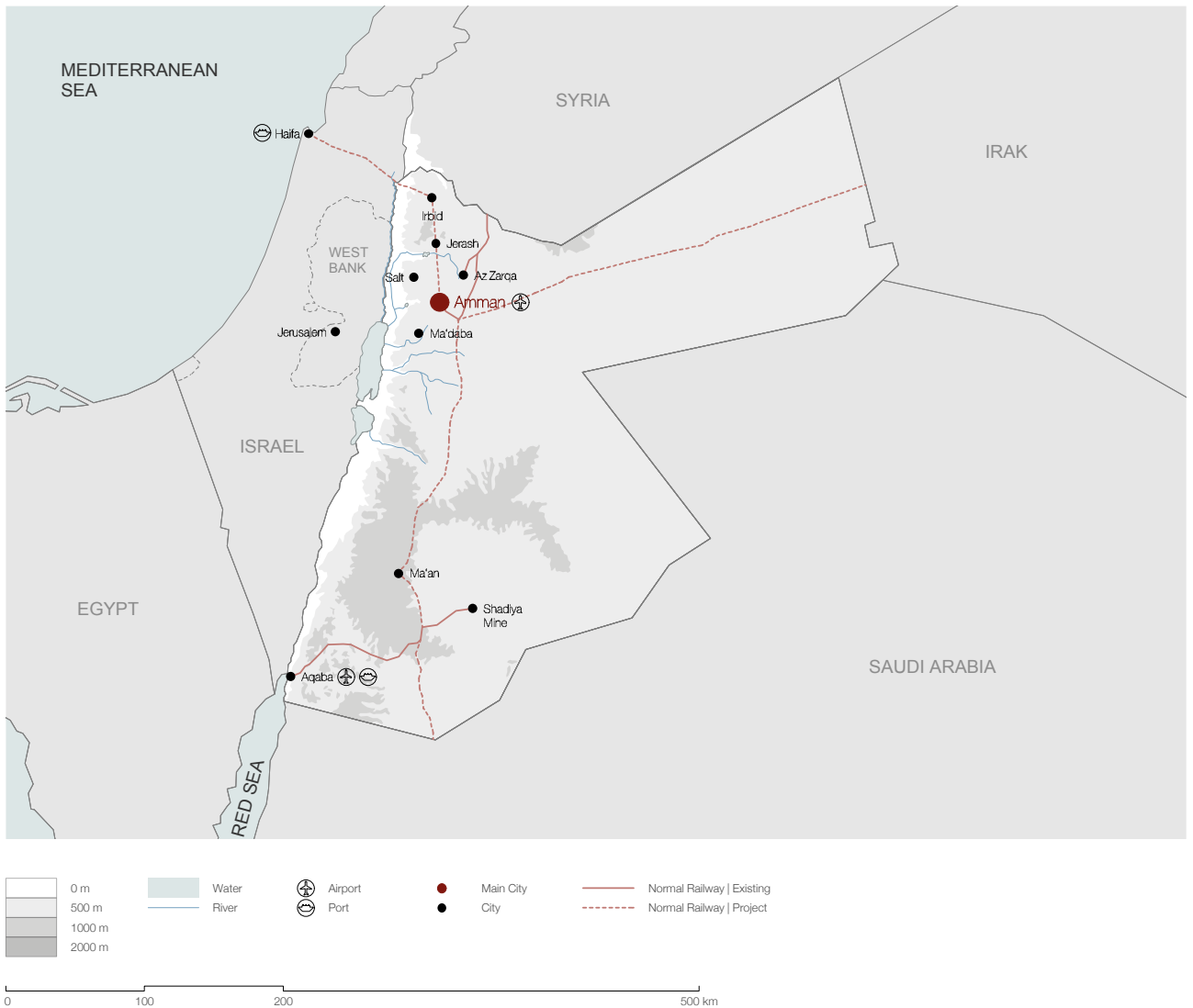
JORDAN | RAILWAY NETWORK

The railway network of Jordan is now composed of two lines. The first in the North, Jordan Hejaz Railway, which is the same line built by the Ottoman Empire, links Amman to Damascus in Syria. The second line is located in the South, is a freight transport line that connects Aqaba to Shydiya phosphate mines. Aqaba Railway Corporation built this line and then repurchased the line of Hejaz. The only rail operator in Jordan is therefore a private company: The Aqaba Railway Corporation. As the map shows, the Jordanian railway network is underdeveloped. Especially as rail lines has a narrow gauge of 1050 mm, which is the only case (with Syria) throughout the region. The southern line is only used for commercial purposes and not for people.

If today Jordan network is almost inexistent, the willingness of Jordan to position itself as a leader in the Middle East is seen in the railway project it wants to build. In partnership with BNP Paribas, the government announced a three-section project in 2010. The project consists initially of replacing the narrow gauge on the line connecting Amman to Damascus with a standard gauge, and to continue the line until the Saudi border. In a second step, it wants to replace the gauge of Aqaba Line so it can be connected to the great North-South line and then make the connection with Irbid in the north. Finally, the third section of the project is to connect the capital with the Iraqi border in the west. All these projects have been planned with a term of three years, but funding problems delayed the whole project,

which was not abandoned as the government is currently in discussions with the Turkish Development Bank for the missing funds.

In 2008, a discussion was held in Tel Aviv between the Jordanian ambassador and the Israeli minister of transport for the construction of a Haifa-Irbid-Amman line that would allow the capital to have access to a port on the Mediterranean Sea. The project is currently on hold but not abandoned since an EU finance fund would be willing to participate.

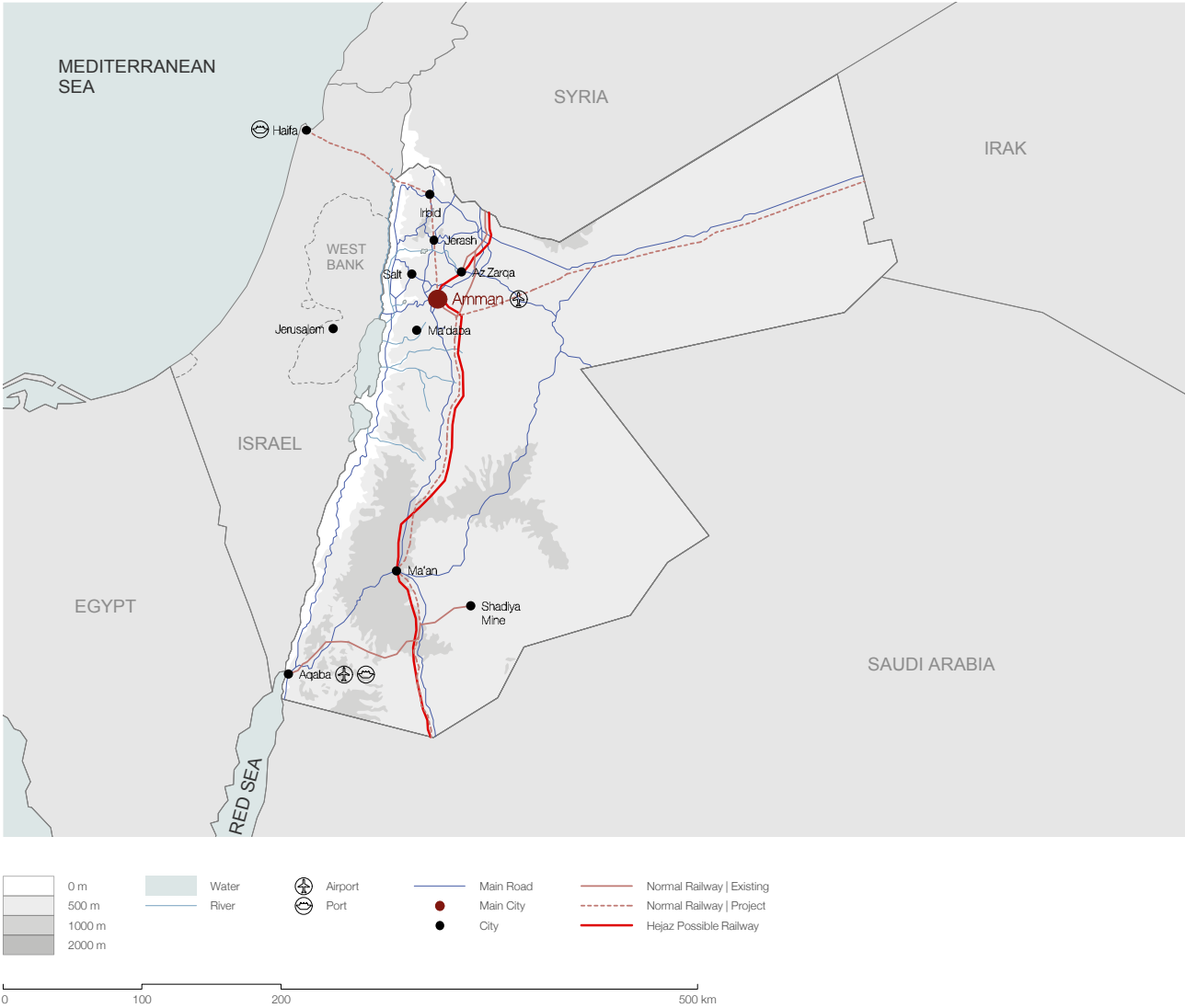


Jordanian rail network is now almost non-existent, but the country has a great potential to become a base for the Middle East network. It is a geographical crossroads and has a desire for developing its rail network.

Its geographical position is strategic because it operates the link between Africa, the Arabian Peninsula, North of the Middle East leading to Europe and finally Iraq to the East leading to Asia. Moreover, Jordan is one of the only countries with Egypt to have a peace treaty with Israel. The country was not concerned by the popular movement of the Arab springs, which makes it, with the Israeli peace Treaty, one of the most stable countries in the region. This stability is a major asset for Jordan.

Even though it is a small country with a relatively weak economy for now, it is an example of stability and solidarity. Stability is an encouraging factor for investors and the solidarity demonstrated by being the main host country for the refugees shows its ambition to be a platform bringing together the Middle East as a strong community with its place on the international scene. This political and economic ambition will obviously need an infrastructure that lives up to it. A train network as the Hejaz would be adequate because it would transform the country into a hub for the region. The line of the Hejaz would be, as in Syria, a North-South axis, facilitated by very low reliefs. This spine would even be favourable to extension to the East and the West as we watch the country's desire to

connect to Iraq and even its collaboration with Israel to connect Haifa to Amman. Furthermore, as being the terrestrial interface between Asia and North Africa, it is possible to see in a medium-term future a rail connection between North Africa and the Hejaz and thus with Europe to the North and Persia (Iraq and Iran) to the West.



SAUDI ARABIA | GEOGRAPHY

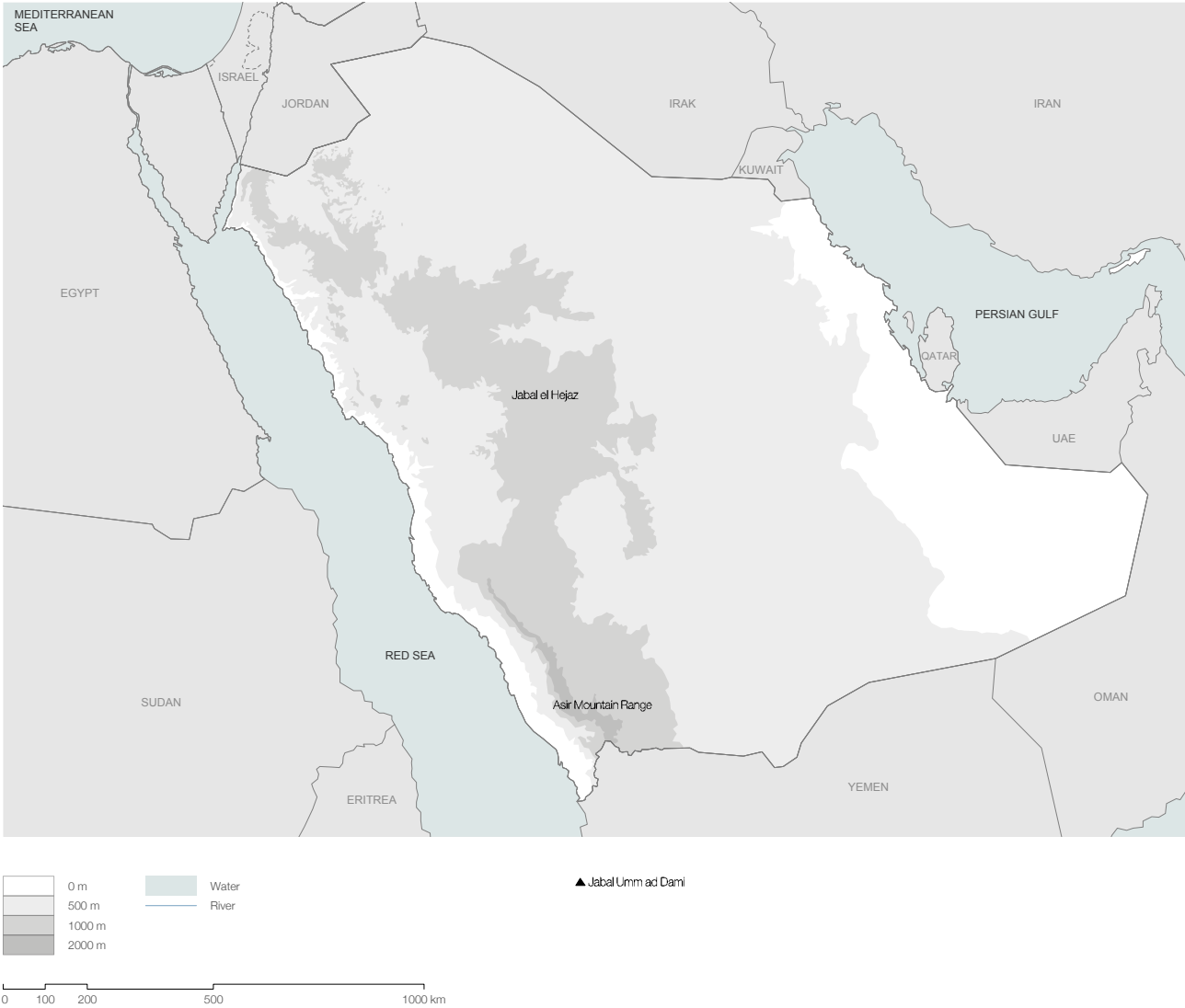
Saudi Arabia represents 80 % of the Arabian Peninsula. It is the second largest Arab country after Algeria. Jordan, Iraq and Kuwait border it to the north, Qatar and by United Arab Emirates to the east and Oman and Yemen to the south. The country has a coast along the Red Sea to the West and another one on the East along the Persian Gulf.

There are two mountain ranges in Saudi Arabia. The first located in the South on the border with Yemen, the Asir Mountain Range. It includes the highest mountain in the country, which rises to over 3000 m. The second one, Jabal al Hejaz covers the Northwest. This mountain range gave its name to the Ottoman rail project. To the east, covering the second half of the country, a broad desertic plateau slopes gently down to the Persian Gulf.

The country has no permanent rivers but has wadis, which are small alternating streams flowing after a rain period. Also, there are occasional small waterholes in the desert. Aside from these oases, the major part of the country is an arid desert unsuitable for life.

Saudi Arabia has four warm seasons. The average summer temperatures are around 45 ° C but can reach 55 ° C in extreme cases. In addition to the temperatures, in coastal region, humidity can reach saturation in the summer, which generates a hot stifling climate. In winter the temperature drops sharply and reaches an average of 9 ° C. In spring and autumn, humidity decreases and the average temperature is 29 ° C.

The shortage of water is worrying for the country. It began to install water desalination plants to turn seas salt water into drinking water. This is an expensive process, but a possible solution for the country's economy now.



SAUDI ARABIA | CITIES & ROADS

In addition to the capital Riyadh, Saudi Arabia has two cities that have an international cultural influence: Medina and Mecca, the two most important holy places in Islam. It is towards Mecca that all the Muslims around the world pray.

Saudi Arabia has a population of 30.1 million people, nearly a quarter (7.3 million) live in the capital. Riyadh is a city that has experienced an economic improvement due to oil revenues. In 1974 it had a population of 650,000 people, now 10 times more people lives in the city.

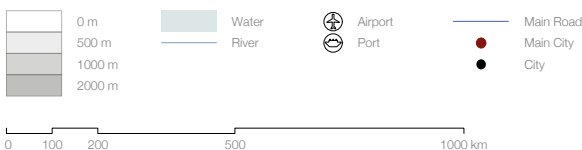
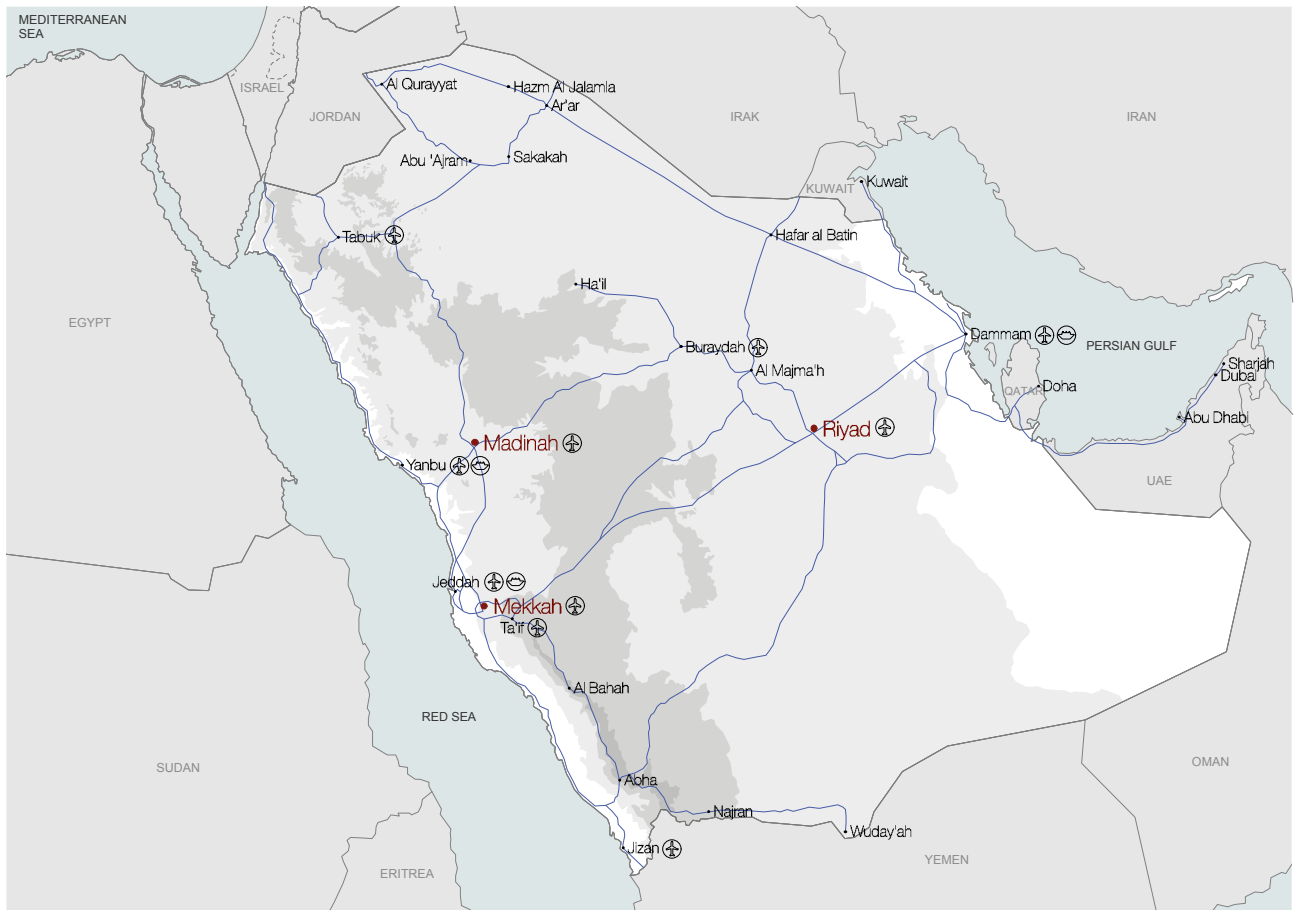
If Riyadh is the political and economic capital of the country, its international influence is widely exceeded by the two holy cities. In fact, aside of being the city of Mohammed, Mecca is a place of pilgrimage for all Muslims of the world. According to the Qur'an all persons able financially and physically have to go at least once in his life to accomplish the pilgrimage in the holy city. This sacred city is responsible for the movement of more than two million Muslims in a few days every year.

Medina is the city in which the prophet found refuge when he was kicked out of Mecca. It is also where Mohammed's tomb is. It is the second holiest site in Islam, which makes it a high place of transit.

The motorway network in the country is relatively developed. There is a North-South axis on each side of the country with crossing motorways connecting major cities together.

The country develops much its transport infrastructure because there are 5 International airport: Dammam, Jeddah, Riyadh, Medina and Yanbu. Four others manage regional

flights: Buraidah, Jizan, Tabuk and Ha'il. Finally, the cities of Damman, Jeddah and Yanbu have major commercial ports.



SAUDI ARABIA | RAILWAY NETWORK

The company that manages the rail transport in Saudi Arabia is a public company called the Saudi Railways Organization.

The current network is 1400 km long. The two main lines connect the commercial port of Dammam and Riyadh. One line is for freight and the other is for the person transport.

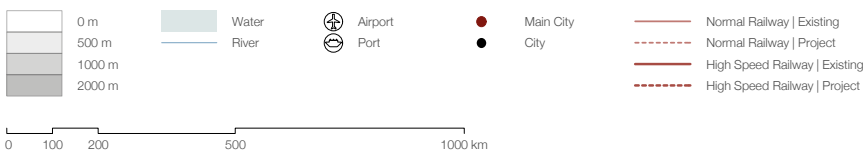
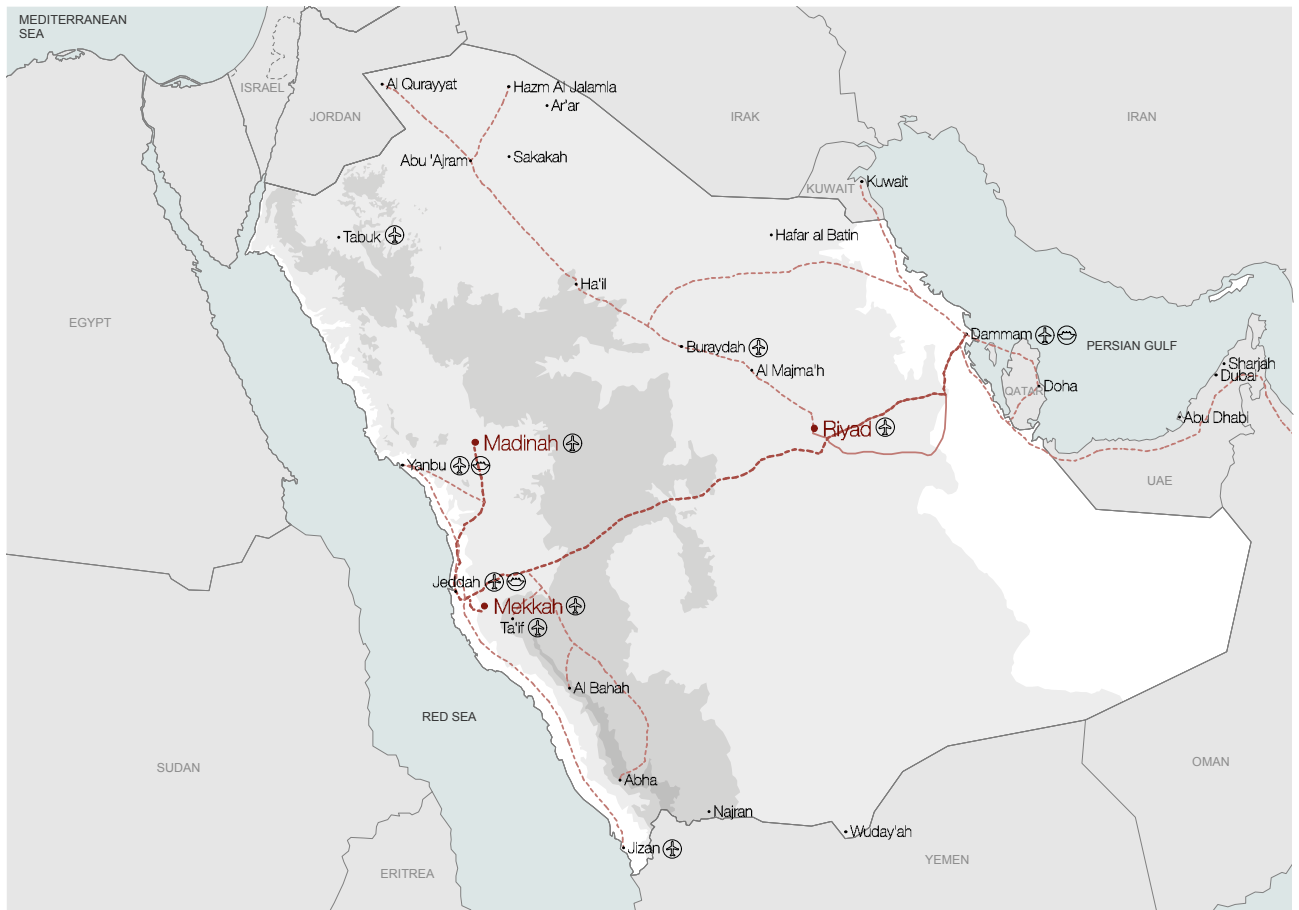
Saudi Arabia is planning many new lines for its territory. The first one, which is now under construction, is the Saudi Landbridge Project, which aims to upgrade the Dammam-Riyadh rail to a high-speed line that would continue until Jeddah. This huge infrastructural project connects the Persian Gulf with the Red Sea. It was initially a private project but financial problems have occurred and the state injected \$ 7 billion to build the line. The second project is a high-speed line connecting Medina and Mecca. It is currently under construction and shall be delivered in December 2015. The latest project of the country is a line connecting the capital to two cities in the north: Al Qurayyat and Hazm Al Jalamlah. Al Qurayyat is important for its geographical location, which is close to neighbouring countries, and Hazm Al Jalamlah for the transportation of phosphorus extracted from its mines.

In addition to its personal projects, Saudi Arabia has plans of international rails with its neighbours in the Persian Gulf. The Gulf Railway project involves five of the gulf countries: Oman, the United Arab Emirates, Qatar, Bahrain and Kuwait. The line should go along the coast and through the towns of

Muscat, Dubai, Abu Dhabi, Doha, Dammam and Kuwait City. At the moment, the projected line is dedicated to the freight transport but discussions have already started about the possibility of person transport (high-speed line).

Finally, there was a project that would connect to Jordan through Tabuk but it was cancelled because of funding difficulties. The fact that a connection was studied shows its importance in the Saudi Arabia's eyes.

RAILWAY NETWORK | SAUDI ARABIA



SAUDI ARABIA | SYNTHESIS

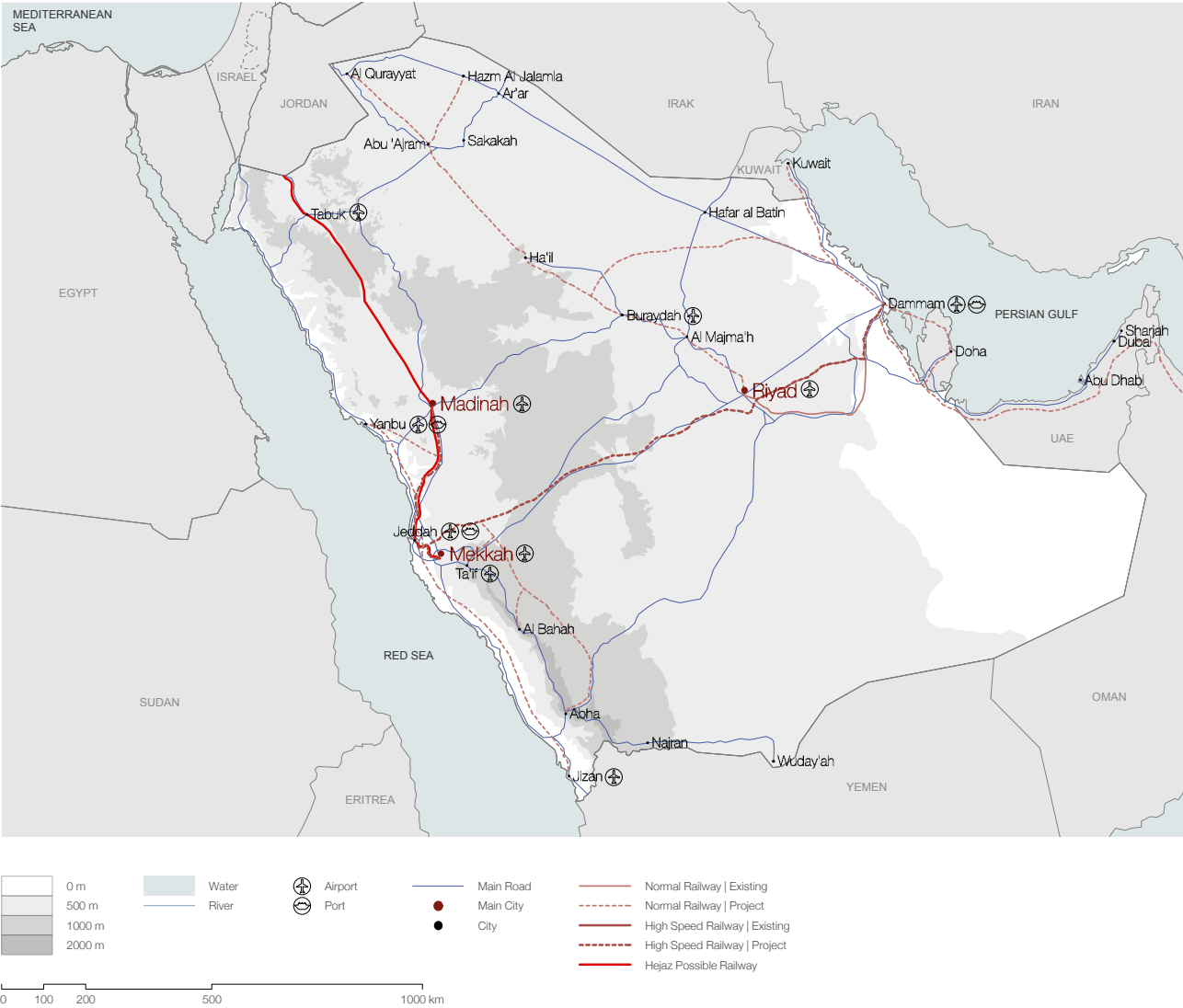
Saudi Arabia, like its neighbours, is currently restructuring its rail network and has recognized that high-speed lines were the future of transportation. Its entire network is standard gauge which, when Jordan will upgrade its rails, would allow a connection to all the networks of the Middle East countries.

The Gulf Project shows that the countries are ready to ally for the realization of an international infrastructure. Even though the connection line to Jordan via Tabuk was cancelled, if the Hejaz Project is put on the table, Saudi Arabia would certainly rethink the abandoned project to allow a connection to the holy city from Istanbul and even from Europe.

Moreover, there are in the country private and public investors who own important funding because of the oil market. Saudi Arabia might position itself as a major investor of such international infrastructure project.

Let us not forget either that the Hejaz Project could also allow many Muslims, who can not afford to fly, to finally perform Hajj. This brings a whole new social and cultural dimension to this large-scale infrastructure project. This is a social but also political and economic argument because it would show all the

solidarity that a country like Saudi Arabia can demonstrate for the Muslim community around the world.



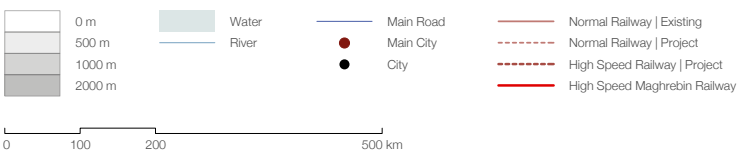
The Arab Maghreb Union (AMU) is an economic and political organization with five member countries: Algeria, Libya, Morocco, Tunisia and Mauritania. Its head office is located in Rabat, Morocco. It was created in 1989 by advocating the evidence that these countries are all connected by their geographic situations, cultures and languages. This union is not very active on the field but we are interested in the relationship between the rail and the political union. In 1965 was the first collaboration between these countries under the organization called MRTC. The Maghreb Railway Transport Committee then grouped Algeria, Morocco and Tunisia. One year after the creation of the AMU, Libya and Mauritania joined the MRTC.

International infrastructural links can form the first agreements that can become, later on, political agreements. If we look at the European Union for example, the first agreement at the beginning concerned the European Coal and Steel Community (ECSC) between Germany, France and England. This economic and infrastructural agreement led, 50 years later, to the creation of the European Union as we know it today. AMU wants to promote free trade between its member countries. It is why in 2004, during one of their summits, they updated the MRTC with new objectives to ensure a smoother exchange by the railway tracks.

All this demonstrates that a project such as the Hejaz Railway Project could also strengthen

the political relations between the countries of the Middle East who would benefit from it and increase the organizational force that gathers them like the Arab League and the Arab Cooperation Council. We will now analyse the different tasks and objectives of the MRTC to understand what impact such organization can have on a territory like the Maghreb.

The MRTC handles, initially, the process and studies of all issues of common interest. It acts as a mediator between the different countries. It is then responsible for coordinating and even initiating improvements of each country's railways and ensures their proper connections. Its latest work was the development of an international infrastructure project: The Maghreb High Speed Train (TGVM) linking Casablanca in Morocco and Tripoli, in Libya. This line would only connect the largest urban centres in each country: Rabat, Casablanca, Fes, Meknes and Oujda in Morocco, Algiers, Annaba, Oran, Constantine and Setif in Algeria, Tunis and Sfax in Tunisia and Tripoli in Libya. There are currently connected tracks from Casablanca to Sfax but no journey is currently in service to ensure this international trip. To make such a journey today, many connections with conventional trains are needed. Casablanca-Algiers journey takes 24 hours with changing of trains and companies. When TGVM will be finished, that travel time will be reduced to only 6 hours. The Algiers-Tunis trip, that demand today 16 hours, will



NORTH AFRICA | MAGHREB

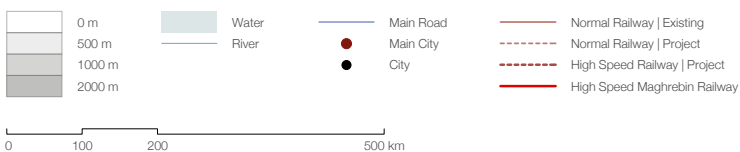
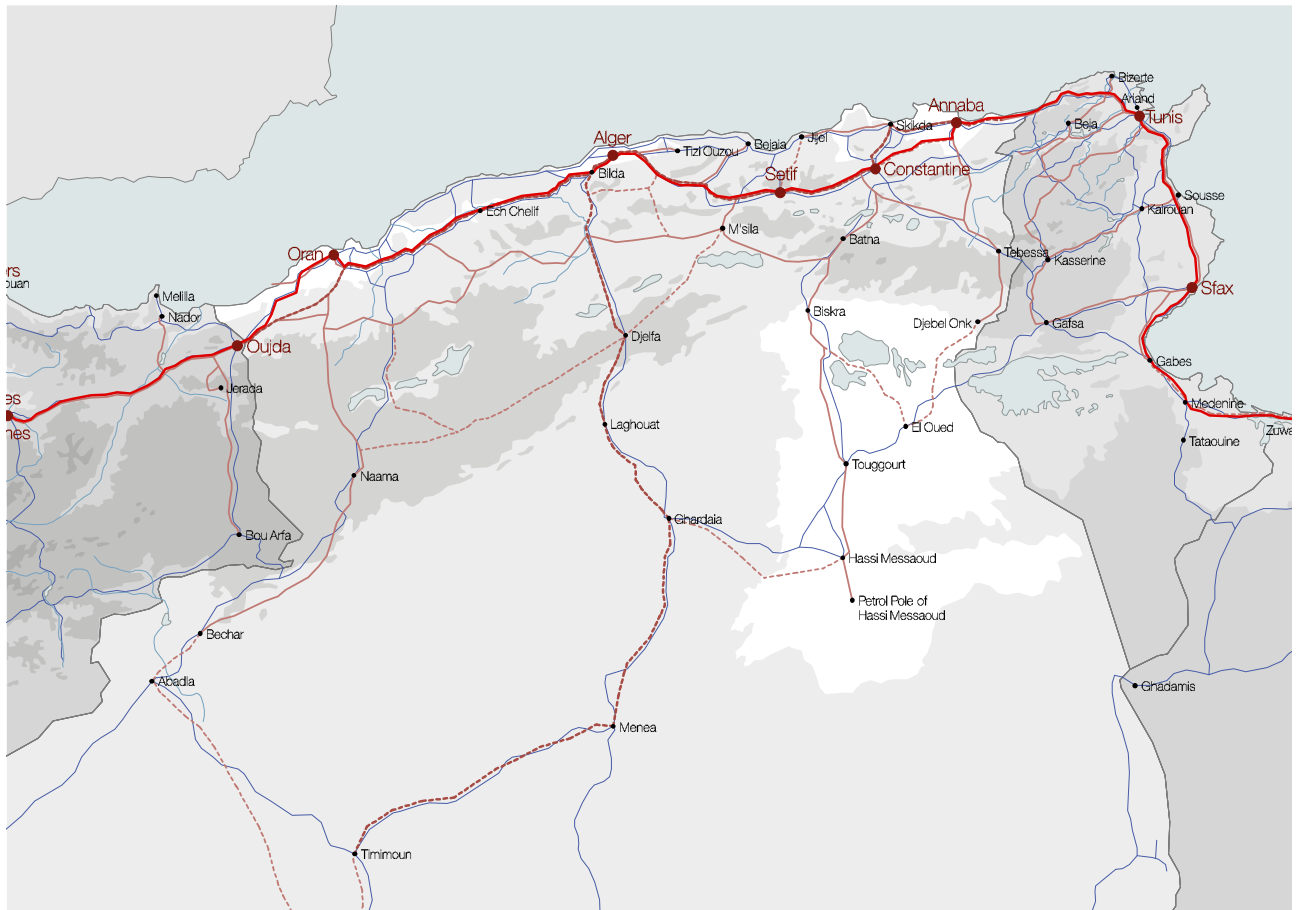
be done in just 4 hours and Tunis-Tripoli trip, which is currently not possible, will be done in just 5 hours.

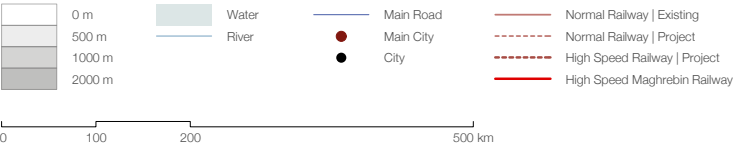
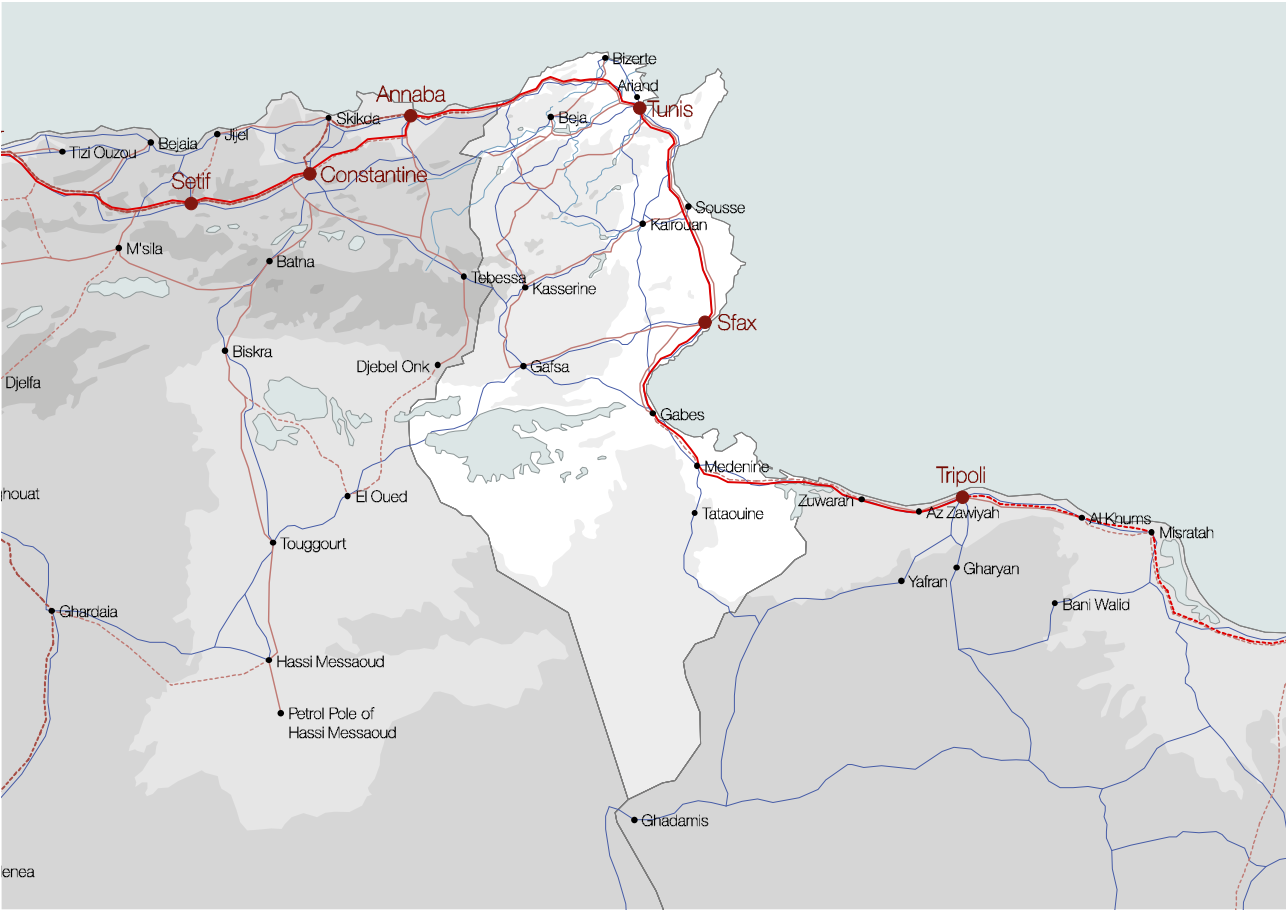
Thanks to the synergies created by MRTC, all the rails of Morocco, Tunisia and Algeria have a standard gauge of 1435mm. This ensures continuity between these lines in a much simpler way. However Libya has, like Jordan, a narrow gauge of 1050mm. This means that the entire Libyan network will be restructured for the hosting of the TGVM.

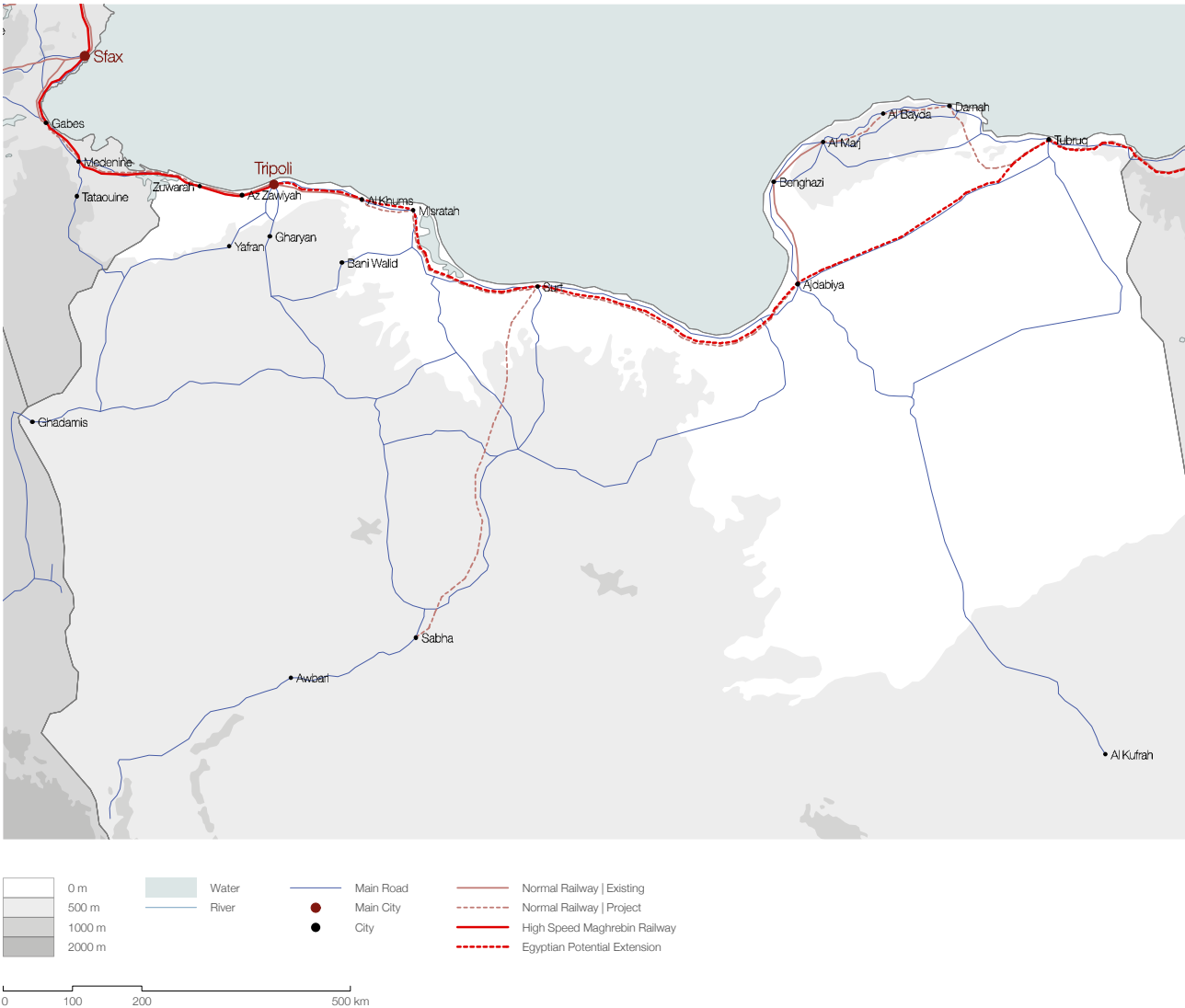
As we can see from the various maps that follow, the entire territory covered by the TGVM undergoes no interruption. The fact that the whole line is on the coast and bypasses the mountains, allow the feasibility of such a project. If important works as large bridges and tunnels had been requested, its likely that the project would never been continued. The cost of such mega structures would have a more substantial impact.

Another highlight of TGVM is in the Moroccan network projects. They have a network with the latest technology and constantly invest in their railway sector. If the headquarter of the MRTC is in Rabat, it is because they are the main managers of the project. In their national network, they are building the first African high-speed line between Marrakech and Tangiers. This line could allow a connection to Europe through Spain. Casablanca, Rabat

and Kenitra being at the same time on the Moroccan high-speed line and the TGVM, means that the entire North African project could also be connected to Europe.







Egypt has a rail system mainly developed around the Nile. The country has a West-East axis along the coast, and a North-South axis along the famous river.

In March 2014, the Egyptian government confirmed the return of the high-speed project, which would follow the Nile. The first part is under study and would connect Alexandria to Giza. The study shows that the project would need three years to be achieved and would cost nearly \$ 10 billion. The state plans to sell shares of the project to pay parts of the infrastructure.

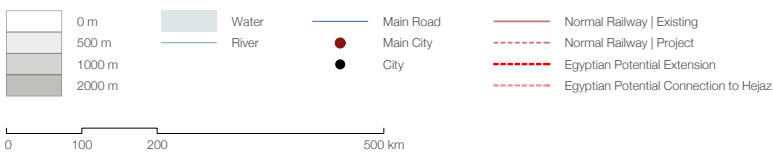
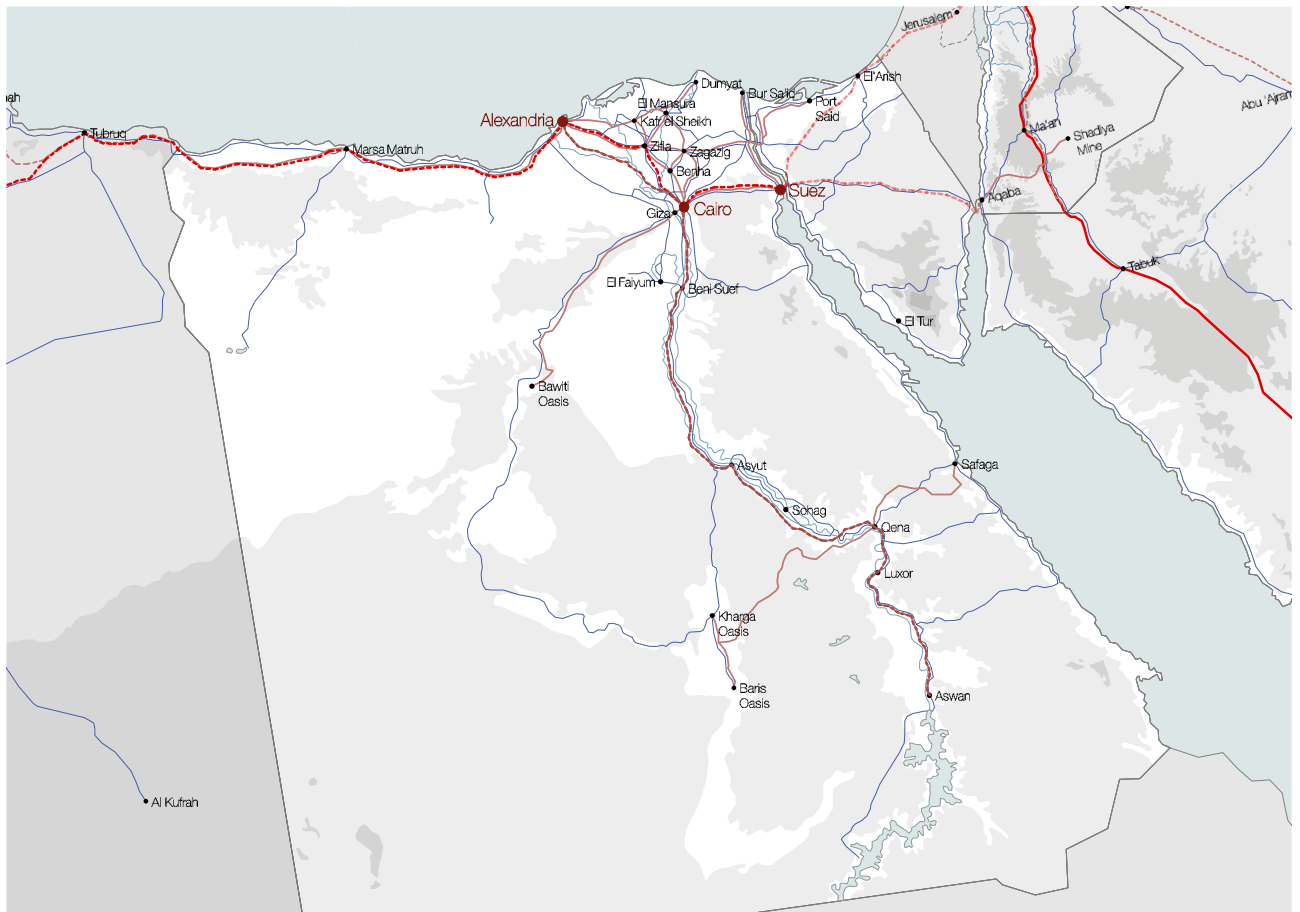
This project shows that the railway network is making space for the high-speed line. Even though there are no serious talks about it, one could easily imagine that, if projects like the Hejaz and the TGVM would exist, Egypt would want to participate. Already having a connection with Libya, Egypt could make the ultimate connection between the Maghreb and the Middle East networks.

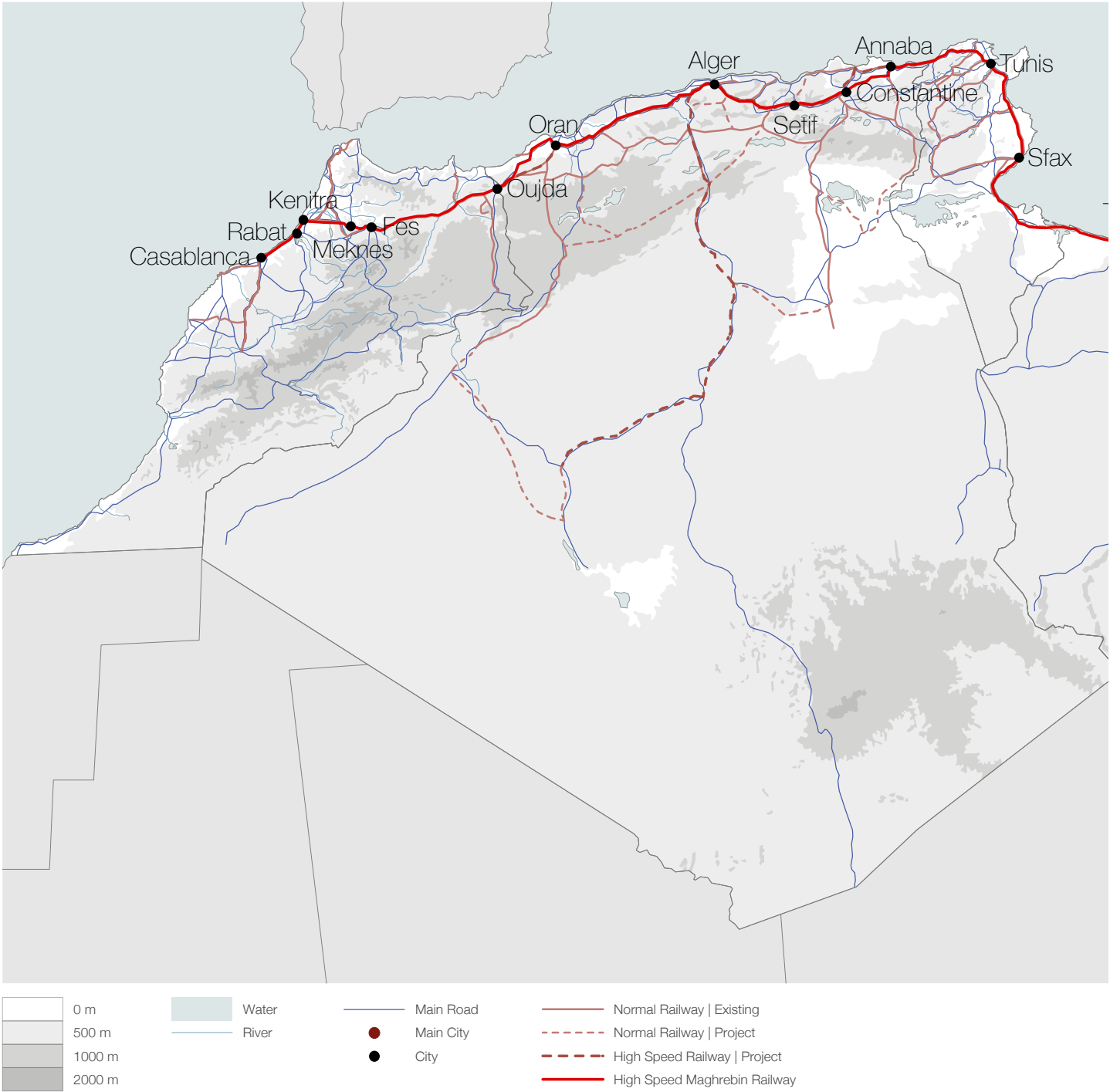
If this perspective sees the light, we would have a complete Arab network, which is connected to Europe at both ends: Tangiers and Istanbul.

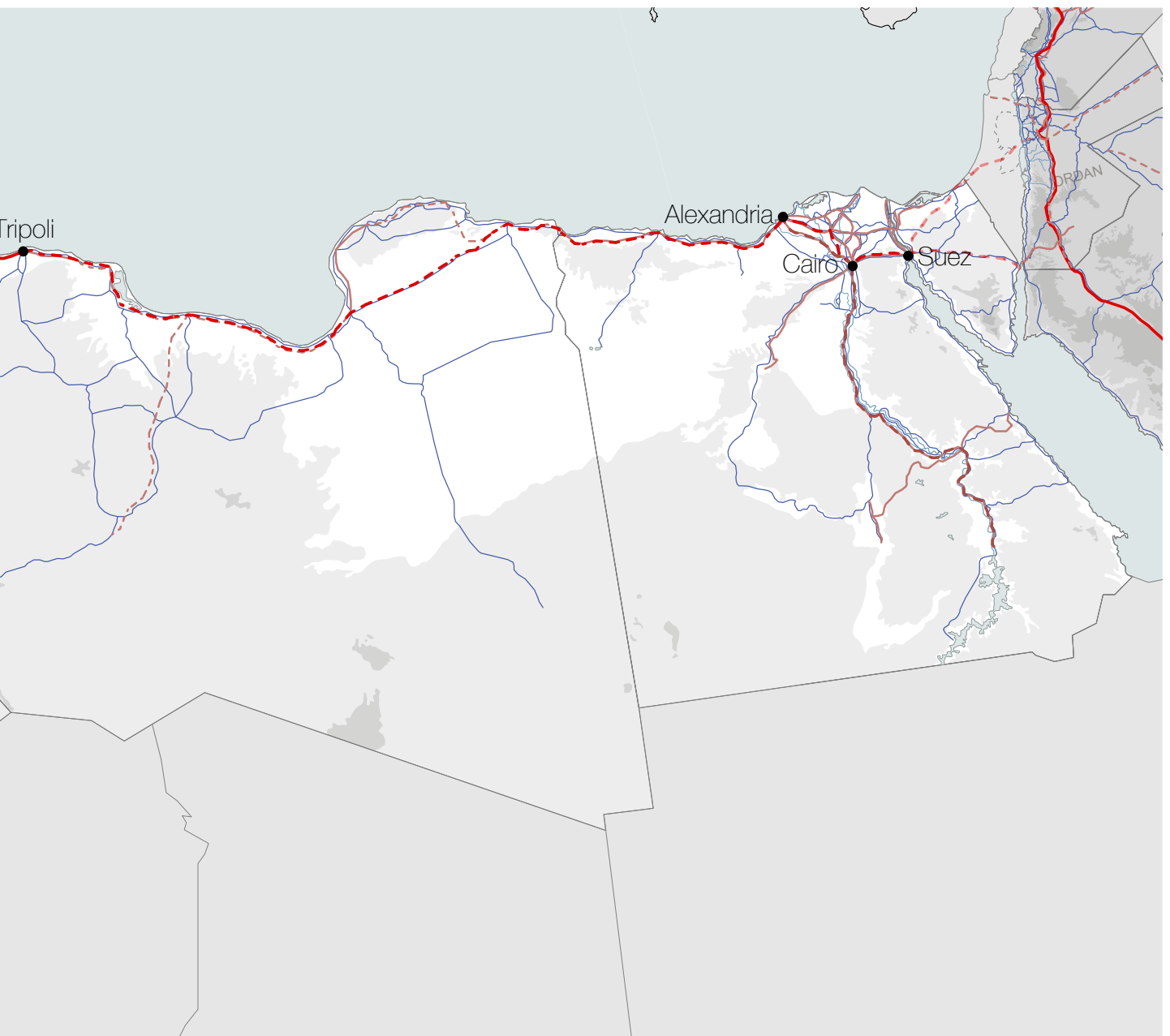
This mega-network would see its connection inevitably in Jordan because it is geographically the crossroads between Africa and Asia. Such a plan would request an agreement with Israel since it is located between Egypt and Jordan. Even if this agreement is hard to imagine today, it must be pointed out that in addition to Jordan, Egypt also has a peace treaty with Israel. Therefore Egypt appears as an important negotiator. A right of way could

allow the line departing from Casablanca, to go through Cairo and then continue through Jerusalem to reach the Hejaz in Amman. A second possibility would be to Build a gigantic bridge at the tip the Red Sea and therefor pass from Egypt to Jordan bypassing Israel. Cairo would be in this case connected to Aqaba and its connection to the Hejaz would be in Ma'an.

This Egyptian high-speed line is for now just a figment of our imagination. But the study we did on the willingness of Turkey to undertake a project like the Hejaz railway, which is supported by the Saudi, Jordanian and Syrian government (before the start of civil war) and the construction of a project as the MRTC's TGVM, demonstrates the infatuation that emerging countries have for high speed railway structures. Even though this Egyptian project is one of our creations, it will inevitably be done if the other two projects got built.







SOCIAL LAYER

We have seen in the earlier parts of the study that the Hejaz line would be profitable on several levels: national and international

On the national level this line would connect hubs of economic importance in each country. For example, a connection between Amman and Aqaba in Jordan would allow economic development in terms of goods and people movement, such a link could allow people living in the capital to work in the port of the country.

Internationally, the Hejaz line would produce a dynamic urban area linking the countries participating in this line. This new network would have greater power at the international economy level and could give this region an economic and even political credibility, if trade is developed into political agreements.

However, we must balance our analysis because such a project cannot be realized unless in times of peace, and the current situation in the Middle East is far from stable.

Peace in Syria is critical for the course of the line. However, the situation in Syria is critical, the civil war is growing in the country. Relations with Turkey were never as bad: Turkey has supported the popular movements that took place, which cut all relations with the current regime in Syria.

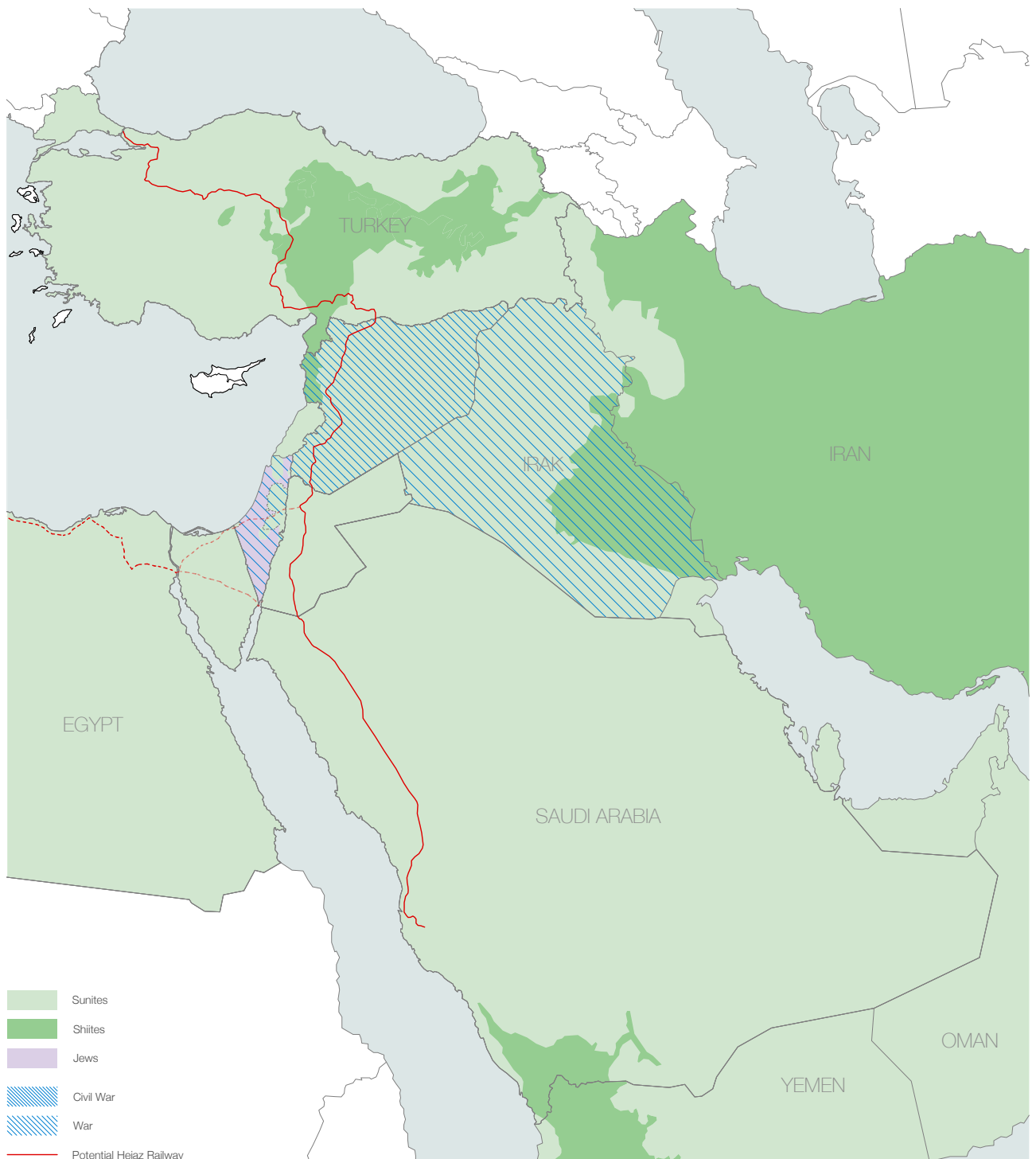
Meanwhile, Jordan remained neutral about what happened in Syria. The country chose a policy of dialogue. The country hosted the Syrian refugees and maintained its relations with Bachar Al Assad regime. Despite an

exemplary stability, the country faces other problems. The peace agreements with Israel had always been perceived, by the people, as a betrayal, which makes the connection with Jerusalem hardly conceivable.

Egypt suffered the same problem, the people never accepted the peace agreements with Israel, and Cairo-Jerusalem connection is very difficult to consider today. Like Syria, Egypt had experienced popular movements in 2011, but with less dramatic consequences. There had been changes but they were far from meeting the people's will and the social situation is still very unstable in this country.

The war launched by George W. Bush, had not been the engine of a democratization of Iraq nor an international order securitization. On the contrary, the US military action created chaos in the country. The democratic transition had not taken place and a civil war started. Religious tensions reached their peaks between Sunni and Shiite Muslims. Future nationwide plans are not possible at the moment.

The Israeli-Palestinian conflict had always been the source of instability in the Middle East. This conflict spread often beyond its border and did not leave indifferent all the region's peoples. They felt very concerned by this problem and had shown great solidarity with the Palestinians. Israel's policy in the region had never been a policy of peace. The planning of International projects in the area was always perceived by Israel as a threat, which made it an even more difficult task.



CONCLUSION

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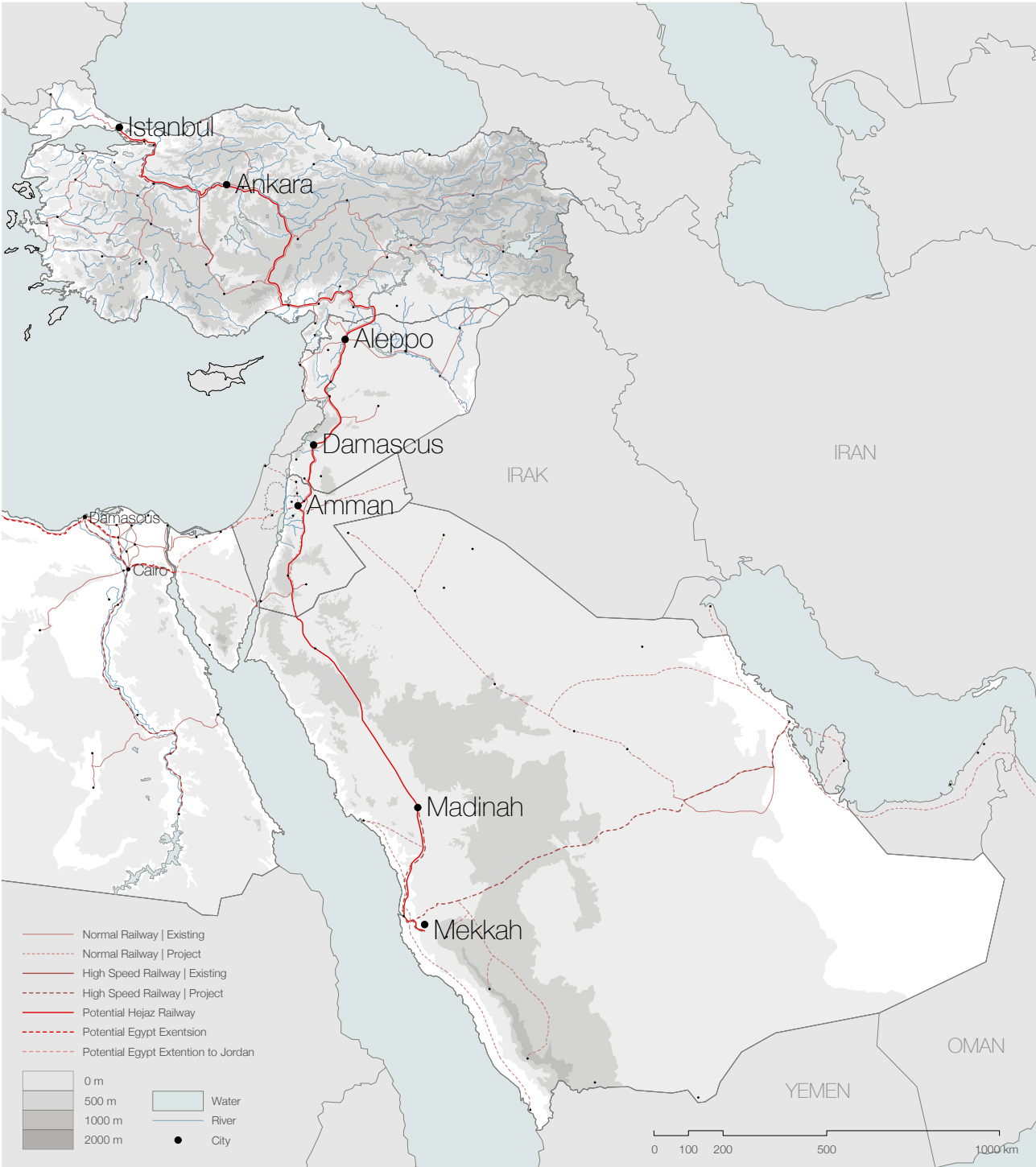
The Middle East is a region with major paradoxes. In fact, it has a common language, history and religion while it appears as disunited in terms of international policy. This fragmentation is due to its abundant resources that have made it a prey to foreign powers. And yet, less than a century ago, when the area was gathered under the Ottoman rule, it was possible to build large infrastructure projects such as the Hejaz Railway. This project has allowed, back then, a strong regional cohesion, an economic growth and a revolution of travel in the region.

Since then, the train evolved considerably, and despite the competition of new means of transport, it is still the most appropriate infrastructure for this region. Indeed, because of its geographic properties (a succession of long desert tablelands) and the presence of existent network fragments, a high-speed line establishment is facilitated. Moreover, it meets the economic, ecological and time-distance ratio demands of the present society standards. The construction of such a network has the potential to, one day, become a hub connecting Europe, Africa and Asia.

Over time, the railway projects have not always been purely infrastructural. As we saw with the Orient Express and the Bering Strait, these projects have a symbolic and federative dimension that one cannot deny.

In the Middle East case, the connections between the different Peoples and countries already exist on the metaphysical form of the language, the patterns of living and the religion. A revival of the Hejaz line would be a natural crystallization of these strong cultural ties.

It took the Turks and the rest of the Muslim world 44 years to build their most famous railway. The question remains how long will it take the Arabs to agree on doing the same?



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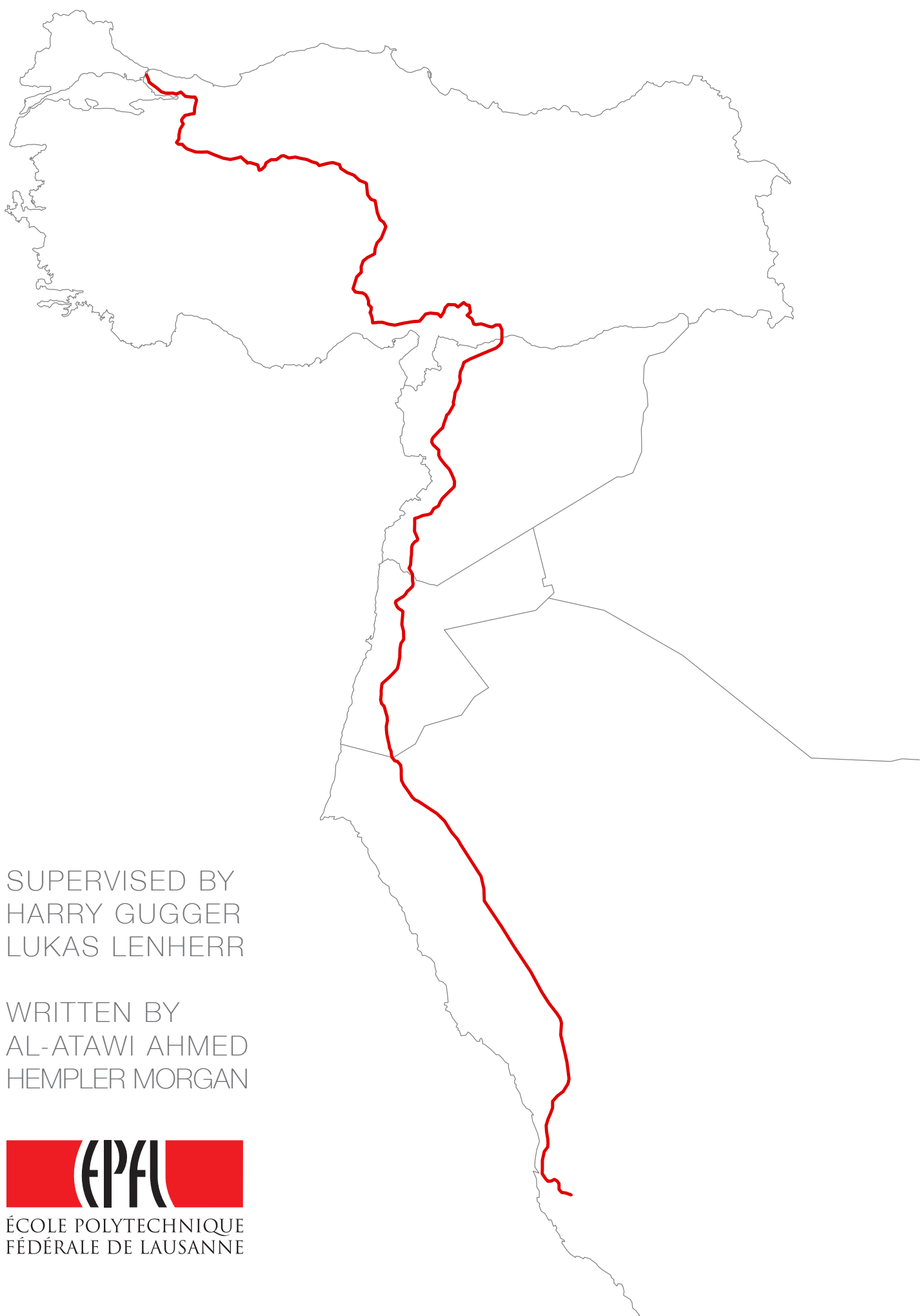
III | SOCIAL LAYER

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Map :

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ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE